



European Employment Observatory

EEO Review: Promoting green jobs throughout the crisis, 2013

Poland

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1. Introduction: employment in the green economy

The share of energy from renewable sources in gross final energy consumption in Poland is low, but has increased gradually, from 8.87 % in 2009, to 10.8 % in 2011 (see Table 1 in the Annex). However, it is still far behind the target set by Poland in the context of the Europe 2020 Strategy – which is 15.0 %. The aforementioned data may suggest a significant potential for green jobs creation in Poland. However, one should also consider the structure of renewable energy sources in energy production, as well as their dynamics and underlying factors.

The majority of the total renewable energy source (RES) production (Table 2) comes from **biomass** (85.57 % in 2011). As often underlined in analyses, the high share of biomass in energy production may stem from the recent investments of energy producing companies in installations, in which coal is co-incinerated with biomass, so that their owners are benefiting from green technology co-awarded certificates under the current system of support for renewable energy¹. Available sources indicated 22 biomass manufacturing enterprises in 2010² and 24 biomass power plants in 2012³ (Table 5). According to estimates the number of direct and indirect jobs in biomass production amounted to 7 500 in 2010 (Table 3).⁴

Wind energy production is also gaining momentum in Poland (its share in total RES production increased from 1.53 % in 2009, to 3.55 % in 2011). Available sources indicate 42 wind energy manufacturing enterprises in 2010⁵, and 663 wind power plants in 2012⁶ (Table 5). According to estimates the number of direct and indirect jobs in wind energy production amounted to 7 000 in 2010 – a sharp increase from 4 000 in 2009 (Table 3).⁷

The potential for job creation in Poland can also be connected to **biofuel** and **biogas** production. Biofuel constitutes a substantial share of total RES production (5.54 %) and job creation (9 600 jobs in 2010⁸). Biogas constituted 1.76 % in 2011 and contributed to 1 000 jobs⁹, but it shows significant growth potential – especially in terms of the development of agricultural biogas plants. According to the Office of Energy Regulation, there were 193 biogas plants operating in 2012 in Poland.

The next essential element of potential RES in Poland are **hydropower plants**, the functioning of which is also subject to a system of green certificates. According to the Office of Energy Regulation, 765 hydropower plants were functioning in Poland in 2012. The share of hydropower in total RES production, in 2011, amounted to 2.58 %.

¹ *Renewable energy in Poland in 2012.*

² *Analysis of the development of production equipment for renewable energy projects in Poland for domestic needs and export*, Institute for Renewable Energy, Warsaw 2010, p. 153.

³ *Amount of RES installations in Poland*, Office of Energy Regulation.

⁴ *The State of Renewable Energies in Europe*, 11st EurObserv'ER Report, January 2012.

⁵ *Analysis of the development...*, op. cit., p. 153.

⁶ *Amount of RES installations...*

⁷ *The State of Renewable Energies in Europe*, op. cit.

⁸ *The State of Renewable Energies in Europe*, op. cit.

⁹ *Ibidem.*

2. Selection of green employment promotion strategies and programmes with low-carbon / environmental objectives or activities

At the **national level** a number of strategic documents include measures aimed at increasing the potential for creating green jobs. Some of the documents refer to the creation of green jobs in general terms, without clear or detailed policies. For example, the **National Development Strategy for years 2007-2015** (under Priority 3: Employment growth and rising its quality) underlines that to achieve truly sustainable growth, it is necessary to focus on policies promoting employment in pro-environmental areas of the economy.

In the analysed period, two strategic documents directly focused on employment have to be mentioned:

- **National Employment Strategy for the years 2007-2013;**
- **National Action Plan for employment for years 2012-2014.**

Tasks directly related to the creation of green jobs can be found in both of these strategic documents. These will be further analysed in the following section of this analysis. Additionally, some national level developments of RES policies have to be mentioned as they can influence the potential for green job creation. Two outstanding documents can be enumerated:

- *New draft law on renewable energy sources* (last draft from October 2012) – changes in the support system for the creation of RES installations;
- *Directions of the development of agricultural biogas plants in Poland in the years 2010-2020*, from the Ministry of Economy.

At the **regional level** the need to invest in green jobs is highlighted in both **Regional Employment Action Plans** as well as **Regional Operational Programmes**.

Each year, each of the 16 province labour offices are obligated to create a **Regional Employment Action Plan**. During the period 2009 to 2012, 5 out of 16 offices included projects related to promoting employment in green economy, in their regional employment action plans:

- Podlaskie - *Partnership for the development and promotion of green jobs;*
- Lubuskie - *Renewable energy sources as an opportunity in the labour market;*
- Dolnośląskie - *Unemployed for water management and flood protection;*
- Małopolskie - *Green jobs;*
- Mazowieckie province labour office - *Protect our forests.*

Other labour offices can support the creation of new jobs in the green economy under the basic scope of active labour market policy measures. For example, they can support the start-up of businesses in the area of green economy or subsidise the employment in companies reporting a need for extra staff in these sectors of economy. However, these are not the measures targeted directly at the creation of green jobs.

All of the 16 **Regional Operational Programmes**¹⁰ include measures in the area of RES support that may indirectly influence the creation of green jobs. Under these measures, a number of EU co-financed projects can be implemented (for a detailed description see Table 6 in the Annex). As examples of the measures implemented under these action plans, some of the projects have been selected and described in brief in the next section.

3. Detailed description of practices

National Employment Strategy for the years 2007-2013 (under Priority 1: Support for the creation of new jobs through entrepreneurship and innovation) includes two tasks which highlight the need to invest in the green economy including its promotion as a new area of employment:

- Task 3.4: Ecological activities as a new area of employment;
- Task 3.5: Creating conditions for the development of capital-and labour-intensive industries.

Task 3.4 underlines the importance of ecological products as a source of competitive advantage, as well as the entrepreneurship developmental factor. It underlines the importance of industries such as environmental protection, alternative energy sources, recycling and waste segregation, as a vital segment of the services sector. Thus it is stated that the emphasis should be placed on areas that will create new jobs, and at the same time contribute to the achievement of environmental policy objectives, such as:

- greater use of renewable energy;
- effective waste management and the recovery of raw materials;
- revitalisation of industrial areas.

Further, Task 3.5 underlines the importance of the service sector in the creation of new jobs. Thus the need to support the development of segments related to environmental protection, in particular technologies for acquiring alternative energy, recycling and waste management, has been underlined.

In the *National Action Plan for employment for the years 2012-2014* (under Priority 1: Adaptive labour market; Activity 3: Support for the creation of new and better jobs, especially in sectors with high growth potential), three tasks (Task 3.7: Investment in enterprises investing in new technologies; Task 3.8: Support for investment in innovation of high importance for the economy; and, Task 3.9: Support for innovation centres [technology parks]) put emphasis on the necessity of support for employment in the green economy. All of the actions under these tasks envisage both the creation of new jobs (Task 3.7: 10 900 new jobs; Task 3.8: 14 550 jobs; Task 3.9: 2 120 jobs), as well as savings in energy (Task 3.7: 389 GWh/year; Task 3.8: 3 612 MWh/year, no data provided for Task 3.9) and water consumption (Task 3.7: 71 million m³/year; Task 3.8: 2 400 m³/year, no data provided for Task 3.9).

In December 2011, the Ministry of Economy presented the *new Draft Law on renewable energy sources*. The Draft was modified in July 2012 and again in October of that year. All four published drafts include proposals for significant changes in the renewable energy

¹⁰ As based on the analysis of the National Action Plan for RES, Ministry of Economy, Warsaw 2010.

support system. When analysing the current Draft Law on RES (form 9 October 2012), in connection with the draft act introducing the RES Law (i.e. the act enforcing the Energy Law, the Gas Law and the RES Law), some issues are essential for the viability and profitability of RES, for example: no indexation of substitution fee; limitation of the support system duration; reduction of certificates amount awarded per 1 Mega Watt Hour (MWh) for wind farms; implementation of the maximum sale price of electricity from RES; ineffective mechanism to prevent the oversupply of certificates; and, changes in regulations for existing RES installations).¹¹ As stated in the aforementioned report by PwC, these changes might have a significant negative impact on the financial security and profitability of existing RES installations and the cost of planned investments in the industry.

The document entitled *Directions of the development of agricultural biogas plants in Poland in the years 2010-2020* by the Ministry of Economy (in cooperation with the Ministry of Agriculture) characterised the legal changes which should be implemented in the Polish legal system to optimise the process of building biogas plants, thus creating the optimal conditions for the development of agricultural biogas installations. The document also indicates the possibility of public financing of this type of installations (both existing budgetary instruments and EU funds). In relation to green jobs, the document underlines the so-called 'local value added' chains in relation to the activation of rural areas, resulting in the increase of employment in local communities and the business sector related to agriculture and renewable energy.

In the scope of **Regional Employment Action Plans** the regional labour offices implemented five projects in the area of green jobs creation in the analysed period.

Partnership for the development and promotion of green jobs is a project implemented by the Labour Office in Białystok (Podlaskie Province). It is a systematic project developed under the Human Capital Operational Programme (Priority VI: Labour market open to all, Measure 6.1: Improving access to employment and supporting economic activity in the region; Sub-measure 6.1.1: Support for the unemployed in the regional labour market). The project is in its implementation phase and will run from 1 May 2011 until 3 April 2013. The budget of the project is PLN 1 838 000 (around EUR 448 000). The main objective of the project is to create conditions for the development of economic activity within the green workplace through the development of public-private partnerships and cooperation in the social development of green jobs in the region. It will be achieved through:

- gaining experience and knowledge of best practices in the field of green jobs through transnational partnerships (with institutions from the UK - Impact Housing Association - and Spain - Fundación Parque Científico y Tecnológico de Extremadura);
- the creation of regional public-private partnerships for human resource development within the green jobs;
- improving skills and increasing awareness within the green jobs in the region of Podlasie.

The project supported the creation of the network of 'green jobs advisors' (30 people in the region – 2 per municipality [poviat]), who have been extensively trained in the course of

¹¹ *Analysis of the impact of proposed changes in the system of support for wind energy in Poland*, PwC October 2012.

internal trainings. As a result, the green jobs advisors have a general knowledge of green technologies, as well as industries related to green jobs, enabling the implementation of counselling in areas, such as: choosing the right profession; choosing a place of employment; or, changing work within green jobs. The target audience of the project includes the stakeholders engaged in the development of human resources and the promotion of social dialogue at regional and local levels. This partnership is formed by the representatives of the Government, non-governmental organisations (NGOs) and trade unions. This approach has been designed to address the identified problem of the lack of cooperation and coordination of actions between institutions involved in the green job market. PES employees have also been engaged in the project. Employees with experience in career guidance (including guidance counsellors and career specialists) were particularly encouraged to join the project, in order to form the backbone of 'green jobs advisors'. The project envisaged the participation of 150 jobseekers (including those registered as unemployed), in particular, those under 25 years, over 45 years and unemployed living in rural communities.

Renewable energy sources as an opportunity in the labour market is a systematic project in the Lubuskie Province, financed from the Human Capital Operational Programme (Priority VI: Labour market open to all, Measure 6.1: Improving access to employment and support economic activity in the region, Sub-measure 6.1.1: Support for the unemployed in the regional labour market). The project was implemented by Hemibau Ltd. Company. It is addressed to the unemployed and jobseekers from the Lubuskie Province and its main objective is to raise the level of economic activity and employability of 32 currently unemployed people. Their professional chances are to be increased through participation in comprehensive training in the field of renewable energy installations, as well as psychological and counselling support offered to people entering and re-entering the labour market. Trainings in the installation of photovoltaic systems, heat pumps, solar collectors and integrated systems are offered to the unemployed. The training programmes include health and safety training, energy permissions up to 1 kilovolt (kV), theoretical and practical training in RES installations, as well as job search workshops and individual counselling.

Unemployed for water management and flood protection is a project implemented by the Labour Office in Lower Silesia, with the Lower Silesia Board of Amelioration and Water. The objective is to support the activation of the unemployed, who are in a particularly difficult situation on the labour market. The activities cover the participation in public works and intervention works organised to perform maintenance and cleaning of rivers and canals, levees and drainage ditches to improve flood safety. During the course of the project (IV-XI 2011) the programme covered 440 unemployed registered in the local labour offices. The expected results of the project were the improvement of flood safety in Lower Silesia, as well as the training of unemployed individuals covered by the programme.

The '**Green jobs**' project was implemented by the Malopolska System Board of Amelioration and Water, in Krakow, for the period 1 September 2008 to 31 October 2013, as a systematic project in the framework of the Human Capital Operational Programme (Sub-measure 6.1.1.). The budget of the project is PLN 3 763 126 (around EUR 918 000). The project aim is the professional activation of the unemployed by raising or changing their educational and professional qualifications in order for them to acquire skills which are important to access and maintain employment. The project provides support for 228 unemployed people, including long-term unemployed and inactive people, through employment under a work

contract, individual and group counselling, as well as training and vocational courses. In 2012, 48 work contracts with the unemployed were signed. Through the maintenance of drainage facilities, the participants acquire practical professional skills. The participants also participated in individual and group career counselling and vocational training courses.

The District Labour Office in Makow Mazowiecki is implementing the programme 'Protecting our forests'. The aim of the programme is to support the activation of the unemployed and job creation based on natural resources and the geographic region, as well as the strengthening of the idea of regionalism through the organisation of public works. The project will result in forest preservation as part of the natural landscape.

A number of RES and green jobs related projects have been undertaken under the Regional Operational Programmes, co-financed mainly by the European Regional Development Fund. Examples of such projects include:

- 1. Renewable Energy Sources - an innovative concept of training future personnel in Bielsko – Biala.**¹² The Centre for Continuous and Practical Learning (Bielskie Centrum Kształcenia Ustawicznego i Praktycznego) in Bielsko-Biala prepared a practical learning programme, in which participants were oriented towards a prospective career in the renewable energy sector. The programme covered issues, including: familiarising participants with the rules and patterns of renewable energy systems; installing a simple solar energy system; the measurement of important parameters of these systems; fuel cell power and determination of the primary indicators; and, performance of photovoltaic installations, including the selection of appropriate electrical equipment and measuring relevant parameters. In the first year of training in Bielsko - Biala a group of 75 students were taught in the occupations of electrical technicians, electronics technicians and electronics assemblers.
- 2. The utilisation of ashes in Zakłady Azotowe w Tarnowie S.A - systematic project.**¹³ The cost of the project amounted to PLN 15.8 million (EUR 3.85 million) with the EU co-financing PLN 4.58 million (EUR 1.2 million). The project was implemented in September 2010 and focused on the building of a new ash transportation and storage system. Five people were subsequently employed.
- 3. Reconstruction of the heat source in Opole - the construction of the high-efficiency cogeneration - systematic project.**¹⁴ This project was implemented by Energetyka Ciepłna Opolszczyzny S.A., at a cost of PLN 81.5 million (EUR 19.9 million), of which, the EU co-financed PLN 23.2 million (EUR 5.65 million). It involved the construction of a new power unit consisting of a steam boiler, pulverised coal-fired steam turbines and backpressure. The system generates combined heat and power. During its implementation the project created employment for over 200 people.

¹² See Internet (<http://www.dobrepraktyki.pl/index.php?p1=1&p2=3&art=110>) 18/01/13

¹³ Green grants for business-presentation of good practices, NFOŚiGW, Warsaw 2011, pp. 31.

¹⁴ Profit energy. The effect of environment-presentation of good practices, NFOŚiGW Warsaw 2012, pp.11,

4. **Construction of an agricultural biogas plant with a capacity of 1.36 MW of electricity Melno - A cogeneration power plant.**¹⁵ The cost of this project amounted to PLN 26.6 million (EUR 6.48 million), with the EU co-financing PLN 15.2 million (EUR 3.7 million). The project involves the construction of agricultural biogas and a cogeneration power plant with a capacity of 1.36 MW of electricity and 1.54 MW of thermal power, supplied with substrates produced biogas plant origin.
5. **Construction of biogas plants in Naclaw, Świelin and Uniechówek - sources of high-efficiency cogeneration.**¹⁶ This project consisted of the construction of three complete installations of biogas plants based on anaerobic digestion in the province Pomerania (District Człuchow) and West Pomerania (District Koszalin), producing electricity and heat in cogeneration.
6. **Solar roofs for community Dzierzgoń.**¹⁷ Under this project, 327 solar collectors have been installed with a total area of 1 586.44 square meters. The programme was addressed to individual farms and solar collectors installed in single-family houses. The total value of the project amounts to PLN 2.8 million (EUR 670 058). It has been co-funded PLN 1.6 million (EUR 382 937) by the Norwegian Financial Mechanism, the municipality's own funds and contributions from individual members.

Some other initiatives that promote employment in the green economy in Poland should also be mentioned. One of such initiatives is the ‘Vistula River Renewable Energy Cluster’ (**Nadwiślański klaster energii odnawialnej**)¹⁸. The cluster was founded in 2009, with the help of Kwidzyn Industry and Technology Park. The partners in the cluster include two departments of local government (the Kwidzyn County Office and the Office of Malbork), NGOs (Powiśle Local Action Group and the Association of Eco-Initiative), educational institutions (Baltic Eco-Energy Cluster, Centre for Renewable Energy UWM in Olsztyn and GreenerG), as well as companies from renewable energy and energy conservation. To date actions taken by the cluster include active promotion of the activities of its members as well as organisation of professional specialised training on domestic and international renewable energy sources. It also carried out consultancy and advisory activities with scientific experts from northern Poland. In addition, small and medium-sized enterprises with the help of a cluster can count on support with applying for grant funding.

Similarly the **Baltic Eco-Energy Cluster (BEEC)**¹⁹ was created as a joint initiative between the Institute of Fluid-Flow Machinery; Polish Academy of Sciences; University of Warmia and Mazury; Gdansk University of Technology; Technical University; Marshals and Local Government; the Pomeranian Province of Warmia and Mazury; and businesses and associations from Pomerania, Warmia and Mazury. The cluster operates in northern Poland, in the Pomerania and West Pomerania regions. The specific objective of the cluster can be

¹⁵ Ibidem, pp. 15.

¹⁶ Ibidem, pp. 17.

¹⁷ See Internet (<http://www.dobrepraktyki.pl/index.php?p1=4&p2=17&art=324>) 18/01/13

¹⁸ Diagnosis of enterprises in the sector of renewable energy sources and the institutions that support the development of the renewable energy sector established in the provinces of Pomerania and Kujawsko-Pomorskie, Gorki 2012, pp. 84.

¹⁹ Ibidem, pp. 84-86.

regarded as the introduction of the idea of distributed generation, the simultaneous production of heat and electricity in a small and medium scale, based on renewable energy sources, and in particular biomass and hydro, solar and wind power. The main objective is to increase the scale of the use of biomass for energy production, to develop energy plantations in rural areas, to reduce environmental pollution by creating biogas, to produce manure and to encourage environmental awareness.

Gdansk Shipyard is an example of how to use the growth of the wind energy market (Forowicz, 2011). In mid-November 2010, the shipyard launched the first line of producing wind towers, producing 100 towers per year. From 2012 the factory will be able to produce 200 towers a year. After the implementation of all investments (their value is estimated at PLN 300 million [EUR 71.9 million 718 560]) the number of jobs will increase to about 250-300 employees.

4. Conclusion

As noted in a recent study by the OECD (Miranda, et al., 2011), there is no official definition of green jobs in Poland. Some attempts to define the term have been undertaken by non-governmental organisations.²⁰ However, due to their unofficial character, it is hard to retrieve the data on employment in the green economy, itself. Thus one can assess the phenomenon on the basis of (often imprecise) estimates, or look at the indirect data regarding energy production and consumption. Another challenge stems from the direct and indirect character of RES job creation – in terms of production and service of RES installations.²¹

The issue of developing a low carbon economy, including the creation of green jobs, has been discussed in a number of recent studies. In the framework of sustainable development of Poland some areas of the economy are regarded as crucial in the future (National Research and Development Centre, 2005), such as: the fight against climate change; protection of biodiversity; green economy, ecology and environmental protection technologies; renewable energy sources and use of energy resources; raw materials; biotechnology and nanotechnology; production of biomass and biofuels on farms, production of high quality organic food; agriculture, food processing in compliance with environmental standards; fishing and aquaculture; protection of forests; and, construction, shipbuilding, and production of 'green' components (for example, wind turbines).

As the recent study by the OECD (2011) shows, the key success factors at the national level are:

²⁰ As noted in OECD study (Miranda, et al., op. cit., p. 19), 'the Institute for Sustainable Development (Instytut na rzecz Ekorozwoju), defined **green jobs as**: *Jobs resulted of capital and non-capital investment undertakings which ease the pressure from the economy and public utilities on environment. Green jobs can be created in each economic sector, the condition being that the workers should be directly or indirectly involved in the improvement of the environment in a given area and operating against the environmentally harmful activities both in the short and the long run*'.

²¹ As for example stated in the analysis of Institute for Renewable Energy (*Analysis of the development of production equipment for renewable energy projects in Poland for domestic and export*, Institute for Renewable Energy, Warsaw 2010, pp. 29), the main wind power installation units and their corresponding industries are: (1) construction of towers, gondola and rotor hubs (iron and steel industry), (2) generators, transformers, control systems (electromechanical industry), (3) gears, shafts, clutches, brakes, bearings, hydraulic and pneumatic systems (machinery industry), (4) composite wings of windmills (aerospace industry), and (5) automation and control systems (manufacturers of industrial automation and electronics).

- ‘Powerful higher education institutions in the majority of regions, highly adaptable to new conditions, and ready to take on new training and educational projects in the area of green economics;
- Growing sensitivity of younger generations towards environmentally friendly life and consumerism (green labelling and standards);
- Growing interest of consumers to buy energy efficient items and equipment (e.g. reduced usage of electricity, water, and fuel);
- Growing sensitivity towards the introduction of green or sustainable public procurement at national, regional and local levels;
- High interest in wind electric power installations, both domestic and foreign (Miranda, et al., 2011).

Under current policies, as well as geographic (climate) conditions, the highest potential for green jobs creation can be attributed to **wind power plants** (onshore and offshore – both in production of components, installation, running and servicing), **biogas**, **biofuels** and (to a smaller extent) **hydropower plants**. As underlined by some sources (Gramzielone.pl, 2012), the development of wind farms in Poland has so far been based on the activity of private developers, thanks to the support of a system guaranteeing an attractive return on investment. Nevertheless, Poland has been recognised as country with a high potential in terms of wind energy production (Ernst & Young, 2012). Out of 38 countries, surveyed by Ernst & Young consultancy, Poland ranked tenth in terms of attractiveness for such investments. Onshore wind farms were identified as one of the cheapest sources of renewable energy in Poland. It is estimated that companies that are currently associated with wind power employ around 1 900 people. According to the report, by the year 2020, depending on the scenario of development, the industry producing, *inter alia*, turbine components, towers and wind farms, might generate around 28 500 jobs in total (as compared to for example, 13 000 in the production of coke and crude oil, in 2011).

Further, analyses by the Institute for Renewable Energy show that several hundred biogas projects are on course now. However, investors face a number of problems with the local community and local authorities; consequently, the implementation of biogas projects is stalled, and in some cases completely blocked.

Certain RES are currently insignificant to job creation, such as:

- photovoltaic (0.13 % in total RES production according to the Central Statistical Office; 8 manufacturing plants according to the Office of Energy Regulation; employment below 50 people according to EurObserv'ER);
- geothermal (0.16 % in total RES production according to CSO; 200 jobs according to EurObserv'ER);
- municipal waste (0.41 % and less than 50 jobs);
- heat pumps (0.29 % and 1 500 jobs).

As shown in the current state of development of the Polish **photovoltaic market**, the current system of support for renewable energy does not support the development of solar energy and

photovoltaic systems and the few that have been made so far in Poland were only created thanks to EU funding (Gramwzielone.pl, 2012).

With respect to **Poland, economy greening can potentially be treated as threatening to employment in more traditional industries**, both directly and indirectly linked to non-renewable energy sources (like coal mining, steel industry, etc.). According to Labour Force Survey (LFS) data by Eurostat, in 2011, Poland experienced an increase in employment in the mining of coal and lignite, from 157 900, in 2009, to 191 800, in 2011 (see Table 4 for details). In addition, the Polish steel industry, which employed over 25 000 people in 2011, expects some losses in the market share, as a result of rising energy prices and environmental costs (especially connected to high CO₂ production)(Polish Steel Association, 2010-2012), which may, as a result, mean cuts in employment.

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Annex. Statistical data and tables.**Table 1. Share of renewable sources in total energy production from RES in 2011 [in %]**

	2009	2010	2011
Biomass	85.77 %	85.29 %	85.57 %
Photovoltaic	0.11 %	0.12 %	0.13 %
Hydropower	3.37 %	3.65 %	2.58 %
Wind energy	1.53 %	2.08 %	3.55 %
Biogas	1.62 %	1.67 %	1.76 %
Biofuels	7.04 %	6.64 %	5.54 %
Geothermal	0.24 %	0.20 %	0.16 %
Municipal waste	0.01 %	0.04 %	0.41 %
Heat pumps	0.30 %	0.31 %	0.29 %

Source: *Energy from renewable sources in 2011*, Central Statistical Office, Warsaw 2012.

Table 2. Sectoral and total share of energy from renewable sources in final gross energy consumption in the years 2009 – 2011 [%]

Specification	2009	2010	2011
The share of energy from RES in heating and cooling	11.92	11.91	13.93
The share of energy from RES in the electricity	5.87	6.67	8.18
The share of energy from RES in the electricity	4.82	5.94	6.17
The share of energy from renewable sources in gross final energy consumption	8.87	9.39	10.8

Source: *Energy from renewable sources in 2011*, Central Statistical Office, Warsaw 2012, p. 70.

Table 3. Employment by RES sector in 2009 and 2010 in Poland [direct and indirect full-time jobs]

RES sector	2009	2010
Wind power*	4 000	7 000
Photovoltaic	<50	<50
Solar Thermal**	1 250	1 250
Small hydropower	300	300
Geothermal energy	200	200
Ground source heat pumps	1 500	1 500
Biogas	950	1 000
Biofuels	8 000	9 600
Renewable municipal waste	<50	<50
Solid biomass	7 000	7 500
Total	23 300	28 450

*75 % manufacturing; 10 % installations; 15 % operation and maintenance

** 30 % manufacturing; 45 % installation; 25 % operation and maintenance

Source: *The State of Renewable Energies in Europe, 11st EurObserv'ER Report, January 2012.*

Table 4. Employment by detailed economic activity of 15-64 year olds (2008-2011, NACE Rev. 2 two digit level) [1000]

	2008	2009	2010	2011
Mining of coal and lignite	171.1	157.9	172.7	191.8
Extraction of crude petroleum and natural gas	8.4	13.6	9.3	10.1
Mining of metal ores	22.3	16.6	16.4	12.9
Other mining and quarrying	26.0	23.2	20.9	27.7
Water collection, treatment and supply	61.2	57.5	59.7	55.7

Sewerage	44.6	31.7	31.0	30.6
Waste collection, treatment and disposal activities; materials recovery	58.5	65.3	61.2	67.0
Construction of buildings	434.3	444.8	376.1	378.3
Civil engineering	149.9	178.1	206.1	214.7
Specialised construction activities	644.3	680.0	694.5	716.4
Land transport and transport via pipelines	651.3	634.2	624.5	638.6
Water transport	20.4	20.8	17.8	17.9
Air transport	5.8	5.4	6.8	8.2

Source: Eurostat, LFS annual data.

Table 5. Amount of RES installations in Poland (data as of 30/09/2012)

Specification	Quantity	Power [MW]
Biogas plants	193	124.015
Solar plants	8	1.251
Hydropower	765	958.160
Biomass power plants	24	559.260
Wind power	663	2341.312

Source: Office of Energy Regulation, <http://www.ure.gov.pl/uremapoze/mapa.html> 18/01/13.

Table 6. RES-related actions in Regional Operational Programmes

Mazowieckie Province – Measure 4.3: Air protection, energy	<p>Support will include projects in the field of renewable energy: wind, solar, biomass, hydroelectric, geothermal others, as well as improving energy efficiency, cogeneration, including in particular the construction, expansion and modernisation of the infrastructure for the production and transmission of energy from renewable sources (wind energy, water, solar, geothermal, organic / biomass and other), including in the field of heating, the following areas:</p> <ul style="list-style-type: none"> ✓ Construction of units generating heat, using biomass, geothermal and other renewable energy sources. ✓ Construction of units generating electricity and heat in combination with the use of renewable energy sources. ✓ Projects using modern technologies and know-how in the use of renewable energy sources. ✓ Construction of small and medium-sized units of electricity generation combined heat. <p>Also construction, expansion and modernisation of heating systems for energy efficient through the use of energy-efficient technologies and practices, including but not limited to the following areas:</p> <ul style="list-style-type: none"> ✓ Construction or modernisation of existing thermal power generation; ✓ Replacement or building of a network of pre-insulated district heating technology; ✓ Replacement of thermal insulation for heating systems which are in poor condition; ✓ Modernisation and construction of new substations; ✓ Construction of electronic monitoring and control systems, district heating systems; contributing to the growth of energy security and cost-effective and eco-energy distribution; ✓ Conversion of existing heating systems in public utility systems more environmentally friendly; ✓ Modernisation of heating, ventilation and air conditioning systems.
Lubelskie Province - Measure 6.2: Environmentally friendly energy	<p>The measure will implement infrastructure development projects for the production of energy from alternative sources, such as biomass, solar and others, and in particular:</p> <ul style="list-style-type: none"> ✓ Investment in the development and use of renewable energy sources such as wind, water (including the needs of nature conservation and environmental aspects of the maintenance of rivers), biomass, solar and geothermal, and others; ✓ Investments to reduce emissions of biogas from sewage treatment plants and landfill through its energy use; ✓ Modernisation of solid fuel fired boilers, with particular focus on the tasks carried out in educational institutions - educational, cultural centres, hospitals.
Dolnośląskie Province - Measure 5.1: Renewable Energy	<p>The investment will support activities related to the dissemination generation of heat and electricity cogeneration and district heating and expansion of the heat distribution network. Preference will be given to projects using RES (for example, biomass, geothermal), and in</p>

Sources	<p>particular, those that are switching from fuels in the form of oil, gas or coal to renewable energy sources. Implementation of the measure will promote the elimination of individual heat sources that are issuers of so-called low-carbon solutions for the cogeneration system, in particular the following tasks:</p> <ul style="list-style-type: none"> ✓ Construction and modernisation of energy production from renewable sources based on hydropower (including geothermal), and biomass; and, ✓ Construction and modernisation of heat along with their necessary equipment.
Łódzkie Province - Measure 2.9: Renewable Energy Sources	<p>Activities will include the use of technology, combining production of electricity and heat, as well as the reconstruction of central heating systems, investments to improve the infrastructure of production and transmission of electricity and heat from renewable sources. Implementation of energy efficiency will be achieved, <i>inter alia</i>, by reducing energy losses in district heating and energy efficiency improvement. In particular, this measure will support the following projects:</p> <ul style="list-style-type: none"> ✓ Construction, expansion and modernisation of the infrastructure for the production and transmission of renewable energy; ✓ Construction or reconstruction of district heating networks; ✓ Construction or reconstruction of small and medium manufacturing units of heat and electricity together; ✓ Investments in distributed energy production and generation directly from its customers; ✓ Projects using modern technologies and know-how in the use of renewable energy sources.
Śląskie Province - Measure 5.3: Clean air and RES	<p>This measure will support initiatives to eliminate or reduce the amount of pollutants released into the air, as well as projects that increase the share of alternative energy sources, to prevent the formation of air pollution, in particular:</p> <ul style="list-style-type: none"> ✓ Construction (including development, reconstruction), reconstruction and repair of heating systems' components (with the liquidation of individual systems), as well as equipment for installation of heating systems to reduce emissions of dust and gas into the air; ✓ Conversion of existing heating systems in public utility systems more friendly to the environment, in particular the reduction of 'low emission'; and, ✓ Construction of infrastructure for the production and transmission of energy from renewable sources in the field of solar energy, biomass energy as well as geothermal energy and biogas.
Świętokrzyskie Province - Measure 4.1 and 4.2	<p>Will provide support to investments, resulting in an increased use of RES, or significant improvements in energy efficiency, such as construction and modernisation of municipal heating systems, along with the modernisation and construction of new energy sources, as well as thermo-modernisation of public utility, and in particular the following projects:</p> <ul style="list-style-type: none"> ✓ Integrated construction and modernisation of heating systems, replacement of outdated heating system, aiming to reduce the amount of pollutants emitted into the air and achieve better energy efficiency; ✓ Construction of electricity and heat units in, together; ✓ Projects to manufacture and use in energy systems and renewable energy heating and the use of energy and heating systems' waste energy.
Zachodniopomorskie Province - Measure 4.1: RES and energy management	<p>This measure will develop the infrastructure of the production of renewable energy, in particular:</p> <ul style="list-style-type: none"> ✓ Operations to develop and increase the use of solar energy, including construction and equipment, with the means and resources in the field of infrastructure and equipment necessary for the production of electricity and heat together; ✓ Operations to develop and increase the use of energy from biomass, including construction and equipment with the means and resources in the field of infrastructure and equipment necessary for the production of electricity or heat joining together; and, ✓ Operations to develop the use of hydropower, geothermal and other alternative energy sources (e.g. coke oven gas) not elsewhere specified, including construction and equipment with the means and resources in the field of infrastructure and equipment necessary for the production of electricity (small hydro power plants to 10 MW) and heat along with the connection.
Pomorskie Province - Development of RES	<p>Support will be focused on creating the conditions for promoting the production and use of so-called green energy. Targeted initiatives will be implemented for the use of RES (wind, biomass, solar, geothermal, water flowing) for the production of electricity and / or heat. Construction, expansion or reconstruction of infrastructure and the purchase of equipment used for the production of energy from renewable sources, including:</p>

	<ul style="list-style-type: none"> ✓ Construction of power generation units using the wind; ✓ Construction of biomass heat, biogas, or biofuels; ✓ Construction of solar systems; and, ✓ Construction of geothermal heat sources.
Warmińsko- mazurskie Province - Measure 6.2: Protection of the environment from pollution and destruction (sub measure: 6.2.1 The use of RES)	<p>Implementation of the programme is likely to increase the share of renewable energy in the energy balance of the Region and the country, as well as reduce the emission of harmful gases and particulates into the atmosphere, and through the use of local renewable energy sources. Assumptions will be made, using solar energy, energy from biogas, biomass and geothermal generation investment in infrastructure, storage and transmission of renewable energy, in particular by:</p> <ul style="list-style-type: none"> ✓ The construction or the modernisation of electricity generation and heat in combination, as required for high-efficiency cogeneration set out in Directive 2004/8/EC of biomass; ✓ The purchase of equipment and production lines for the processing of biomass, as part of a comprehensive project; ✓ A comprehensive modernisation of heating systems for public utility facilities using renewable energy sources, including source-transmission-reception; and, ✓ Projects using modern technologies and know-how in the use of RES.
Podkarpackie Province - Measure 2.2: Energy infrastructure	<p>With regard to renewable energy sources, this measure will provide support in the following areas:</p> <ul style="list-style-type: none"> ✓ The use of biomass for energy production; ✓ The use of water power; and, ✓ The use of wind energy. <p>In addition to the above, the measure is expected to support projects based on other renewable energy sources, including solar and geothermal energy, and in particular:</p> <ul style="list-style-type: none"> ✓ Construction and / or equipment for projects related to renewable energy sources; ✓ Construction and / or equipment for projects for generation of electricity or heat, including in combination.
Podlaskie Province - Priority 5: The development of environmental infrastructure - the axis of action pursued by the local and regional level	<p>In order to improve the air quality of the project, Priority 5 will be financed by eliminating or reducing the amount of air entering the contaminants, projects for the construction and reconstruction of heating systems, including modernisation of existing lines and thermo heat distribution in public utility facilities. In addition, support will be associated with the use of RES, with the construction of the power grid for distribution of energy obtained from renewable sources to the existing power grid, in particular:</p> <ul style="list-style-type: none"> ✓ Construction, reconstruction of infrastructure and the purchase of equipment for the production, processing, storage and transmission of energy from renewable sources (wind, Water, solar panels, photovoltaic cells, energy from biomass and others); ✓ The purchase of modern technology and know-how in the use of renewable energy sources; ✓ Construction to increase the power units of electricity and heat from renewable sources; ✓ The construction of the power grid for the distribution of energy obtained from renewable sources to the grid system.
Małopolskie Province - Measure 7.2: Improving air quality and increase the use of renewable energy sources	<p>The use of clean energy sources such as biomass, solar and geothermal water could effectively eliminate coal as a fuel. The programme will support the following projects:</p> <ul style="list-style-type: none"> ✓ Working capital (modernisation, expansion and construction) for heating systems and equipment in their plants to reduce emissions of dust and gas into the air; ✓ Conversion of existing heating systems in public utility systems that are more environmentally friendly; ✓ The use of renewable energy sources - development of infrastructure for the production and transmission of renewable energy; ✓ Use of geothermal energy for heating, ✓ Acquisition of solar energy especially for public buildings (schools, hospitals, health centres, etc.); ✓ Construction and installation of plant and equipment for the use of biomass; ✓ Construction of recovering biogas from landfills and sewage treatment plants.
Opolskie Province - Measure 4.3: Air protection and RES,	<p>The assistance will be granted to preferred projects with high energy efficiency, which will lead to greater energy savings. The projects are intended to reduce emissions of particulate matter and gases into the atmosphere, which in turn will lead to improved air quality in the region. Funding for the projects leading to the energy efficiency of public buildings through such thermo-</p>

	modernisation of buildings, modernisation of heating, ventilation, air conditioning, heat exchange, as well as the construction or modernisation of heating systems.
Lubuskie Province - Measure 3.2: Improving air quality, energy efficiency and the development and use of renewable energy sources,	Projects are focused on the development and reconstruction of energy networks and energy sources, in order to reduce energy losses, as well as reduce emissions arising from energy processes. The development of renewable energy sources will reduce the use of traditional, often inefficient, energy sources.
Wielkopolskie Province - Measure 3.7: Increasing the use of renewable energy resources,	<p>Action will be implemented through:</p> <ul style="list-style-type: none"> ✓ Construction and reconstruction (modernisation) of local systems of electricity supply (medium voltage), gas and thermal energy; ✓ Installation and reconstruction (modernisation) of filtering devices for gases and dust extraction; ✓ Construction and development of solar-thermal and photovoltaic installation for power transmission; ✓ Construction and development of biomass-fired heating equipment with the installation of power transmission; ✓ Construction and development of heating installations, with the installation of geothermal energy for power transmission; ✓ The construction and use of equipment for the production of energy and energy transmission system based on other types of renewable energy sources; ✓ The construction and development of equipment and installations for the production and transmission of electricity and thermal energy (cogeneration) using RES.
Kujawsko- pomorskie Province - Measure 2.4: Environmentally friendly energy infrastructure.	<p>It is necessary to take steps to increase the proportion of this type of clean energy, especially where the sources concerned, are biomass, water, geothermal, water and sun. The objectives can be achieved by supporting projects such as:</p> <ul style="list-style-type: none"> ✓ Construction, extension, reconstruction of electricity generation and heat energy using water, biomass, biogas and geothermal and solar energy; and, ✓ Construction and reconstruction of grid electricity and heat from renewable sources.