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German-Polish Innovation Forum on Renewable Energy

Workshop Documentation

Poznan, Nov 25, 2009

Imprint

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Preface

The development and implementation of technologies for the energy generation from renewable sources is a key priority in order to secure the energy supply of the future. There are various approaches. Significant budgets are provided for research and development in the industry and in research organisations.

Initiated by the German Embassy in Warsaw and financed by the German Federal Ministry of Education and Research (BMBF) the innovation forum was intended to instigate, support and attend to an exchange of experiences between actors from both countries in order to stimulate joint activities in research and innovation. The idea was to bring the strengths of both countries together in order to mobilise new and competitive solutions for the generation and distribution of energy and for new approaches regarding energy efficiency. There was a particular focus on the involvement of small and medium-size enterprises.

The workshop took place in the context of the international trade fair POLEKO in Poznan/Poland on November 25, 2009. It was attended by over 200 participants from industry, research organisations, and public administration. The majority of the participants were polish. This documentation contains a collection of the presentations.

On behalf of all organisers and participants VDI/VDE-IT would like to express it´s gratitude to the presenters for their contributions and to the BMBF for providing the financial resources for the organisation of this successful event.

Berlin, February 2nd 2010

Helmut Kergel

VDI/VDE Innovation + Technik GmbH

1 Research, Development and Innovation in the Field of Renewable Energy Prospects of German-Polish Co-operation

Gerd Meier zu Köcker, Institute for Innovation and Technology, Berlin

Dr. Gerd Meier zu Köcker is working for VDI/VDE Innovation + Technik GmbH (VDI/VDE-IT) since 1999. He is head of the section "International Technology Cooperation and Cluster" as well as co-head of the Institute for Innovation and Technology, located within VDI/VDE-IT. His technical background is materials science and production engineering. He was involved in various activities in the context of scientific and technical evaluation of all kinds project proposals, on the national as well as on the international level. Today he is responsible for managing several projects in the domain of initiation, implementation, and evaluation of policy, governance, and impact of regional innovation cluster and related programmes. Since 2007 he is head of the office of the German cluster initiative "Kompetenz - netze Deutschland" and he is member of the High Level Advisory Group on Clusters on behalf of the European Commission. In the recent years he was involved in the elaboration of a number of studies and publications related to cluster and innovation policy.

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Stimulating research and innovation can be considered as one of the major tasks of a national approach to increase the wealth of a domestic economy. It aims at different objectives, like economic growth, full employment, stable prices or positive balance of payments from international trade. Insufficient innovation was recently considered a major cause of Europe's disappointing growth performance.

As a consequence European regions need more research and innovation to catch up with the global challenges. In 2000 the European Council decided to make the European Union the most competitive and dynamic knowledge-based economic area by 2010. A central element of the strategy was to strengthen research and development in the Member States and to increase the R&D expenditure in the Member States to 3 % of the GDP by 2010. Consequently, more and more European nations set up new national initiatives for innovation and growth under which additional funds have been invested for research and development. This is also valid for Germany and Poland, who considerably increased their efforts in research and development by launching new initiatives.

In parallel, transnational research and development is considered to be an important element in a national research strategic agenda by the most European Member States. Coping the challenges of global heating, the domain of Renewable Energy is an excellent field for bundling national competences. As a consequence, several bilateral and multilateral research an development initiatives in the field of Renewable Energy were successfully set up.

The German-Polish R&D co-operation can very much benefit from this trend. There are a number of benefits for German-Polish cross border networking and R&D co-operation, like

- Lower costs and risk of R&D and exploitation (sharing budgets / risks)
- Higher efficiency and synergies due to broader access to knowledge and interested partners

- Facilitating exploitation and dissemination of results inside the networks for mutual benefits of the network partners
- Higher added value of the funding
- Achieving technological coherence
- Opening and easier access to mutual markets
- Creation of partnerships as a basis for successful bilateral co-operation
- Easier management of co-ordination compared to EC projects
- Training and education for qualified specialists in technology needed in Poland and Germany to increase their capacity to compete
- Complementarities of German and Polish strengths

German-Polish R&D co-operations have a long tradition. There are plenty of excellent examples showing the mutual benefits of such bilateral co-operation, also in the field of Renewable Energy. The Governments of the Federal Republic of Germany and the Republic of Poland have successfully strengthened cross-border co-operations to intensify the neighbourly, amicable relations between the two countries.

The strong interest in the Innovation Forum carried out during the POLEKO 2009 trade fair in November 2009 in Poznan shows the growing demands of German and Polish companies and R&D institutions to intensify mutual co-operations in the field of Renewable Energy. This workshop documentation shall give some insights in the topics presented and discussed, shall outline opportunities for bilateral activities in research and innovation as well as commercial business, and finally shall show good practice examples of successful German-Polish co-operation.

2 Renewable Energy in Germany and Saxonia - Prospects of Support for German-Polish R&D Projects

Nadine May, EESA Saxon Industrial Network for Renewable Energy, Dresden

born in 1978; from 2001 to 2005 studies of geoecology at the Technical University of Braunschweig. From 2004 to 2005 diploma thesis at the German Aerospace Centre about solarthermal power plants and electricity networks. From 2006 to 2007 engaged as project manager for the registration of pesticides at GAB Consulting GmbH. Since April 2007 employee at VDI/VDE-IT in the division Information and Energy Technology. Responsible for renewable energy projects (bioenergy and geothermal energy) in the scope of the Saxon industrial network EESA. Working for the evaluation of the Export Initiative for Renewable Energies of the Federal Ministry of Economics and Technology and supervision of research projects within the electromobility funding programme of the Federal Ministry of Environmental Protection.

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To strengthen competitiveness and innovation, to create steady employment and therefore support sustainable growth are aims that have been pursued for many years by the Free State of Saxony. This policy correlates to the Lisbon Strategy on European level, which contains a structural change and further development towards a knowledge-based economy. As Saxony has a traditionally strong machine and plant engineering sector, energy supply based on renewables will be an important growth sector for the future. Especially, the decentralised energy supply offers considerable growth opportunities for small and medium-sized companies.

With the establishment of the Industrial Network for Renewable Energies in Saxony (EESA, www.eesa-sachsen.de) at the beginning of 2008, the Free State of Saxony has established an initiative in order to enhance the competitiveness of Saxon companies in the field of renewable energies. A closer co-operation between companies, research institutions and educational facilities plays a major role in the EESA networking activities. Moreover, the renewable energy topic shall be developed strategically by EESA through the identification of new domains of activities and the development of complete value chains. As a result, more innovation, productivity and export strength of Saxon companies can be achieved and ensured for the future.

Around 380 industrial and service companies in Saxony develop, plan, produce or build facilities for the use of renewable energies. The 4.700 employees generated a turnover of more than 1.3 billion Euros in 2007 - with a clear upward trend. These facts make Saxony one of the international leading hot spots for renewable energy engineering, ranging from basic through applied research to industrial production and services.

Photovoltaics:

Saxony is one of the most important locations for photovoltaics worldwide. One essential reason is the great technological variety of solar module manufacturers in this region. In addition to established producers of crystalline silicon solar and thin layer modules, there also are companies for the development of organic based solar cell concepts. Further important pillars of photovoltaics in Saxony are local manufacturers of equipment and research institutions.

Solar thermal energy:

In Saxony the whole value chain is covered by the field of solar thermal energy. This comprises manufacturers of flat-plate and evacuated tube collectors as well as planners, manufacturers of key components such as storages, heat exchangers and control technologies. Last but not least this spectrum also includes companies responsible for the correct installation of complete systems.

Geothermal energy:

Near-surface geothermal energy is of high economical importance for Saxony. More than 70 Saxon companies cover the whole value chain from building services, drilling and geothermal technology to planning services. In Technical University Bergakademie Freiberg and the University of Applied Sciences Zittau / Görlitz represent centres of excellence with long-term experience in this research field.

Bioenergy:

Saxony has a remarkable biomass potential, whose exploitation and utilisation may especially increase the regional value chain. The Saxon bioenergy branch covers all fields of energetic use of biomass. Moreover, the German Biomass Research Centre and many other research institutions prove the excellent infrastructure of Saxony.

Wind energy:

The all-around rapid growth of the wind energy branch can be tangible among all Saxony. This is especially the case for suppliers and manufacturers of production systems for wind energy equipment. Significant strengths lie in the very outstanding research infrastructure, the comprehensive corporate landscape for the production of components as well as Saxony‘s proximity of eastern Europe as a new, important business market.

Hydropower:

Many of Saxony‘s mechanical engineering companies deal with the planning, construction and production of components as well as complete hydropower systems. This mainly concerns small hydropower systems. The technical, economical and ecological potentials of Saxony are considered to be largely exhausted. Main markets for hydropower therefore are located abroad.

3 Status of the Implementation of a Legal Framework for Feed-in Tariffs for Renewable Energy in Poland

Paweł Płachecki, Polish Energy Regulatory Office (ERO), Warszawa

Main duties and work area:
- conducting administrative investigations of licenses renewable source; Co-operation with regional branches of the staff of The Energy Regulatory Office
- in case relating to licenses for cogeneration and co-fired technology and grid connection;
- review of applications and issuing certificates of origin from cogeneration;
- carrying out data transmission and exchange of information between The Energy Regulatory Office and The Power Exchange;
- redemption certificates of origin and certificates of origin from cogeneration;
- preparing the draft interpretation of current legislation and respond to questions within the scope of jurisdiction of the Department in subjects RES and CHP;
- cooperation involving RES and CHP in the organization: The Council of European Energy Regulators (CEER), European Regulators Group for Electricity and Gas (ERGEG);
- representing the President of the Energy Regulatory Office in conferences, meetings.

The President of the Energy Regulatory Office[1] is the central body of state administration nominated on the basis of an act of 10 April 1997 Energy Law, for the realization of tasks in the scope of fuel and energy management control as well as promotion of competition.

The duties and competence of the ERO President are strictly connected with the state policy in terms of energy, i.e. economic conditions of energy enterprises operations, ideas of market operations, as well as requirements coming from the obligation of adjusting Polish law to the European Union law. The activities undertaken by independent regulatory body are addressed at fulfilling the aim given by the legislator, and heading towards the creation of balanced economic growth of the country, ensuring energy security, economical and rational use of fuels and energy, development of competition, fighting with negative effects of natural monopoles, taking into consideration environmental protection, obligations resulting from international agreements as well as balancing the interests of energy enterprises and consumers of fuels and energy.

In the space of several years of activities of the ERO President, the Energy law has been amended many times. As a consequence of the amendments, the scope of activities of the ERO President has been extended from year to year.

Currently the competence of the ERO President resulting from art 23 point 2 of the Energy Law cover the following activities in renewable sources area inter alia:

1. granting and withdrawing licenses,

[1] http://www.ure.gov.pl/portal/en/4/22/Presidents_duties.html

2. controlling the fulfilment of duties in the scope of electricity purchase from renewable sources of energy and co-generation,

3. approving transmission network codes in the scope of balancing the system and congestions system management,

4. resolving disputes concerning the refusal of concluding an agreement to access the grid, selling agreement, agreement for transmission services or distribution of fuels and energy, agreement for natural gas transport services, agreement for gaseous fuels storing services, agreement for accessibility to partial installation for storing gaseous fuels, agreement for liquefying natural gas services, as well as license agreement, and in cases of unjustified shortage of gaseous fuels or energy supply,

5. collecting and processing information relating to energy enterprises, including calculating and publishing in the period up to 31 March every year:

   a. average price of sales for electricity produced in highly-efficient cogeneration;

   b. average price of sales for electricity on the competitive market in previous calendar year

6. issuing certificates of origin for electricity, which comes from renewable sources of energy and certificates of origin from co-generation as well as their discontinuation.

4 Status and R&D Priorities of Renewable Energy in Poland -Prospects of German-Polish Cooperation

Grzegorz Wisniewski, managing director of Institute for Renewable Energy (EC BREC IEO), Warsaw

Mr. Wisniewski graduated from Warsaw University of Technology (mechanics and process engineering) in 1987 and Warsaw University (organisation and management) in 1989. He specialised in research and development of solar, wind and bioenergy technologies, socio-economic studies. He has considerable experience in management of research establishments (a state own renewable energy agency EC BREC/IBMER, NGO- Social Ecological Institute and non-public research centre (EC BREC IEO), and project management. He was a project leader and co-ordinator of several EU funded research projects. In 2002 he was nominated by the Polish Minister of Science as an expert of the FP6 EU RTD Programme in area of Sustainable Energy Systems. Since 2003 he is also representative of Poland and member of the ManagEnergy Reflection Group (MERG Chairman '2007) – advisory group of the Directorate General of Transport and Energy at the European commission (DG TREN) in the area of local and sustainable energy. He was a chairman of the renewable energy advisory group for the Polish Minister of Environment and is a chairman of renewable energy advisory group of Association of Polish Counties as well as a member of advisory group of the Polish Economic Chamber of Renewable Energy (PIGE). He published 5 books on solar and sustainable energy and more than 100 research papers and he was awarded by 3 patents related to solar energy. He is a chairman of a conference "Polish Solar Energy Industry Forum" organised by EC BREC IEO on a yearly basis and chairman of Solar Energy Section at PIGEO.

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The Institute for Renewable Energy (EC BREC IEO) Ltd. was founded in 2001 by a team of experts of the former EC Renewable Energy Center (EC BREC/IBMER). The core of the team consists of people who at the turn of the XXI century elaborated key legislative and strategic documents for the renewable energy sector in Poland i.e.: the Strategy for RES Development, the Implementation Programme for Green Electricity, and the Draft of the Renewable Energy Act. Today, the above mentioned documents are foundation pillars for the RES energy policy and legislation in Poland.

The idea of creation of an independent institute was to merge R&D with investments and consultancy services without public support. The income generated by commercial activities and services has been spent on further research activities as well as strengthening of the think-tank capacities. The above strategy enables to realize our long-term societal goals as well as our public mission in the area of sustainable local development, dispersed generation, as well as the development and nurturing RES technologies on the energy market.

The institute's mission is to generate and use the up-to-date scientific and technical knowledge in the area of RES utilisation in order to:

- Support the economically viable wind, solar, biogas and biofuels investments
- Develop theoretical solutions and practical application as well as promote local dispersed RES generation

- Introduce to the market innovative products (technical solutions, software, statistical and market development reports) as well as services in the area of renewable energy sources

The main task of the institute is to bring to the market players modern technologies, which have been elaborated either by own staff or other R&D domestic and foreign institutions. The key clients for the institute's products and services are small and medium size enterprises, local authorities, corporative clients (e.g. due-diligence) and independent RES energy producers (e.g. feasibility studies). The institute also performs think-tank services for public administration in the area of evaluation of RES impact on the economy or the environment. Numerous market study reports have been performed: for the Polish Government (Ministry of Industry, Ministry of Environment), Polish Parliament, European Commission (6/7 FP, IEE, INTERREG) as well as foreign institutions and foundations (Word Future Council, Heinrich Boll Foundation, embassies etc.).

5 Education as Driving Force for the International Dissemination of Renewable Energy Technologies

Tina Völker, Renewables Academy (RENAC) AG, Berlin

Tina Völker is a lawyer and completed her studies at Westfälische-Wilhelms-Universität in Münster/Germany and University of Liverpool/England. In her Postgraduate Judicial Traineeship she worked in German Bundestag for the Committee on the Affairs of the European Union and at German Technical Agency in Lima/Peru in the Criminal-Law-Reform-Project. Ms. Völker started her career at the law firm Schütz in 2003, specializing in insolvency law, before changing over to the International Department of German Solar Industry Association (BSW) in 2004, focusing on monitoring and evaluation of international solar markets and policies as well as developing export strategies for the German solar industry. From 2006 Ms. Völker worked at German Energy-Agency (dena) in the Renewable Energy Department. At dena she was advising German renewable energy companies on international market entry strategies as well as analysing foreign renewable energy markets. Since 2008 Ms. Völker is a project director at Renewables Academy AG. She is responsible for course design and implementation as well as development of online courses and course materials, amongst other issues. Her general focus within the renewables sector are policies and legal frameworks.

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Qualified staff and suitable conditions are the major prerequisites for continued successful growth of companies and markets in the renewable energy industry as well as for energy efficiency improvements. The Renewables Academy AG - RENAC - in Berlin provides training and further education for engineers, investors, sales staff, lawyers, management, project developers and decision makers in the areas of renewable energy and energy efficiency. RENAC's goal is to disseminate the excellent expertise available in Germany for the use of renewable energy and energy efficiency technology, domestically and internationally. RENAC wants their education program to contribute to the plan for a sustainable worldwide energy supply system.

6 Decentralized Energy Supply – Strategy and Best Practice

Jan Kallok, Kompetenznetzwerk Dezentrale Energietechnologien e. V., Kassel

After obtaining his Master of Arts in Economics and Slavonic Studies in 2008, Jan Kallok did an internship at the East-West-Science-Center of the University of Kassel. Since 2009 he is working on cluster management and internationalization at deENet, a network for distributed energy technologies at Kassel.

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Over the past 25 years, the North Hesse region has built up extensive know-how in the field of distributed power generation and energy efficiency. Successful companies, the University of Kassel, and research institutions are addressing a range of issues such as distributed power generators and their integration into existing supply systems, environment-friendly construction, rational energy utilisation, and climate-efficient production methods. deENet e.V., comprising over 90 companies, research institutions, and service providers, was founded against this backdrop in 2003.

Based on the extensive experience of deENet member companies in the field of distributed and renewable energy systems and energy efficiency, combined with up-to-date research and development findings, deENet is able to develop technical solutions for complex supply tasks. The work has undertaken ranges from concept and feasibility studies to specific planning.

deENet works with its members to develop the North Hesse region into a model for distributed energy and energy efficiency. Systems solutions that primarily leverage know-how from the region are intended to demonstrate what is currently feasible and what will be possible in the future. deENet plans to turn the topic of distributed energy generation and energy efficiency into one of the economic and social pillars of the region.

To carry out publicly funded R&D projects, the network has founded "deENet GmbH", a non-profit society for the promotion of distributed power generation technologies. The company was founded to intensify applied research on distributed energy supply technologies and measures to increase energy efficiency. In cooperation with companies and research institutions, the society is coordinating applied projects in research, development, and demonstration.

7 Grid-Integration of Off-Shore Wind Parks

Bogdan Gutkowski, Polish Wind Energy Society, Gdansk

- Graduate of Chemical Faculty of Gdansk University of Technology and its long-term scientific worker.
- Since 1989 involved in consulting and engineering sector; consultant for many national and foreign companies in the field of environment protection, law and economical principles of investment in Poland and since 2000 occupying with renewable energy, particularly on- & off-shore wind energy.
- Expert providing professional consulting in Environmental Impact Assessment reports and procedures for over 400 investments in different scale.
- Member of Polish RES Coordination Council. Managing Director of AOS Ltd. with offices in Koszalin and Gdańsk.
- President of Polish Wind Energy Society (PWES) in Gdańsk, being a non-governmental organization active since 1997, which the main activity is focused on promotion and lobby in aid of wind energy development, especially the Baltic off-shore wind energy. PWES is a member of World Wind Energy Association (WWEA) and European Wind Energy Association (EWEA).
- Author of idea to create Polish Offshore Grid (PSM®) system on the Polish part of Baltic Sea. Founder, under the same name, of the consortium - Polish Offshore Grid (PSM®) Consortium. Consortium was established in May 2009 by 3 experienced companies from the renewable energy sector as well as companies dealing with designing and constructing HV grid - AOS Ltd. Gdansk Branch, ENERGO PROJEKT Krakow S.A. and ELTEL Grid S.A. from Olsztyn. The Consortium is supported by 3 an experienced research and development institutions; Maritime Institute in Gdansk, the Foundation for Sustainable Power Engineering Development in Warsaw and the Renewable Energy Institute in Warsaw. The main aim of this Consortium is designing, building, starting up and exploitation the system of undersea HV power cables in the Polish maritime areas with the necessary accompanying facilities. The system will be used for transmission of electric power produced by offshore wind farms to the Polish National Grid System on the mainland, or to the other European countries.

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The Polish Wind Energy Society (PWES) has been involved in activities supporting wind power in Poland since 1997, i.e. since it was established.

Since 2007 we have paid special attention to the promotion and development of offshore wind power in the Polish section of the Baltic Sea. We are convinced that without offshore wind power (OWP) Poland will not be capable of achieving the required 15% of electric power generated by renewable energy sources by the year 2020.

And if we also consider the fact that offshore wind power is one of the fastest developing fields of electric power in Europe it will become clear that the program which is currently being implemented by our Society is modern, pro-economic and pro-ecological.

The Society's activity consists in e.g. organizing conferences and seminars, disseminating knowledge on OWP, collecting and publishing information on operational experience of offshore wind turbines and cooperation with national and foreign research centres and institutions promoting OWP.

Also, the fact that our Society's office is located in Gdańsk – a city with a strong scientific and technical base focusing on maritime research and predestined to become the centre of development of this new field of the Polish economy - is very significant.

PWES highly values the cooperation with the Maritime Institute in Gdańsk, with which it participated in the international POWER project (determining the possibility of locating wind farms on the Baltic Sea). PWES is a co-founder of the Baltic Offshore Energy Cluster (BOSEC), together with befriended institutions from Lithuania, Latvia and Estonia. PWES organized an international conference "Offshore wind energy development on the Baltic Sea - chances & opportunities" in Gdańsk in 2008 with an active participation of Prof. Jerzy Buzek who is currently the President of the European Parliament.

We are fully aware that basic political and legal decisions are taken in Warsaw. That is why we cooperate with central governmental and non-governmental institutions and we engage in organizational and lobbying actions aimed at removing the existing legal barriers inhibiting the establishment of this field of electric power which is new in Poland.

Building an appropriate electric power infrastructure connecting wind farms to the inland power grid is an indispensable component for the development of offshore wind power. Therefore, establishing the "PSM ®" Consortium with the participation of the following companies: AOS (Gdańsk branch), ENERGOPROJEKT Kraków and ELTEL Networks Olsztyn in May 2009 is an example of initiatives supported and promoted by PWES. The aim of the Consortium is to design and construct a maritime electric power system for offshore wind farms in the Polish section of the Baltic Sea.

8 Solar Thermal Power Engineering in Poland

Aneta Więcka, Head of Solar Energy Team, Institute for Renewable Energy (EC BREC IEO), Warsaw

She is a Master of Science Engineer in Agricultural and Forest Technology and a Master of Science Engineer in Management and Production Engineering. Since 2006, she is involved in research and promotion projects concerning solar energy and transfer of innovative technologies. During her years in IEO she was developing many (also international funded) projects connected with renewable energy, mainly making analysis and elaboration concerning the state of the market of solar energy development in Poland, in particular the possibilities of investments in range of starting production of solar collectors and their sale, preparing forms for financing of solar investments for finance institutions, also help for producers of solar collectors to elaborate the forms for financing the innovative production of solar collectors, maintaining statistical data of solar market and technology in Poland. She worked as a Spokesman for Innovations at the INNOWATOR Mazovian Centre for Management of Knowledge of Innovative Technologies and was involved in promoting innovative technological solutions and their implementation and as expert in an area “Energy” - Monitoring and foresight of priority modern technologies for balanced development of Mazovia Voivodship “Foresight Mazovia”. She is responsible for annual organization of the Solar Energy Industry Forum, a meeting addressed to prominent solar collector’s producers, distributors, sales representatives, installers and all interested in solar thermal energy sector. She has experience in provide European promotion campaign, she was responsible for direct a European project to provide Solar Energy for Camping sites (SOLCAMP). Other European projects where she was involved as a person responsible are: Rescue - assistance to SME in participation in research framework programmes of the EU, FIRE - Facilitating Innovation in Renewable Energies, EurObserv'ER (IEE) - collection of the renewable energy statistical data.

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9 German-Polish Cooperation in the Field of Solar Thermal Technology

Sebastian Hesse, NARVA GmbH + Co. KG, Brand-Erbisdorf

Dipl.-Engineer at the R&D department of NARVA GmbH + Co. KG. His main responsibility is the further development of the solar thermal branch of NARVA by initiating and supervising innovative projects. He joined NARVA contributing to projects in the fluorescent lamp branch.

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NARVA carried out the step in solar technology in mid 2007. The explicit aim of the NARVA process developments was to transfer knowledge acquired from the latest glass processing techniques and production of fluorescent lamps to the manufacture of vacuum tubes. This relates in particular to pipe production in the company's own glassworks, the coating technologies, production of vacuum tubes, evacuation processes and logistics and operational technologies.

About a million vacuum tubes can be manufactured here per shift and year with a new plant. Due to NARVA's 40-years of experience in the field of glass manufacture and processing, their extensive knowledge about coating and vacuum processes, as well as experience in the field of glass-metal-compounds, they have been able to realize the production and process very quickly.

Especially the patent-protected glass-metal-compound between sheathing and absorber makes the product robust and durable. Through the coating with nano-particles, the transparency of the glass is once again considerably improved and with that, the effectiveness of the tubes.

The certified production in Brand-Erbisdorf includes all the essential production stages. The tube is made at the company's own glass factory; the prefabrication manufactures the copper absorber units. The assembly of both parts for the finished product takes place at the new plant which was put into operation in 2007.

The German company NARVA and the Polish company Hewalex work together in the field of solar thermal applications.

NARVA is a manufacturer of fluorescent lamps as well as vacuum tubes. The production of fluorescent lamps made by NARVA started in 1966 and has been the main business of the company until today. Vacuum tubes for solar thermal applications have been an important product line since 2005. The vacuum tubes are designed for both direct flow and heat pipe exchangers.

Hewalex is a producer of solar collectors. Hewalex also provides the complete product portfolio required for installation of solar thermal systems. They are specialists for solar collectors and fixtures, water heaters and fixtures, installation materials, solar systems accessories and solar kits.

Form Follows Function (Sullivan 1896, US-American Architect): This basic principle should be self-evident for technology on each level, described in the following paragraphs:.

The Vacuum Tube - The Anti Reflex Coating of the Cladding Tube:
The highly transparent special glass of the cladding tube produced at NARVA's own glassworks is made from raw materials which are low in iron to make it particularly transparent for light. In addition, the cladding tube is coated with nano-particles of silicon dioxide, both inside and outside. The layers are sintered into the surfaces, making them smudge proof. This coating increases the transparency of the glass further, reaching a maximum glass transmission of 96 %. It prevents weathering of the glass surface and also stabilizes the glass by sealing any microcracks. The comparatively high wall thickness of the NARVA vacuum tubes and their coating gives the tubes a high level of hail resistance, tested by TÜV Rheinland in accordance with the EN 12975-2 hail resistance requirements using an ice ball test. The special glass of the vacuum tube also has a significantly lower permeability level for hydrogen and helium compared to the frequently used borosilicate glass. As a result, the vacuum properties of the tubes last for 20 years.

The Vaccum Tube - The Coating of the Absorber:
The copper absorber plates with titanium oxide nitride coating used in NARVA vacuum tubes are the latest on the market. The absorber sheeting is applied to the absorber pipe using ultrasound welding technologies. A high final vacuum in the collector tubes is achieved by the use of efficient evacuation technologies and a getter. The vacuum is protecting the absorber and avoids its degradation. The absorber layer shows no degradation in the quality of its properties even with a lifespan of around 20 years (see SPF report, 2004). The absorber plates are available with one (Standard) and double-sided (Power) coating. Double-sided coating is used in collectors which are fitted with reflector systems. An increase in performance of up to 30 % can therefore be achieved for each pipe.

The Vaccum Tube - Direct Flow Vacuum Tubes:
Measurements of the efficiency factor vs. temperature difference graph of a customer module by TÜV Rheinland give the following values:
- eta 0: 0,781
- k1: 1,12
- k2: 0,004

Given the very even efficiency factor graph for the NARVA vacuum tube, which falls only slightly as temperature difference increases, the manufactured collectors are particularly suitable for providing heat support and for applications which require high water temperatures (air conditioning, process heat, drying processes, laundries etc).

The Vacuum Tubes - Heat Pipe Vacuum Tubes:
The heat pipe developed at NARVA is constructed in such a way, that no vent in the condenser is required. The temperature of the NARVA heat pipe vacuum tube condenser does not exceed 160 °C even when stagnant. As such, the device incorporates intrinsic safety features. The vaporizer fluid has been specially selected to ensure that no frost damage or fluid decomposition can occur over the 20 year product lifespan. Inside the heat pipe the pressure is max. 13 bar in stagnation. The condenser has been optimized in size and geometry for achieving a high efficiency factor and to enable a large working area in terms of the gradient of the collector. The collector functions at its maximum performance when positioned upright or up to an angle of 20 °C.

The Collector - Solar Collector KSR10

Length:	2130 mm
Width:	860 mm
Height:	116 mm
Weight:	30 kg
Cross surface:	1.823 m2
Aperture area:	1.014 m2

System Integration - Open Air Pool Wodny Raj ŁÓDŹ / Poland:
Horizontal installation on the wall and roof installation

- of 174 collectors with direct flow tubes (Hewalex company),
- 1.740 vacuum tubes NARVA 2m standard direct flow,
- 316 m² collector cross surface area in total.
- Hot water / shower water for swimming pool
- Energy not required for hot water is used for heating the swimming pool.

Architecture

To make a technology acceptable to users and the public, it is important to take care of aesthetic aspects. It is necessary to incorporate the solar thermal installation into the proportions of the architecture, in particular if the solar thermal collectors are shown on the face of a building. When creating a new building, there is the challenge to design the facade with the functional structure given by the solar thermal equipment itself. The Open air pool Wodny Raj ŁÓDŹ / Poland is an example of a successful functional redesign of an existing building with a functional solar thermal facade.

10 Using Geothermal Energy for Heating and Cooling - Example Warsaw

Rüdiger Grimm, geoENERGIE Konzept GmbH, Freiberg

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geoENERGIE Konzept is a specialist planning company active in the area of shallow geothermal energy. This includes the core areas of consulting, planning, developing and monitoring of geothermal plants for heating and cooling as well as combining geothermal energy with other renewable energy sources such as solar heat.

Key areas of activity include computer-aided simulations of subsurface conditions, designing probe fields for geothermal energy probes, construction planning/supervision, as well as carrying out geothermal tests (e.g. thermal response tests and temperature logs for determining geothermal subsurface parameters).

11 The Organizers

11.1 VDI/VDE Innovation + Technik GmbH, Berlin

VDI/VDE-IT is a private company owned by the VDI (Association of German Engineers) and the VDE (Association for Electrical, Electronic & Information Technologies), two of the biggest science and technology associations in Europe. Since more than 20 years an interdisciplinary team is carrying out various types of innovation related projects and services, in particular at the interface of innovative high-technologies. Contractors are governmental and private authorities from Germany (federal level, federal state level, regional level), Europe and selected non-European countries.

www.vdivde-it.de

11.2 Komfort Consulting s.c., Warsaw

Komfort Consulting, a consulting company based in Warsaw, offers a broad spectrum of services to European companies planning to invest or search for business partners in Poland - in particular in the domains construction, engineering, and renewable energy. The company is focusing on the specific needs of SMEs.

www.komfortconsulting.eu

11.3 Internationales Büro des BMBF, Bonn

The International Bureau (IB) at the German Aerospace Center (DLR) is the central management agency of the German Federal Ministry of Education and Research (BMBF) for international relations in research. The IB administers BMBF support, granted to German higher education and public research institutions as well as to industries and SMEs, for developing international contacts and preparing joint research activities.

www.internationales-buero.de

The workshop was initiated by the German Embassy in Warsaw, Poland (www.warschau.diplo.de/Vertretung/warschau) and funded by the German Federal Ministry of Education and Research (www.bmbf.de) under the umbrella of the initiative "Research in Germany" (www.research-in-germany.de).

12 Annex: Copies of the Presentations

Dr. Gerd Meier zu Köcker, Director Institute for Innovation and Technology, Berlin/Germany
“Research, Development and Innovation in the Field of Renewable Energies – Perspectives for German-Polish Co-operations”

Nadine May, EESA Saxon Industrial Network for Renewable Energy, Dresden/Germany
“Renewable Energies in Germany and Saxony – Supporting possibilities for German-Polish R&D projects”

Paweł Płachecki, Department of Energy Enterprises RES and CHP Unit, Energy Regulatory Office
“Renewable Energy Sources and Combined Heat and Power”

Grzegorz Wiśniewski, CEO of IEO Institute for Renewable Energy, Warsaw/Poland
“Status and perspectives of development of renewable power engineering in Poland, research priorities and possibilities of financing”

Tina Völker, Renewables Academy AG, Berlin/Germany
„Capacity Building – driver for the international implementation of RET”

Jan Kallok, deENet Kompetenznetzwerk Dezentrale Energietechnologien, Kassel/Germany
„Decentralized Energy supply – Strategy and best practise”

Bogdan Gutkowski, Head of consortium „Polskie Sieci Morskie”
“Offshore networks integration”

Aneta Wiecka, CEO of IEO Institute for Renewable Energy, Warsaw/Poland, “Platforma Słoneczna”
“Solar thermal power engineering in Poland: market and concept of development from the perspectives of industry and fitters”

Sebastian Hesse, NARVA Lichtquellen GmbH + Co. KG, Brand-Erbisdorf/ Germany
„German-Polish-Co-operation – In the field of Solar Heat”

Rüdiger Grimm, geoENERGIE Konzept GmbH, Freiberg/Germany
„Using geothermal energy for heating and cooling – example Warsaw“

Dr. Monika Schidorowitz, German Embassy in Poland, Unit for Science and Research
"Final statement and forecast"

INSTITUTE FOR INNOVATION AND TECHNOLOGY

Research, Development and Innovation in the Field of Renewable Energies

- Perspectives for German-Polish Co-operations -

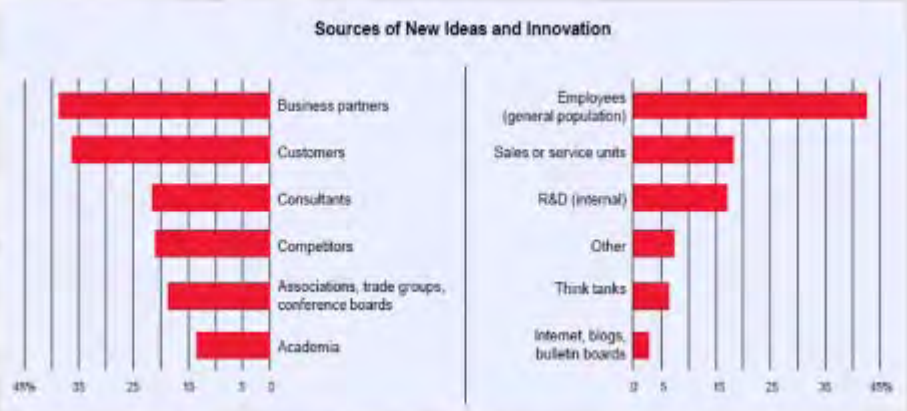
Dr. Gerd Meier zu Köcker

Director

Institute for Innovation und Technology, Berlin

INSTITUTE FOR INNOVATION AND TECHNOLOGY

Main Sources of New Ideas and Innovation



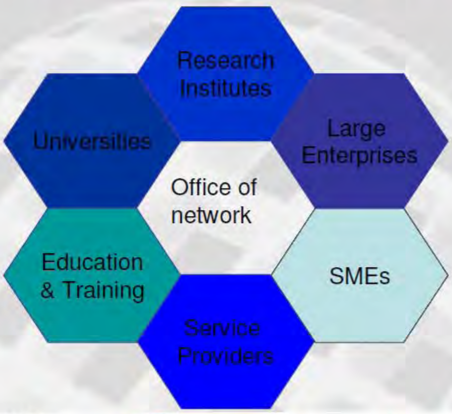
Source: IBM CEO Study 2006

Networks as Drivers for Innovation

Networks can increase the innovation capabilities of its members by

§ Bundling regional competences
§ Bringing together different partners with individual strengths
§ Initiate collaborative R&D activities
§ Initiate mutual information and experience exchange
§ Support partners in internationalisation issues
§ Establish joint education & training approaches
§ Increase public awareness of the regions and its partners

Regional Networks in Germany and Poland



Thematic Focus

Regional Concentration

Vertical Cluster

- Manufacturer
- Supplier
- Partner (finance, marking, logistic)
- Developer
- Researcher

eesa Industrielles Netzwerk Erneuerbare Energien Sachsen
deENet Energie mit System
KLASTER ENERGIA mega nano
EnergieRegion Nürnberg e.V. Kompetenz und Kooperationsnetzwerk der Energiewirtschaft
wab windenergie agentur bremerhaven bremen e.v.
H2BZ Initiative hessen
KUMAS Kompetenzzentrum Umwelt

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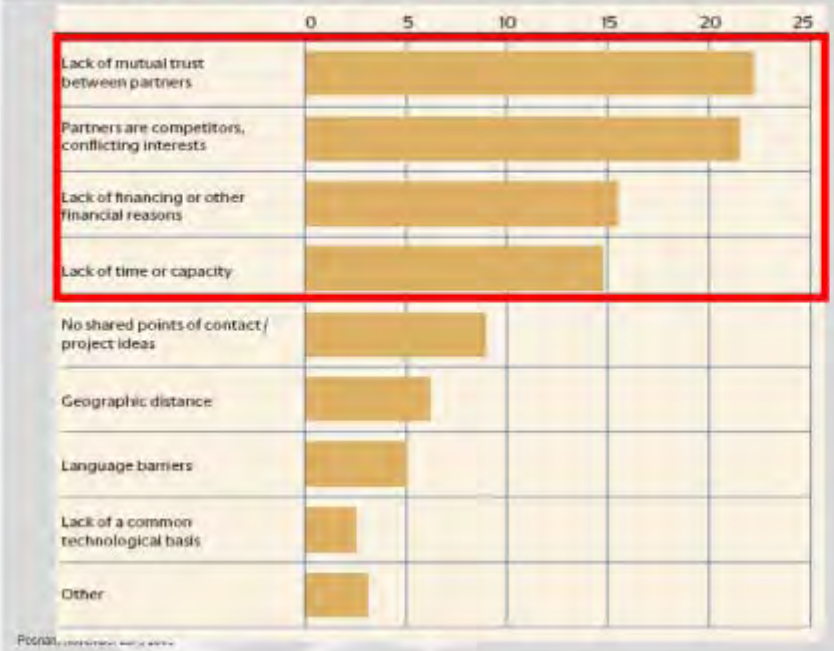
Networks as Tool to Facilitate International Co-operations



Figures in %

Source: 84 clusters replied, multiple answers allowed

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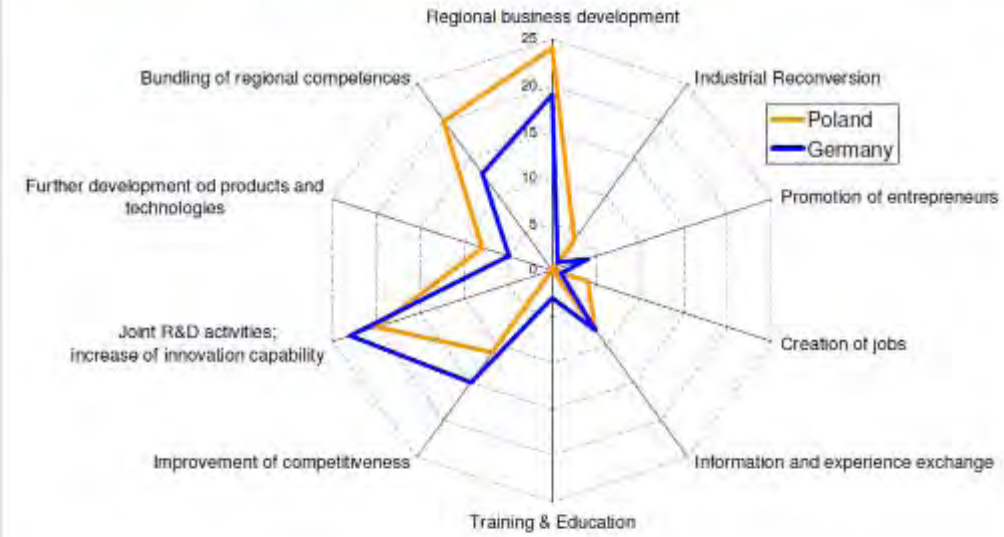
Objectives of German and Polish Networks



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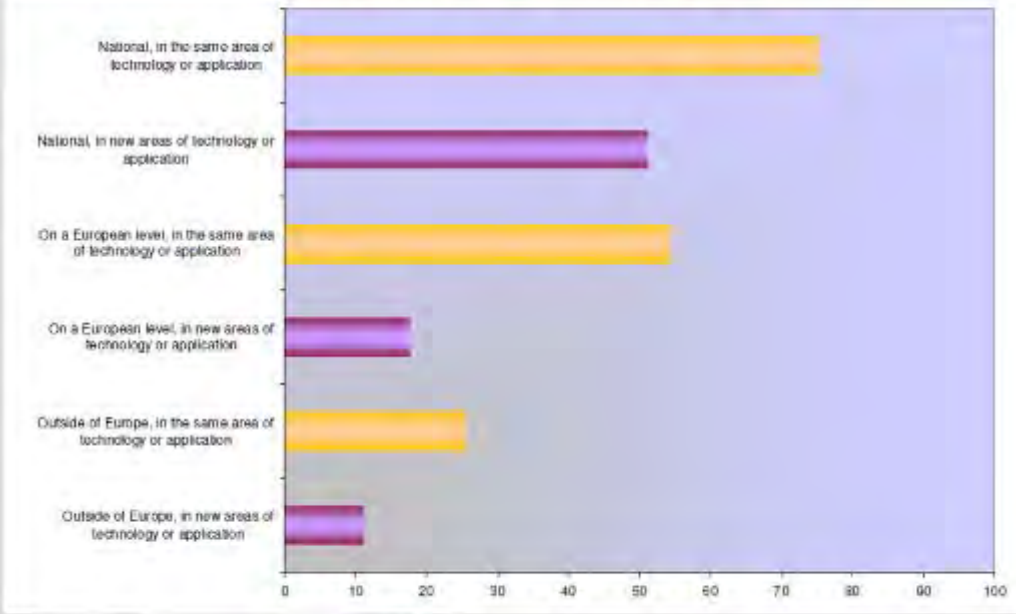
International Co-operations, initiated by Networks



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Framework Conditions for German – Polish Networks-based R&D Co-operations in the Field of Renewable Energies

The German – Polish Perspective:

- § Promising market potentials
- § Considerable number of competitive networks available in both countries
- § Networks in both countries have proven their competence and innovation capability
- § Excellent R&D infrastructure available
- § Good frameworks condition for funding bilateral R&D co-operations
- § Many successful co-operations already exist

INSTITUTE FOR INNOVATION AND TECHNOLOGY

Thanks you very much for your attention

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Innovation + Technik

Renewable Energies in Germany and Saxony – Supporting possibilities for German-Polish R&D projects

Innovation forum Renewable Energies
25th November 2009, Poznań

Nadine May, EESA

Innovation + Technik

EESA as part of the Saxon Cluster Policy

Saxon State Ministry for Economic Affairs and Labor (SMWA)

Objectives:

- Enhance the competitiveness of Saxon companies especially SMEs in the field of renewable energies
- Provide long-term support for the creation of complete value chains
- Support regional and cross-national co-operations and networks

Guiding Principles

Innovation + Technik

Strategic targets	Implementation
Support networking	- Expert meetings, workshops, match making for new research and business partner
Encourage innovations	- Initiation of R&D joint projects - Support funding application on State, Federal and European levels
Improve framework conditions	- Reduction of barriers like shortages of skilled staff or incomplete value chains - Initiation of international co-operations
Increase the visibility of topics	- Exhibitions, trade missions, conferences - Business and press delegations
Enhance transparency	- Well-directed public relation and marketing measures (website, newsletter, flyer, databases)

Importance of Renewable Energies

Innovation + Technik

German goals for 2020

- minus 40% CO_2 (comp. to 1990)
- 15 % → minimum 30 % renewables share in electricity consumption
- 8 % → 14 % renewables share in heat demand
- 6 % → 12 % biofuel share

→ EEG + MAP since 2000

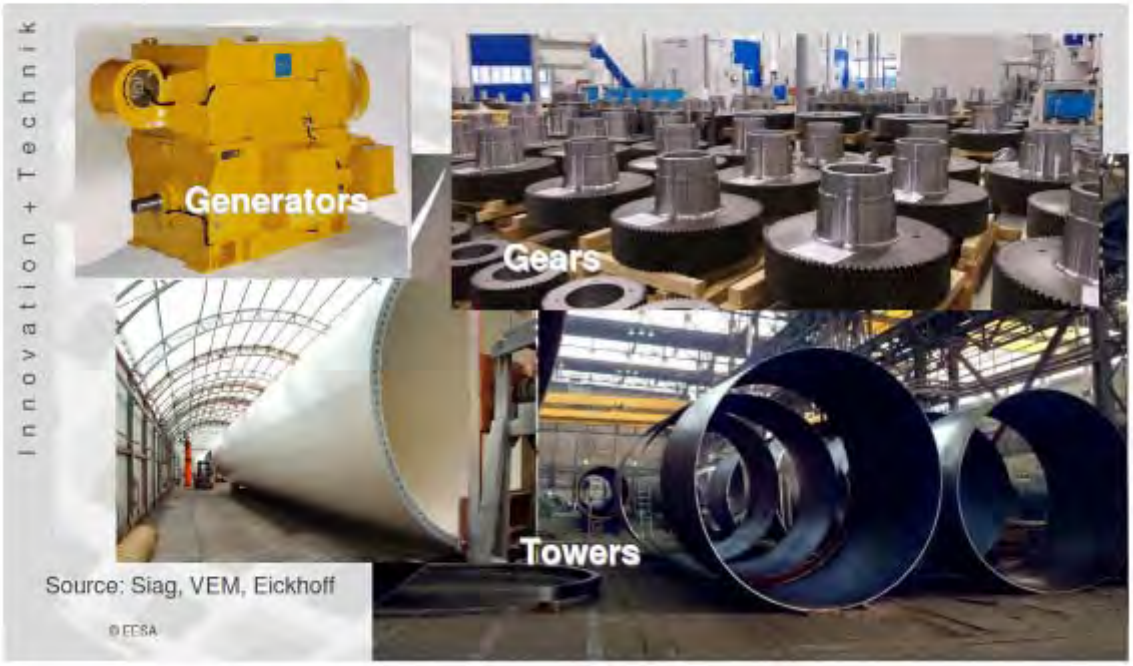
→ 28.8 billion € turnover in 2008

Effects on turnover and employment in Saxony

Saxon technologies for Bioenergy

Source: Lehmann Maschinenbau, FF-Maschinenbau

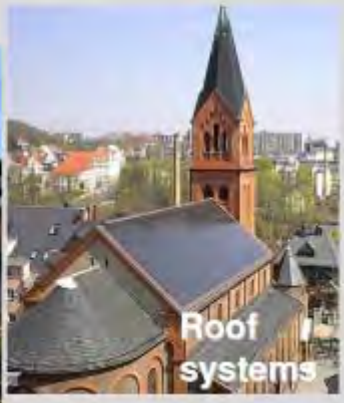
Saxon technologies for Wind energy



Saxon technologies for Geothermal energy

Saxon technologies for Solar energy

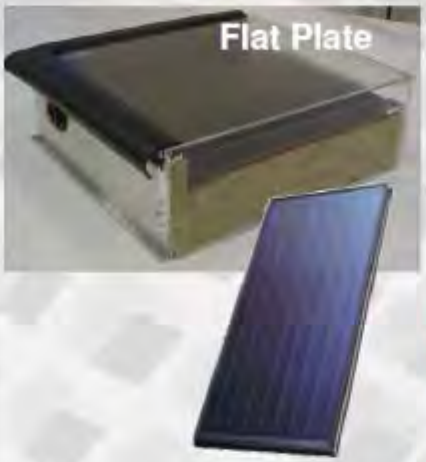
Innovation + Technik

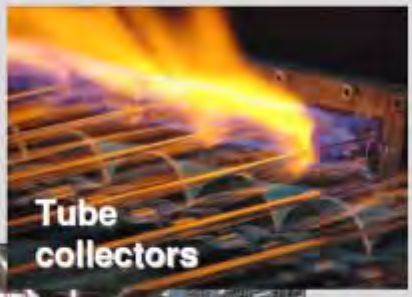


Source: Solarwatt

Saxon technologies for Solar thermal energy

Innovation + Technik





Source: Narva, STI

Growing markets in Poland

Innovation + Technik

Renewables share at total energy consumption:
4 % in 2008, Ziel 15 % in 2020

Future markets:
- Bioenergy, Biogas, Biofuels
- Wind energy
- Small hydro power
- Geothermal energy
- Solar thermal energy

http://www.ure.gov.pl/uremapoze/mapa.html

Funding for companies located in Poland (EU-Co-Financing):
Operational Programme Infrastructure and Environment (1.7 billion € for renewables) → Regional Operational Programmes

EU-Funding programme – Ziel 3

Innovation + Technik

Operational Programme of cross-border collaboration between Saxony - Poland 2007-2013

Cross-border projects for strengthening the economic and social cohesion

Criteria:
- minimum 1 Polish and 1 German partner
- One of them is the "Lead Partner"
- minimum two of four requirements have to be met:
  - joint planning of the project
  - joint execution of the project
  - joint personnel for the project
  - joint financing of the project

SNPL 2007-2013

Eligible contents

Innovation + Technik

Priority 1 (cross-border development)

- Economy and science (**exchange of experience, networking, R&D projects, technology transfer**)
- Tourism and health facilities
- Traffic and communication
- Environment
- Regional policy and regional planning

Priority 2 (cross-border social integration)

- Education and qualification
- Art and culture
- Social infrastructure
- Public security
- Development of a close cooperation
- Small project funds

R&D joint projects in the field of future technologies

FQ invest: max. 50 % for SMEs

500.000 Euro per year and partner

Funding area

Innovation + Technik

Eligible applicants

Innovation + Technik

For Saxony:

- **Agencies**, chambers, associations, foundations, communities
- Health facilities
- Museum, libraries, group of artists
- **Local traffic companies**
- Universities, technology centres, research institutions
- SME, agriculture and forestry companies

For Poland:

- Counties and communities, chambers, foundations, associations, public administrative bodies
- Health facilities
- **Country parks and national parks**
- Cultural institutions, museum, libraries, **NGOs, churches**
- Educational institutions, universities, technology centres, research institutions
- SME, agriculture and forestry companies

7th Research Framework Programme (FP7)

Innovation + Technik

- Strengthening of the scientific and technological basis of the European industry
- Improvement of the international competitiveness
- Additional benefit for Europe → Transnationality (min. 3 countries)

- yearly working programmes, calls, review process (Cordis, EPSS)

- Single programmes (Σ 50.5 billion €, 2007-2013):
  - COOPERATION (joint research projects, 32 billion €)
  - IDEAS (fundamental research, 7.5 Mrd. €)
  - PEOPLE (research scholarship, mobility, 4.75 billion €)
  - CAPACITIES (research infrastructure, 4 billion €)
  - NUCLEAR RESEARCH (ITER, 1.75 billion €)

- eligible: companies, research institutions, universities
- FQ: 50-75 % for joint projects, 50 % for demonstration projects

Competitiveness and Innovation Framework Programme (CIP)

Innovation + Technik

- Improvement of the competitiveness and the innovation potential of the EU
- Creation of a convenient framework for the cross-border cooperation between SMEs
- Support of SMEs when adopting
  - new information, communication and environmental technologies
  - Eco-innovations
  - Energie efficiency, Renewable Energies
- Working programmes and support measures, calls

Competitiveness and Innovation Framework Programme (CIP)

Innovation + Technik

- Sub programmes (3.6 billion €, 2007-2013):

Intelligent Energy Europe (730 Mio. €)

→ Transfer of demonstration projects into profitable products,
→ PR measures,
→ Implementation of energy specific legal rules,
→ Erection of local energy agencies

Entrepreneurship and Innovation (2.2 billion €)

→ Start-up financing,
→ Eco-innovations: products, processes, services,
→ SME support for internationalisation and networking through Enterprise Europe Networks,
→ Conferences

Innovation + Technik

Thank you for your attention!

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Tel. +49 351 4865-421
Email: may@eesa-sachsen.de
www.eesa-sachsen.de

Energy Regulatory Office

Renewable Energy Sources and Combined Heat and Power

Paweł Płachecki
Department of Energy Enterprises
RES and CHP Unit

Energy Regulatory Office

Introduction

1) legislative background,
2) targets for consumption of electricity from RES and CHP,
3) RES and CHP electricity support mechanism,
   a) certificate of origin,
   b) circulation and redemption property rights,
   c) substitute fee,
   d) controlling of fulfilling the obligation,
4) RES and CHP capacity and electricity generation,
5) résumé.

Energy Regulatory Office

Legislative background

The Act of 10th April 1997 – Energy Law (Journal of Laws 2006, No 89, position. 625 with later changes)

Ordinance of Ministry of Economy of 14th August, 2008 on detailed range of obligations for obtaining and presenting for redemption of certificates of origin, for making substitute fees as well as for purchasing of energy and heat produced from renewable energy sources and confirmation of data concerning the quantity of electricity produced from renewable energy sources. (Journal of Laws 2005, No 261, pos. 2187)

Ordinance of Ministry of Economy of 26th September 2007 on method data processing and detailed range of obligations for obtaining and presenting for redemption of certificates of origin, for making substitute fees and confirmation of data concerning the quantity of electricity produced from high efficiency cogeneration. (Journal of Laws 2007 No 185, pos. 1314)

Energy Regulatory Office

Targets for consumption of electricity from RES

Indicative target outlined for Poland in the EU Directive 2001/77/EC dated September 27, on supporting of production of energy from renewable energy sources on the internal market, amounts to **7,5** %*) in 2010.

Below numbers (described in the Ordinance of Ministry of Economy of 14th August, 2008), shall determine the way of reaching the indicative targets outlined in the EU Directive:

1) **7,0** % - 2008,
2) **8,7** % - 2009,
3) **10,4** % - 2010,
4) **10,4** % - 2011,
5) **10,4** % - 2012,
6) **10,9** % - 2013,
7) **11,4** % - 2014,
8) **11,9** % - 2015,
9) **12,4** % - 2016,
10) **12,9** % -2017.

electricity sold to the final customers connected to the grid on the territory of the Republic of Poland

*) Renewable energy share within total energy usage in 2010.

Energy Regulatory Office

Targets for consumption of electricity from CHP

Below numbers (described in the Ordinance Ministry of Economy of 26th September, 2007) shall determined the way of reaching the indicative targets of CHP technologies :

Small (under 1 MW) or gas CHP:

2,7 % in 2008
2,9 % in 2009
3,1 % in 2010
3,3 % in 2011
3,5 % in 2012

Other CHP:

19,0 % in 2008
20,6 % in 2009
21,3 % in 2010
22,2 % in 2011
23,2 % in 2012

electricity sold to the final customers connected to the grid on the territory of the Republic of Poland

Energy Regulatory Office

RES and CHP electricity support mechanism

All RES and CHP have **licenses** granted by the President of the Energy Regulatory Office (ERO).

RES and CHP produce two items: energy and certificates of origin.

Priority of transmission electricity from RES and obligation of purchase of all RES electricity by the official energy supplier (at average electricity sale price in the preceding calendar year, 155,44 PLN/MWh in 2009).

Priority of transmission electricity from CHP and obligation receipt of all CHP energy for the distribution or transmission system by the DSO or TSO.

Energy Regulatory Office

Certificates of origin

Certificates of origin are issued by the President of ERO at Producer of energy from RES or CHP request.

First of all certificate of origin contains: type (RES or CHP) name and address of the energy enterprise which generates electricity; name, location, type and capacity source; amount generated electricity submitted by the electricity system operator (TSO or DSO); period in which electricity was generated.

Certificates of origin are issued in two forms: as a paper document for Producer and as electronic information sending to the Polish Power Exchange

Energy Regulatory Office

PREZES

Warszawa, dnia _____ maja 2007 r.

SWIADECTWO POCHODZENIA

Nr PL0011146/WOB/02/05555/2007

Zaswiadcza się, że niżej wymieniona ilość energii elektrycznej została wytworzona w odnawialnym źródle energii:

Rodzaj źródła: elektrownia wodna

Moc zainstalowana: 5800 MW

Lokalizacja źródła: FFFFFF

Wytwórca: DDDDDDDD S.A.
ul. Ks. J. Popiełuszki 2, 17-000 MMMM

Okres wytworzenia energii: 1 stycznia 2007 r. – 31 marca 2007 r.

Ilość energii elektrycznej objęta świadectwem:

1 733,880 MWh

Prezes
Urzędu Regulacji Energetyki
z upoważnienia

Energy Regulatory Office

PREZES
URZĘDU REGULACJI ENERGETYKI

Warszawa, dnia .... października ... r.

ŚWIADECTWO POCHODZENIA
Z KOGENERACJI
Nr

[illegible]

Wytwórca	
Lokalizacja źródła	
Typ źródła	
Moc zainstalowana	
Okres wytworzenia energii	
Ilość wytworzonej energii elektr.	
Oszczędność energii pierwotnej	
Wykorzystane paliwo	
Ciepło użytkowe	
Kwalifikacja świadectwa	[illegible]

Rodzaj	Wartość opałowa [kJ/kg]	Ilość

Sposób wykorzystania	Ilość [GJ]
Ogrzewanie i przygotowanie ciepłej wody użytkowej	
W przemysłowych procesach technologicznych	
W chłodniach wyk. ciepło do produkcji chłodu	
Własne wytwarzanie chłodu	
Łącznie	

[illegible]

Prezes
Urzędu Regulacji Energetyki
z upoważnienia
Wiceprezes

Adnotacja o opłacie skarbowej:
[illegible]

Wiesław Wójcik

Energy Regulatory Office

PREZES
URZĘDU REGULACJI ENERGETYKI

Warszawa, dnia .... października ... r.

ŚWIADECTWO POCHODZENIA
Z KOGENERACJI
Nr

[illegible]

Wytwórca	
Lokalizacja źródła	
Typ źródła	
Moc zainstalowana	
Okres wytworzenia energii	
Ilość wytworzonej energii elektr.	
Oszczędność energii pierwotnej	
Wykorzystane paliwo	
Ciepło użytkowe	
Kwalifikacja świadectwa	[illegible]

Rodzaj	Wartość opałowa [kJ/kg]	Ilość

Sposób wykorzystania	Ilość [GJ]
Ogrzewanie i przygotowanie ciepłej wody użytkowej	
W przemysłowych procesach technologicznych	
W chłodniach wyk. ciepło do produkcji chłodu	
Własne wytwarzanie chłodu	
Łącznie	

[illegible]

Prezes
Urzędu Regulacji Energetyki
z upoważnienia
Wiceprezes

Adnotacja o opłacie skarbowej:
[illegible]

Wiesław Wójcik

Energy Regulatory Office

Circulation and redemption property rights

When certificates of origin are register on the Polish Power Exchange databases of the information about certificates of origin, they become the property rights at this moment.

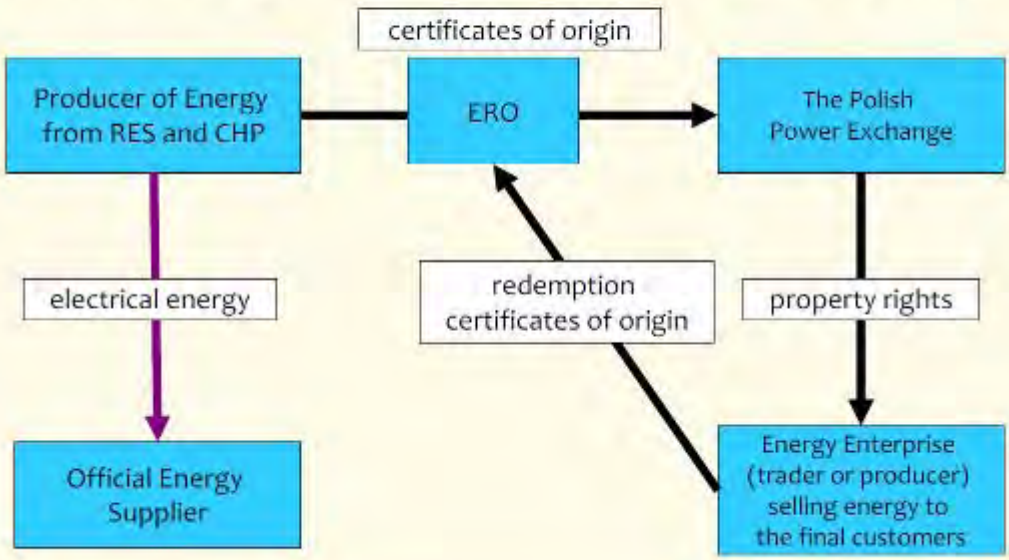
The property rights arising of the certificate of origin are transferable and constitute an exchangeable commodity.

Upon a motion of the energy enterprise (which sells electricity to the final customers connected to the grid on the territory of the Republic of Poland) which is holder of the property rights arising of the certificate of origin, President ERO redemption the certificate of origin by the decision, completely or partially.

Redemption decision confirms fulfillment obligation regarding electricity from RES and CHP completely or partially.

Energy Regulatory Office

Pictorial diagram of RES and CHP support system



Energy Regulatory Office

Substitute fee

Energy companies selling energy to the end users connected to the grid on the territory of the Republic of Poland, are obligated to:

–Receive and present for redemption a RES and CHP energy certificate of origin to the President of the Energy Regulatory Office, or

–Pay a substitute fee accordingly to the number of missing certificates of origin.

The substitute fee shall constitute the revenue of National Fund for Environmental Protection and Water Management and shall be paid to separate bank account of Fund by 31 March each year.

Energy Regulatory Office

Level of substitute fee regarding RES

$$O_z = O_{zj} \times (E_o - E_u)$$

according to art. 9a point 2:

O_z – substitute fee in PLN,

O_{zj} – substitute fee unit 258,89 PLN/MWh in 2009,

E_o – the amount of electricity which is based on the obligation to acquire and present certificates of origin for redemption in the given year in MWh,

E_u – the amount of electricity which been documented in the certificates of origin presented by the energy enterprise for redemption in the given year in MWh.

The substitute fee unit O_{zj} is subject to an annual revaluation using the average annual total customer goods and services price index for the calendar year.

Energy Regulatory Office

Level of substitute fee regarding CHP

$$O_{zs} = O_{zg} \times E_{og} + O_{zk} \times E_{ok}$$

Where:

O_{zs} – a substitute fee in PLN

O_{zg} – a substitute fee unit not lower than 15% and not higher than 110% of average electricity selling price on competitive market (gas cogeneration sources and with installed capacity below 1 MW), 128,80 PLN/MWh in 2009,

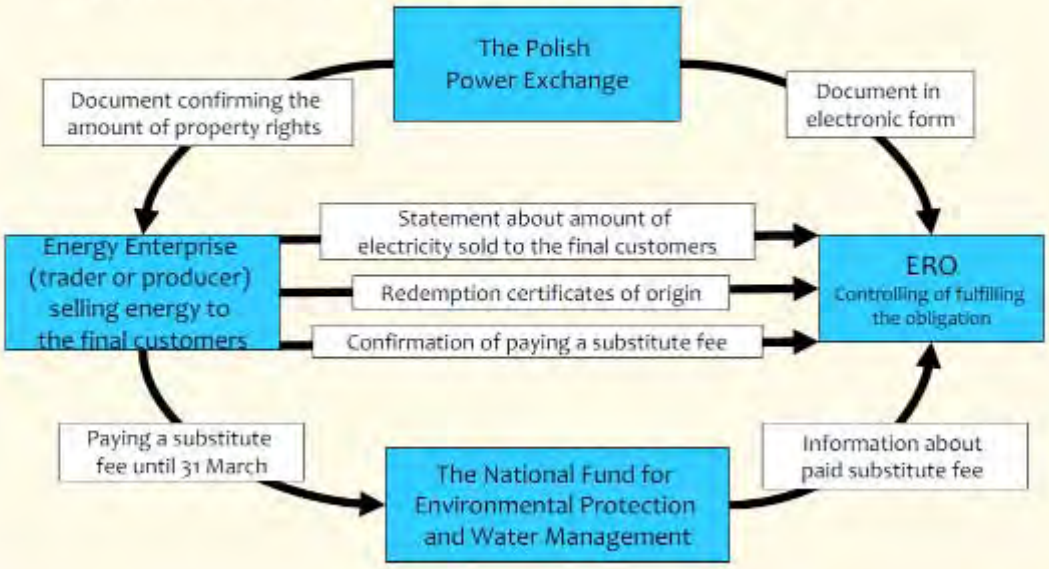
E_{og} – the amount of electricity which is equal the difference between the amount of electricity referred to the quota obligation for gas cogeneration units or below 1 MW, and the amount of electricity which has been documented in the certificates of origin issued for those units, presented by the energy enterprise for redemption in the given year in MWh,

O_{zk} – a substitute fee unit not lower than 15% and not higher than 40% of average electricity selling price on the competitive market (other cogeneration sources), 19,32 PLN/MWh in 2009

E_{ok} – the amount of electricity which is equal the difference between the amount of electricity referred to the quota obligation for CHP units above 1 MW of installed capacity and not fired with gas and the amount of electricity which has been documented in the certificates of origin issued for those units, presented by the energy enterprise for redemption in the given year in MWh.

Energy Regulatory Office

System of controlling fulfilling the obligation



Energy Regulatory Office

Level of penalty

The penalty for not meeting the obligation of submitting the certificate of origin to redemption or paying substitute fee cannot be lower than:

$$K_o = 1{,}3 \times (O_z - O_{zz})$$

Where:

K – Penalty in a given year in PLN,

O_z –The amount due (calculated according to art. 9a point 2 for RES or calculated according to art. 9a point 8a for CHP) substitutefee in the current year (in PLN),

O_{zz} – Substitute fee paid in the current year in PLN.

The penalty for not fulfilling the obligation of submitting the certificate of origin of RES and CHP to redemption or paying substitute fee is the income of the National Fund of Environmental Protection and Water Management.

Energy Regulatory Office

RES Capacity

31.12.2008

RES technology	Capacity [MW]		
	2007	2008	2009*
Photovoltaics	0	0	**0,001**
Biogas	45,699	54,615	**69,105**
Solid biomass	255,390	231,990	**246,490**
Onshore wind	287,909	451,090	**666,332**
Hydro	934,779	940,576	**944,130**
Co-fired	-	-	-
Total	**1 523,777**	**1 678,271**	**1 926,058**

* 30.09.2009

Energy Regulatory Office

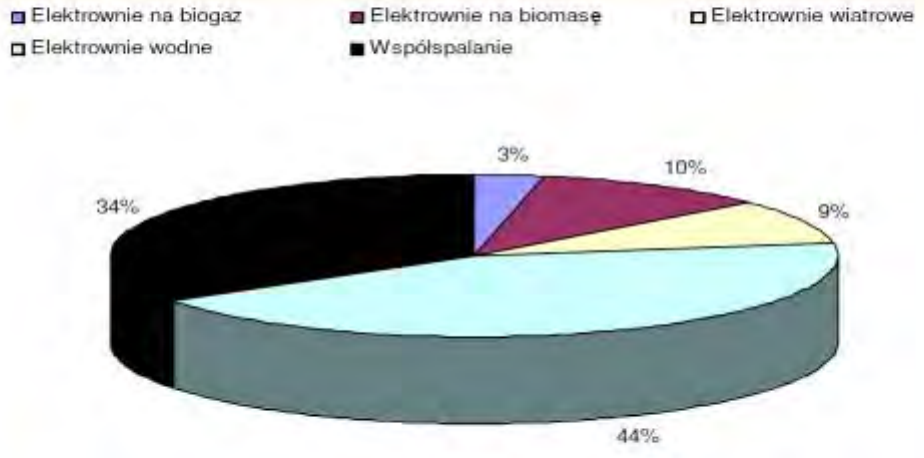
RES electricity generation

31.12.2008

RES technology	2005	2006	2007	2008	
	amount [MWh]	amount [MWh]	amount [MWh]	amount [MWh]	amount SP
(1)	(2)	(3)	(4)	(5)	(6)
Biogas	104 465,281	116 691,863	161 767,939	**246 092,336**	**569**
Solid biomass	467 975,678	503 846,206	545 764,936	**468 970,004**	**55**
Onshore wind	135 291,628	257 037,412	472 116,429	**722 598,940**	**1 107**
Hydro	2 175 559,099	2 029 635,604	2 252 659,312	**1 916 940,101**	**4 252**
Co-fired	877 009,321	1 314 336,612	1 797 217,058	**2 166 404,745**	**102**
Total	**3 760 301,007** (5 150 SP)	**4 221 547,697** (4 223 SP)	**5 229 525,674** (5 739 SP)	**5 521 006,126**	**6 085**

Energy Regulatory Office

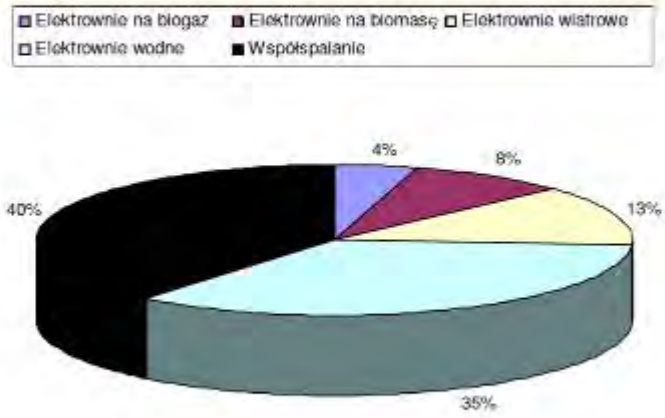
RES Energy mix 2007



Energy Regulatory Office

RES Energy mix 2008

31.12.2008



Energy Regulatory Office

CHP electricity generation

31.12.2008 r.

RES technology	2007 (first half-year)		2008	
	amount electricity [MWh]	amount SP	Amount electricity [MWh]	amount SP
(1)	(4)	(5)	(6)	(7)
Other	9 405 003,581	97	14 709 751,237	254
Small (under 1 MW) or gas	1 112 971,93	23	2 249 178,451	94
Total	**10 517 975,506**	**120**	**16 958 929,688**	**348**

Energy
Regulatory Office

Changes, modifications, future plans

- certificates of origin for installation fired methane from the mine,
- certificates of origin for biogas pumped to grid,
- two types certificates of origin for one amount electricity,
- micro scale sources and problem with licenses for them,
- how support more expensive renewable technology ?
- mixed support system ?
- white certificates for energy efficiency,
- electricity coloring.

Thank you for your attention

Energy
Regulatory Office

Status and perspectives of development of renewable power engineering in Poland, research priorities and possibilities of financing

Grzegorz Wiśniewski

Institute for Renewable Energy

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Potential and possibilities of using renewable energy sources in Poland until 2020

Renewable energy resources:

Point of departure for plan of actions for RES until 2020 and further...

Real economical potential of renewable energy resources and state of its use for the year 2006

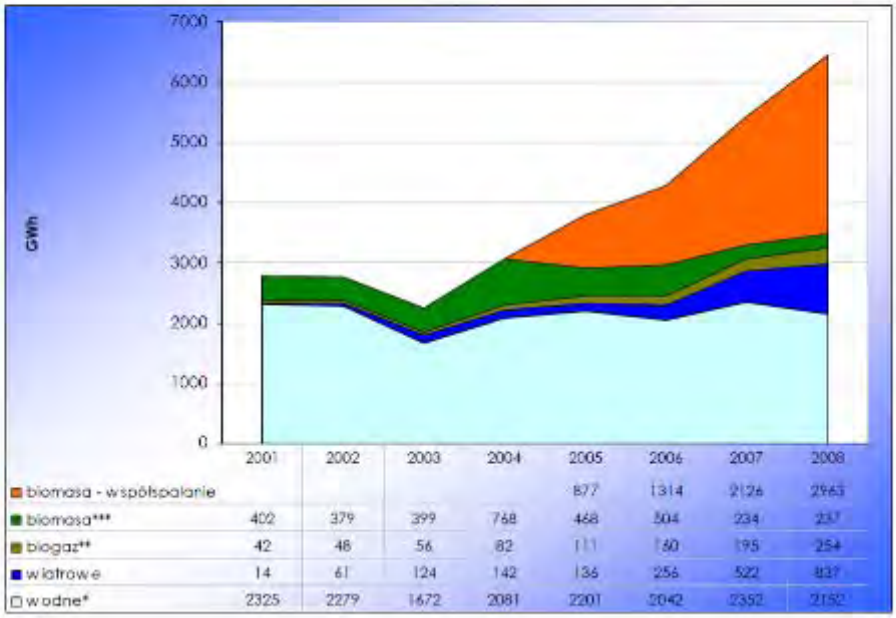
Potential of renewable energy resources	Real economical potential – final energy	State of using the economical potential for the year 2006	
Types of renewable energy resources	[TJ]	[TJ]	[%]
Solar power industry including:	**83 312,2**	**149,8**	**0,18%**
thermal, including:	83 152,9	149,6	0,18%
hot water preparation	36 491,9	149,6	0,41%
central heating	46 661,0	0,0	0,00%
photovoltaic	159,3	0,2	0,11%
Geothermal energy, including:	**12 367,0**	**1 535,0**	**12,4%**
deep	4 200,0	535,0	12,7%
shallow	8 167,0	1 000,0	12,2%
Biomass, including:	**500 187,8**	**192 097,0**	**38,0%**
solid dry waste	165 930,8	160 976,2	97,0%
biogas wet waste)	123 066,3	2 613,0	2,12%
fuel wood (forests)	24 451,8	24 451,8	100,0%
energy farming, including:	286 718,9	4 056,0	1,41%
cellulose	145 600,0	0,0	0,00%
sugar-starch-bioethanol	21 501,0	2 558,0	11,90%
rape-biodiesel	37 980,0	1 498,0	3,94%
corn silage biogas	81 637,9	0,0	0,00%
Water power engineering	**17 974,4**	**7 351,2**	**40,90%**
Wind power engineering, including:	**444 647,6**	**921,6**	**0,21%**
land	377 242,5	921,6	0,24%
sea	67 405,0	0,0	0,00%
Total:	**1 158 469**	**202 055**	**17,4%**

What have we achieved in the present decade until *2010*,

and what are the challenges for 2020?

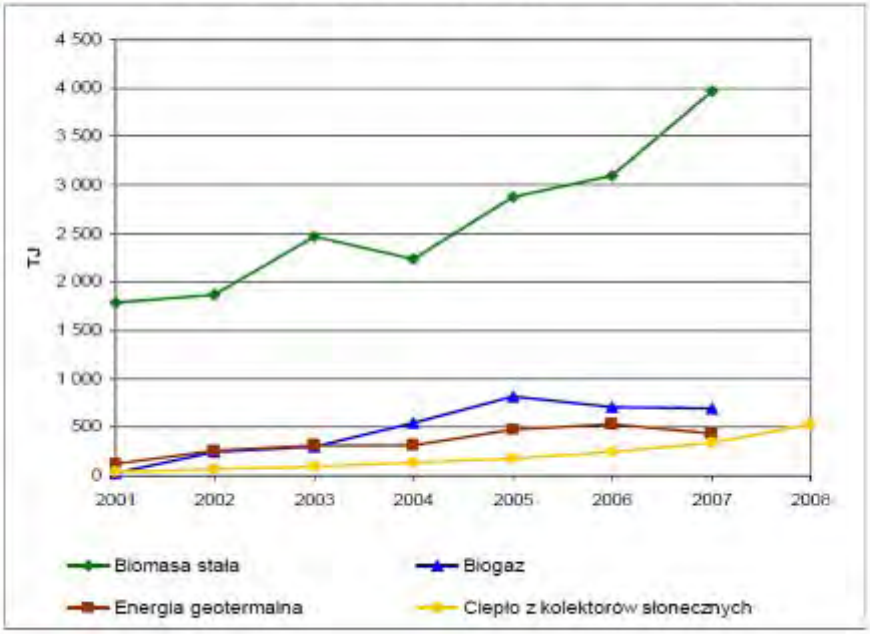
Development of green electric energy production in Poland

Source: GUS and ARE, IEO study

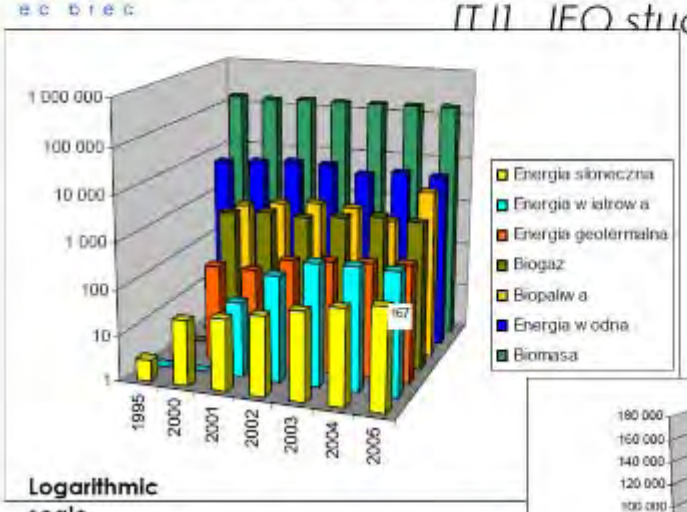


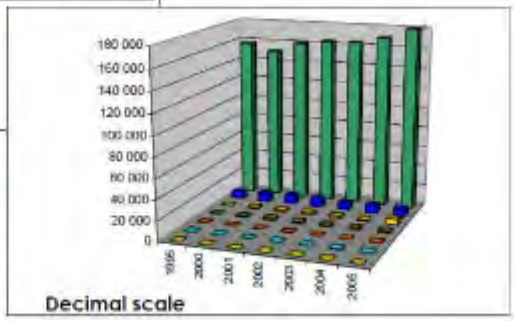
	2001	2002	2003	2004	2005	2006	2007	2008
biomasa - współspalanie					877	1314	2126	2963
biomasa***	402	379	399	768	468	504	234	237
biogaz**	42	48	56	82	111	160	195	254
wiatrowe	14	61	124	142	136	256	522	837
wodne*	2325	2279	1672	2081	2201	2042	2352	2152

Development of green heat production acc. to GUS and IEO (solar energy)



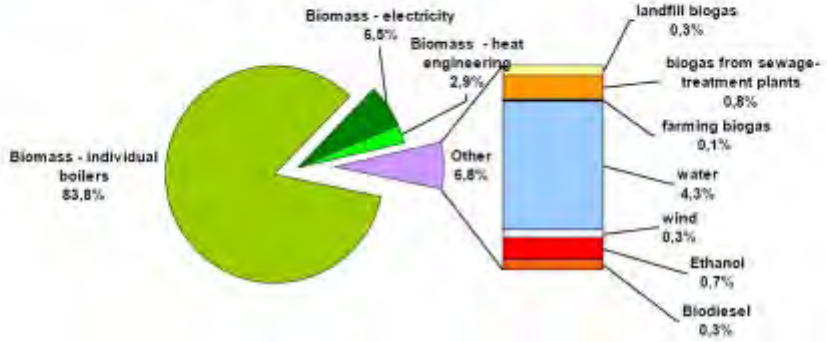
Production of energy from renewable resources in Poland in the years1995-2005, [T.1] - IEO study





Share of biomass: over 90%

Energy carriers supplied to the market from renewable energy sources in2005



Consumption of RES energy (176 PJ) constituted **7,2%** of the total final energy used and it was dominated by biomass (94%) and heat (90%)

In other UE countries, share of the biomass is much lower and on average it comes to about 60% (below 50% in Germany)

RES energy carrier 2005	*TJ*	*%*
Electric energy	15 111	**8,6**
biofuels	1 937	**1,1**
green heat	159 467	**90,9**
Total RES	**176 515**	**100,0**

Selected elements of the 2009/28/EC directive on promotion of using renewable energy sources

1. For the first time in history, each UE member state was given its target amount for the year 2020, (**UE-20% PL-15%**), which is a mandatory goal (legally binding under pain of punitive sanction)
2. Until 2010-06-30, the governments must prepare **national action plans (NAP) for RES,** demonstrating in detail how do they intend to meet their goals;
3. Two or more UE countries can complete **joint projects** (also infrastructural, particularly in the case of trading energy with other countries from outside EU) and make an agreement regarding distribution of the „green" energy. The European Commission will create a website, on which the member states will be able to offer joint projects and so-called „**statistical transfers**" of RES energy surpluses or deficiencies in comparison to the national target values.
4. **Priority of RES access to electrical power networks,** enhancing current regulations, e.g. the 2001/77/EC directive, including: in justified cases – full costs of network development on account of operators, promoting intelligent networks, energy storing, and financial support for development of electric power networks (including heat distribution and gas network – important for promotion of biogas)
5. Active **participation of local governments** in creation and implemetnation of RES is provided for

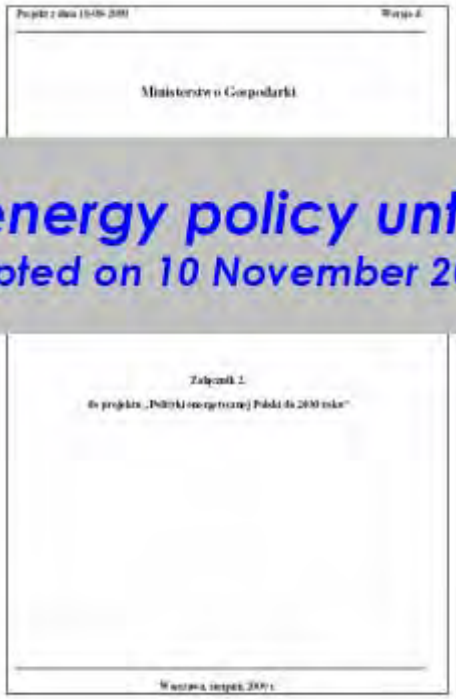
How will the achievement of „15% for 2020" goal for Poland be calculated

*acc. to **2009/28/EC** directive on promotion of using power from Renewable Energy S[illegible]s*

$$15\% = \frac{OZE_C + OZE_E + OZE_B + OZE_{ZWW}}{FZE + PW + S}$$

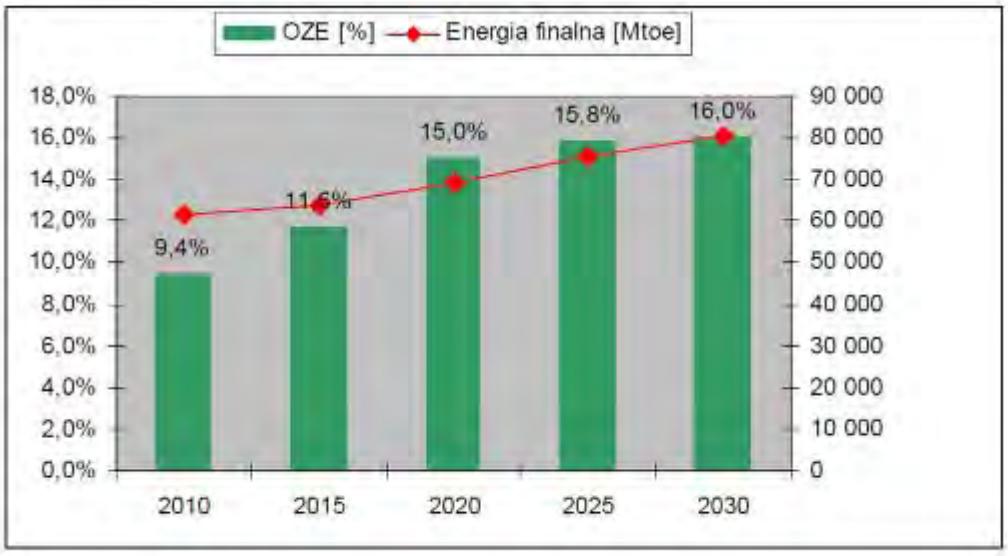
*The package favours **effectiveness** in the whole power industry*

- ➲OZEC -consumption (~production) of green heat [TJ]
- ➲OZEE -consumption (~production) of green electric energy [T[illegible]
- ➲OZEB -consumption (~production) of biofuels [TJ]
- ➲OZE_{ZWW} - consumption of biomass for the needs of renewable energy sources and secondary energy – derivative energy (e.g. heating charges in biogas-works with heat recovered from biogas engine) [TJ]
- ➲FZE -final energy consumption [TJ]
- ➲PW -consumption of energy for the needs of the power engineering sector [TJ]
- ➲S -losses of fuel and energy during transfer and distribution [TJ]

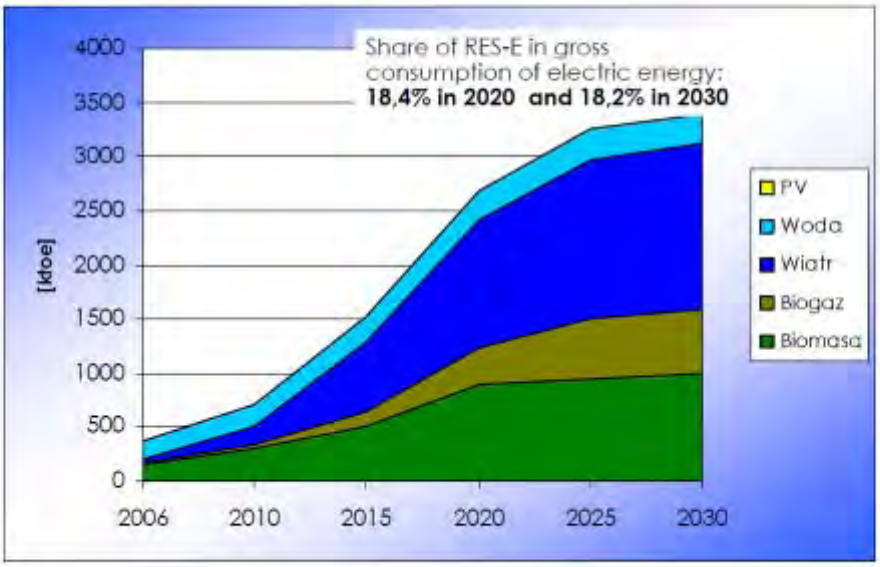


Polish energy policy until 2030
adopted on 10 November 2009

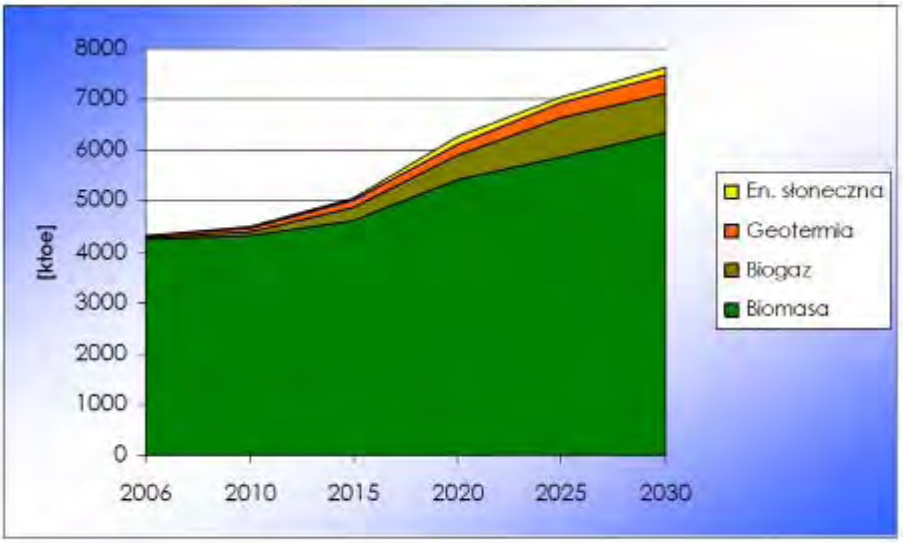
Share of RES acc. to the „Polish energy policy until 2030" (PEP '2030)



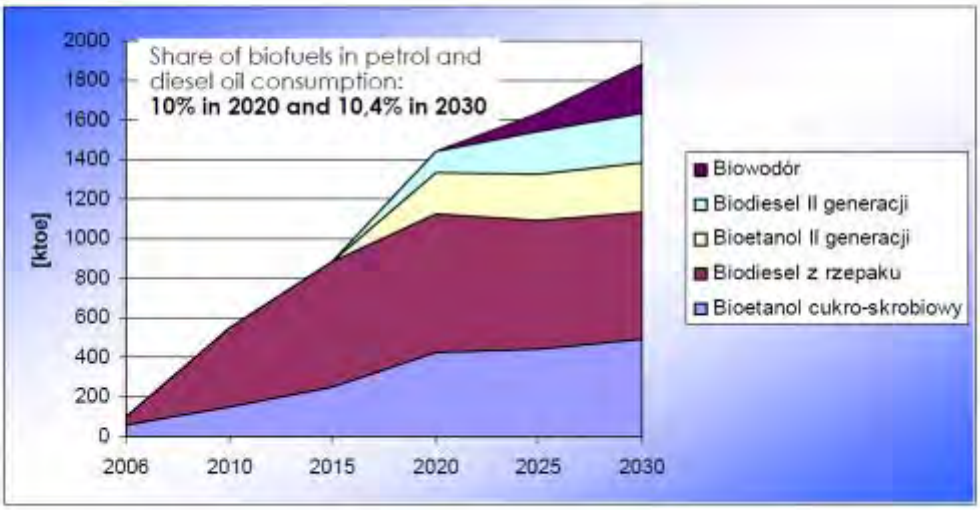
PEP'2030: prognosis for green electric energy



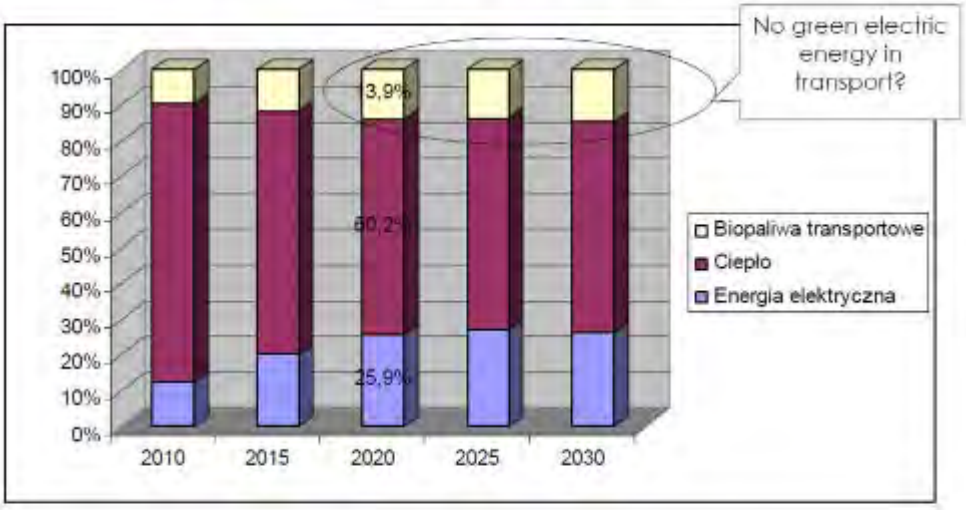
PEP'2030: prognosis for green heat



PEP'2030: prognosis for biofuels



Final share of RES carriers acc. to the „Polish energy policy until 2030"



Gross demand for final energy from RES acc. to PEP'2030 [ktoe] and for lands [tys. ha]

using analyses of Prof. A. Fabera, IUNG

Energy types	2006	2020	Required land surface '2020, thousands of hectares
Electric energy	370,6	2686,6	
Solid biomass	159,2	**892,3**	**351-587**
Biogas	13,8	**344,5**	**38-76**
wind	22	1178,4	
water	175,6	271,4	
Heat	4312,7	6255,9	
solid biomass	4249,8	**5405,9**	**<2076**
biogas	27,1	**503,1**	**55-110**
geothermal	32,2	221,5	
solar	3,6	125,4	
Transport biofuels	96,9	1444,1	
sugar-starch bioethanol	61,1	**425,2**	**605**
biodiesel from rape	35,8	**696,8**	**774**
second generation bioethanol	0	**210**	**61-94**
second generation biodiesel	0	**112,1**	**18-28**
Total final energy RES/cultivation surface	**4780,2**	**10386,6**	**1903 - 4350**
Share of renewable source energy / share of			

Share of biomass in completion of the 15% goal for 2020 is to reach **83%**

What does the 2009/28/EC directive say about sustainability of biomass consumption?

Production of farming raw materials and their conversion into liquid biofuels and energy meets the criteria of sustainable production.

- For liquid and gas biofuels, the criterion is an obligation to prove, using the **LCA** method (Life Cycle Analysis) that liquid fuels will reduce emission of greenhouse gases in the whole production chain by 35% in 2013, by 50% in 2017, and by 60% in 2018 (currently, bioethanol produced from grains and biodiesel made from rape do not meet the requirement of greenhouse gas emission reduction by *2017)*
- Use of green electric energy in transport is promoted *(the multiplier for achieving the directive goal by using green electric drives is 2.5 times higher than for use of biofuels)*
- Due to their biodiversity and various forms of protection, some areas are excluded from production of biomass for the power engineering purposes
- In the case of biomass, the member states promote conversion technologies the energy conversion effectiveness of which is at least 85 % for residential and commercial applications, and at least 70 % for industrial applications (in practice this excludes co-combustion of biomass in coal power plants)

Bold and environmentally sustainable vision of plan of actions in favour of RES until 2020, with a perspective until 2050

Modelling renewable power engineering development scenarios until 2050 – September 2008

Energy [R]evolution = time to change … thinking in and about power industry?

Using the MASEP/Markal model to simulate the RES development scenarios until 2050, considering 2020

„Scenario of providing Poland with clean energy carriers in a long—term perspective"

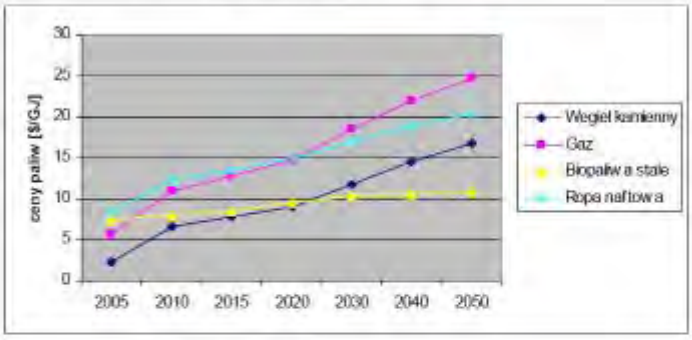
EC BREC Institute for Renewable Energy
DLR Space Research and Technical Thermodynamics Institute in Stuttgart

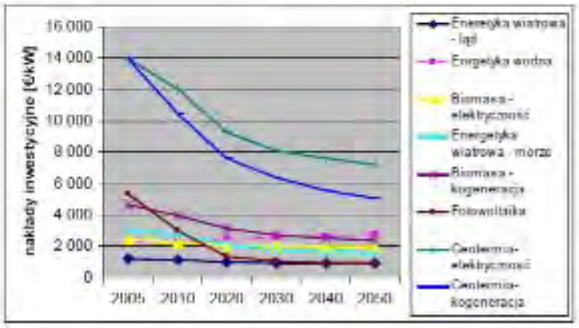
Published by **Greenpeace Poland**, October '2008

http://www.greenpeace.org/raw/content/poland/press-centre/dokumenty-i-raporty/rewolucja-energetyczna-polska.pdf

Assumptions for scenarios -II

Comparison of increase in mineral fuel prices in USD – until 2050 (with constant prices from 2005).

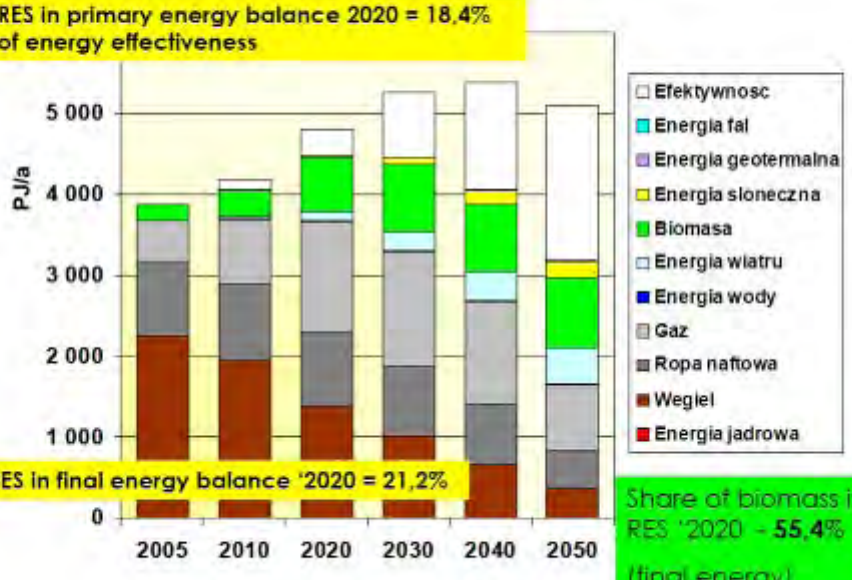




Decrease in amount of individual investment expenditures for renewable technologies which produce electric energy, with constant prices in Euro from 2005

Prognosis of domestic demand for primary energy –Energy [R]evolution

- Share of RES in primary energy balance 2020 = 18,4%
- Key role of energy effectiveness

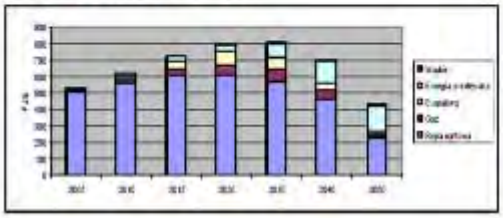


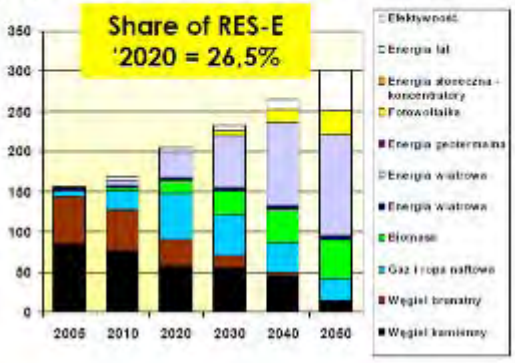
Share of RES in final energy balance '2020 = 21,2%

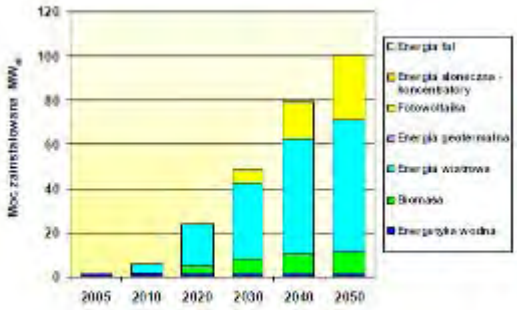
Share of biomass in RES '2020 - **55,4%** (final energy)

Electric energy in TWh/year in the *Energy [R]evolution scenario*

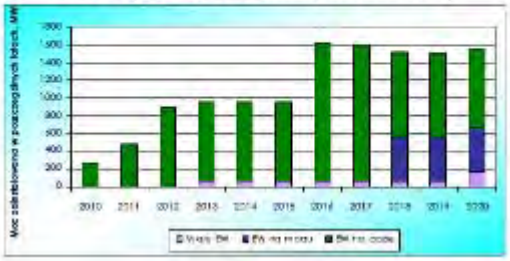
Electricity also in transport





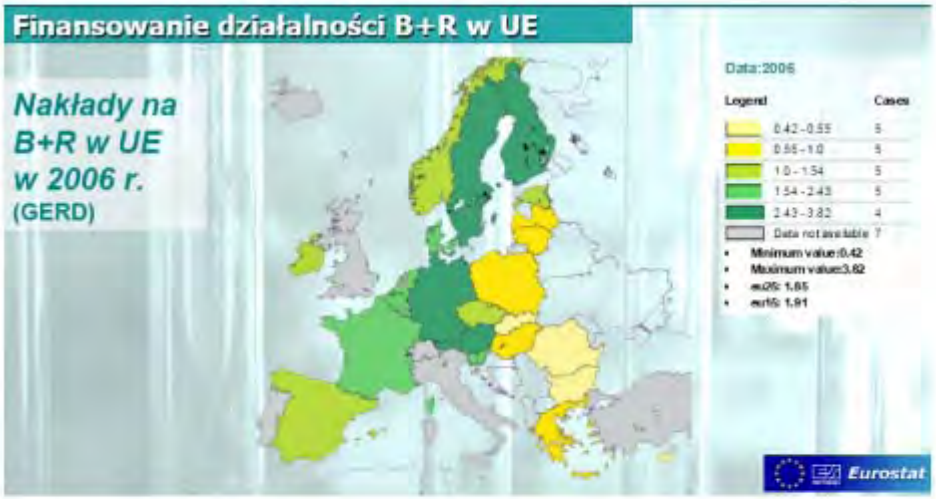


Great significance of wind power industry

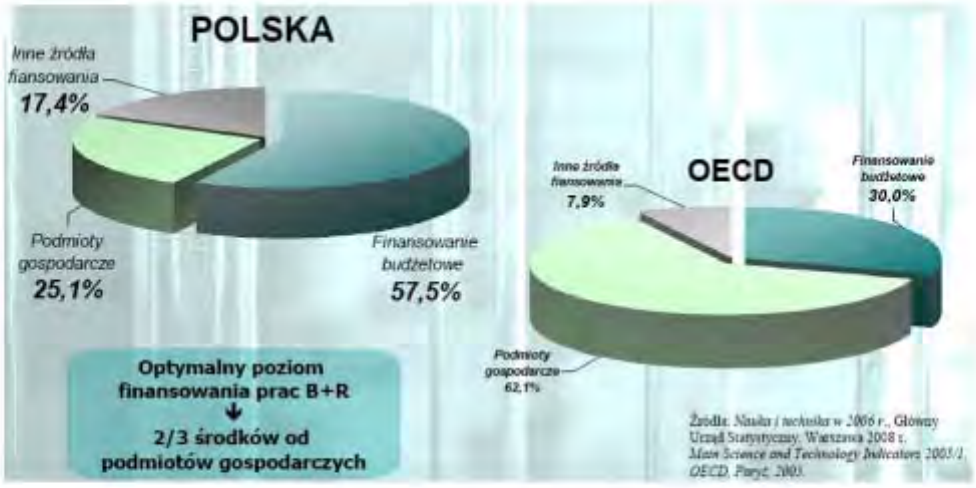


Scientific research and innovations in renewable power industry and financing them

Financing of B+R activity in EU

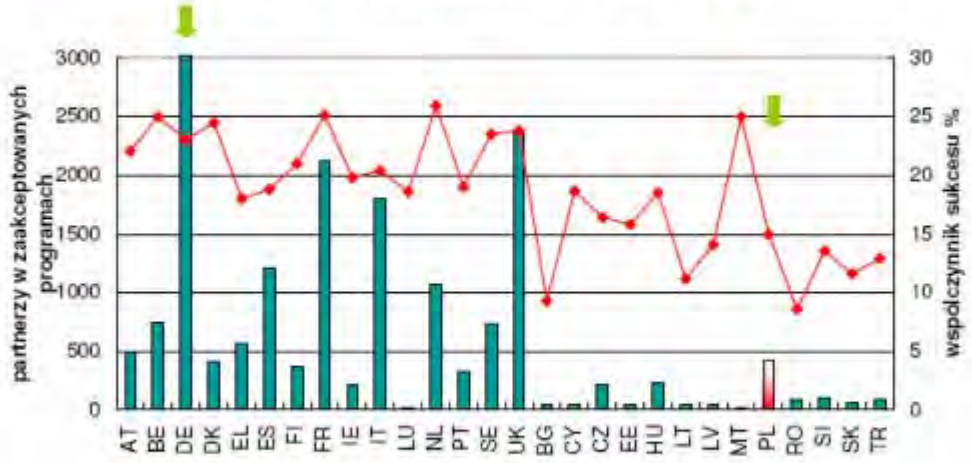


Structure of expenditure on B+R



Large share of financing from the budget, small share of financing by business entities, great significance of EU funds („other sources of financing" on the chart)

Number of programs approved for completion divided into countries (partners) and global success rate in 6 PR EU



Source: „Polityka MNiI w odniesieniu do udziału polskich zespołów Naukowych w Programach Ramowych UE", Warszawa 2006

Great significance of EU structural and cohesion funds EU 2007-2012

Operational Programme Innovative Economy

Action 1.4 Support for research and special purpose projects in favour of companies – 390 million euro (for research),

Action 4.2 support for implementation of B+R programs – 390 million Euro (for investments)

Operational Programme Infrastructure and Environment

Action 10.3 Development of industry for renewable energy sources – allocation of 91 million Euro (including EU contribution of 27 million Euro)

Principles of subsidizing in EU and national programmes for innovations

	Subsidizing level	Minimal value of qualified expenses	Deadline for applications	Implementing institution
10.3 Development of industry for RES, OPI&E	up tp 70%	20 million	III/IV quarter 2009	IPiEO
1.4-4.1Support for research and development and implementation of works results, OPIE	30-70% depending on status and region	400 thousand	01.11-30.11 2009	PARP
4.3 Technological credit, OPIE	40-70% - technological bonus	-	Permanent	BGK
4.4 New investments of high innovative potential, OPIE	40-70% depending on the region	8 million	28.09-30.10.2009	PARP
Special purpose projects NOT	50-80%	-	Cyclically every 6 months	NOT
IniTech	100%- research stage, 50%- industrial research, 25%	-	Announced cyclically	NCBiR

Current financing of power industry programmes by Ministry of Science

Source: *Jerzy Tokarski – NCBiR*

Projects	Start	End	Total subsidizing	Completed projects
Research	2002-2007	2006-2010	**21 400 000**	**4 300 000**
Special purpose	2000-2008	2001-2010	**12 100 000** 47 900 000	**1 800 000** 2 600 000
Commissioned Research *	2007	2010	**32 9000 000**	**32 9000 000**
Development	2006-2007	2008-2010	**18 200 000**	**15 800 000**
			84 600 000	**54 800 000**

** In the years 2007-2010, one research project, ordered from the RES scope entitled „Modern technologies for power industry application of biomass and bio-degradable waste – conversion into energy gas fuels" is financed. Coordinator: Institute of Power Engineering*

National Scientific Research and Development Works Programme (KPBNiPR)

Decision of Minister of Science and Higher Education on establishing a National Scientific Research and Development Works Programme of **2008-10-30**
and on implementation of the Programme by the National Centre for Research and Development (NCBR)

Priority research areas:

1. Research area- „Society under conditions of safe, fast and sustainable social-economic development"
2. Research area - „Health„
3. **Research area - „Energy and infrastructure„**
4. Research area - „Modern technologies for economy"
5. Research area - „Environment and agriculture"

Research area no. 3 in (KPBNiPR): Energy and infrastructure

3.3. DEVELOPMENT OF ALTERNATIVE ENERGY SOURCES – RENEWABLE NUCLEAER, BASED ON HYDROGEN, AND OF NEW TECHNOLOGIES LEADING TO INCREASE IN RELIABILITY, EFFECTIVENESS OF PRODUCTION, PROCESSING, STORAGE AND TRANSFER OF ENERGY

3.3.1 Development of safe and ecological technologies of production and storage of energy from renewable sources (combustion and gasification of biomass, integrated systems – steam and gas micro power plants, bio-refineries and biogas-works, using wind, geothermal and water sourc solar power engineering, fuel cells).

.....

Strategic programme „Advanced technologies of acquiring energy"

Carried out on behalf of MNiISW by NCBiR

„The is mostly oriented at results of those scientific research which have the highest chances of being applied and fully implemented. It exposes Polish scientific and technological specialities, basing on the main fuel raw material which is, and continues to be, coal, as well as aon alternative energy sources."

GOALS:

The goal of the strategic program is to carry out the *3x20 Strategy*, included in the European Commission announcement of 2007-01-10, which assumes that until 2020, in the total EU balance, in comparison to 1990, it is necessary to:

1. Improve energy effectiveness by 20%,
2. Increase share of renewable energy up to 20%.
3. Reduce CO2 emission by 20%.

Basic research tasks in the programme *Advanced technologies of acquiring energy*

The programme budget is PLN 300 million.

1. Technologies which increase effectiveness of electric power production

2. Technologies of oxy-combustion of coal for effective and low-emission production of electric energy

3. Technology of coal gasification for highly-effective production of energy and fuels

4. **Technologies of renewable power engineering, including alternative**

The first announced research task in the scope of renewable power engineering: **„Development of integrated technologies of producing fuels and energy from biomass, farming waste and other waste"**

Summary

1. The domestic potential of renewable energy sources makes it possible for the share of energy from renewable sources in the balance of final energy consumption oin Poland to reach over 21% in 2020, and almost 60% in 2050.
2. The 2009/28/EC directive on promotion of RES is a good solution for Poland – it is an ambitious challenge, but absolutely possible to achieve by 2020.
3. Although Poland is not among the EU leaders in respect of innovativeness and resources for B+R, demonstrates one of the highest dynamics of increase in financing of science and innovative potential
4. Power engineering, including renewable power engineering, is becoming gradually more important in research programmes
5. There is a lot of potential for international cooperation in renewable power engineering (e.g. biogas, wind and solar power engineering) and regarding innovations in this

Thank you for your attention

Questions/contact:
gwisniewski@ieo.pl

Additional documents and discussion:

- www.ieo.pl (news)
- www.odnawialny.blogspot.com)

renac
renewables academy

Poznan, 25 November 2009

Capacity Building - driver for the international implementation of RET

Tina Völker, Renewables Academy AG

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renewables academy

What do we need to implement renewables I

- Government an other stakeholders´ comittment
- Ressource assessment
- Secure legal framework to develop a stable market
  - Feed-in tarif, quota system, tax exemptions, loans, etc.
  - Grid access and grid integration
- Liable technology

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What do we need to implement renewables II

- Financing
- Strong and reliable institutions, strong dedication and driving force
- Qualified and specialized staff
- Public awareness / end-user awareness

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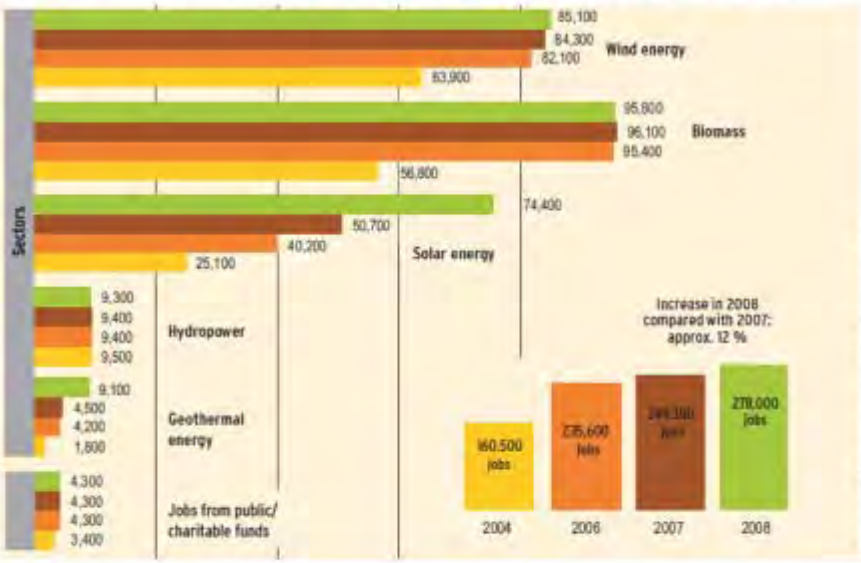
Jobs in the renewable energy industry in Germany



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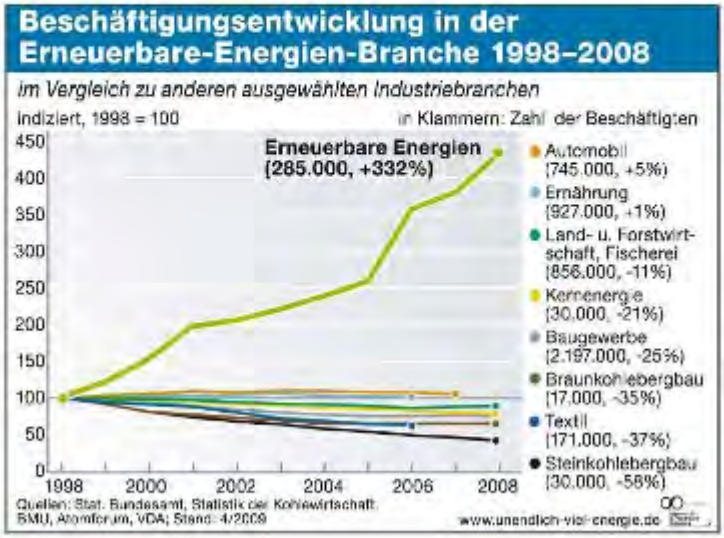
Job development in the renewables industry



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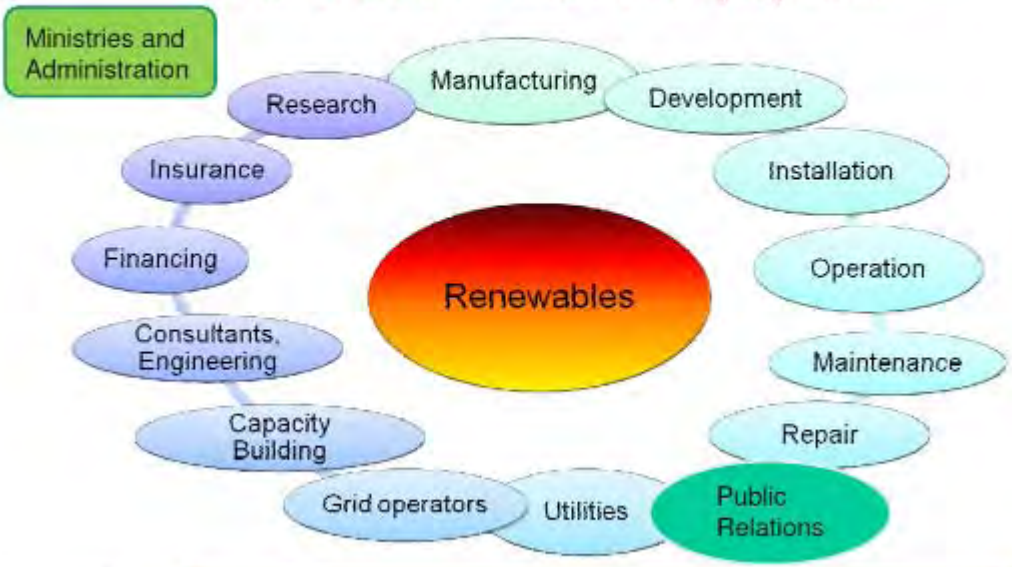
Renewables – areas of employment



4 areas and target groups for capacity building

- Legal frameworks and administration > decision makers and staff public bodies
- Technology > technicians, engineers, project developers, grid operators
- Financing > banks and other financing institutions
- Public relations > press and media to inform general public
- Differentiation regarding status of development > industrialized nations, emerging and developing nations

How to develop a strategy for capacity building in a country?

- Involving relevant stakeholders
- Analysing skills of local staff
- Analysing which further expertise is necessary in order to match the needs of a new industry (solar, wind, biogas, etc.)
- Getting advice from countries who already are successful in the renewables sector
- Preparing, implementation of training
- Evaluation

Approach to education

- University courses on renewable energy in general or specified (bachelor and master degrees), e.g. solar master program of the Technical University of Berlin in cooperation with RENAC
- Focus on/integration of renewables in existing university courses (electrical engineering, etc.)
- Vocational training and education of specialists in the companies of the sector
- Further education and training for working people on various issues
- Pilot projects to experience the whole project cycle

IRENA

- Capacity Building: Further education for Governments/ Ministries to support creation of suitable frameworks for the implementation of RET
- Exchange of know-how and experience on an international level

The Renewables Academy AG – a private further education company

Further education and training at RENAC

- Technology focus:
  - Photovoltaics, solar thermal, concentrating solar power (CSP)
  - Wind energy and grid integration
  - Energie efficiency
- Courses:
  - A combination of lectures and practical training
  - Courses in English

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renewables academy

Further education and training at RENAC

- Content:
  - Political and legal framworks for renewables
  - Technical and engineering courses
  - Calculation of profitability and financing
  - Project development and project management
  - International market access, merketing and sales
- Target groups - national and international
  - Companies of energy- and supplier industry
  - Project developers
  - Insurances and financing institutions
  - Public bodies

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renewables academy

RENAC participants

Conclusions

- Growth of the renewable energy industry depends on qualified staff
- Trained and specialised staff is one of the most relevant prerequisites for the sustainable implementation of renewable energy technologies in a country
- YES! Capacity Building is a driver for the international implementation of renewable energy technologies!

Thank you!

Contact

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Decentralized Energy supply – Strategy and Best practice

Jan Kallok

deENet | Competence Network Distributed Energy Technologies

KompetenznetzeDeutschland deENet

Climacy policy: outlines

Climate and energy targets of the European Union

Until 2020:

- cutting greenhouse gases by 20% of 1990 levels
  (fewer emission allowances)
- increasing share of Renewables to 20% of total consumption
  (national binding targets: from 10%/Malta to 49%/Sweden)
- cutting Energy consumption by 20%
  (improving Energy Efficiency)

Regional Energy supply

New Structures of Energy Supply: Close Cooperation of Renewables and Energy Efficiency

Requirements:

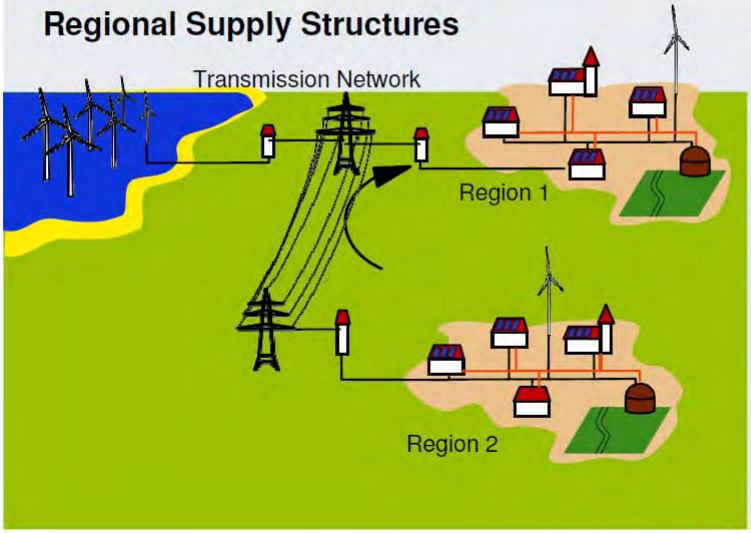
- An increase of energy efficiency requires technological progress as well as completely new user's behaviour
- A massive expansion of RES requires maximum utilisation also of regional RES potentials
- Both requirements are supported by regional supply structures

Regional Energy supply

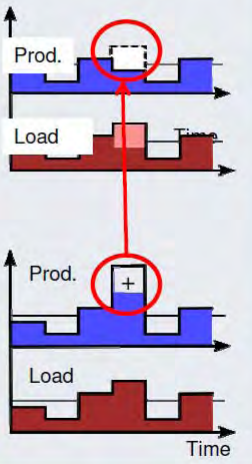
Region | Municipality | Settlement | Building

Regional Energy supply

Regional Supply Structures



Energy Flow (15-min-intervall)



Regional Energy supply

Changing Energy Economy Framework Conditions as a Chance for Regions

To be expected until 2030:

- Electricity from RES is abundant and gets less expensive than fossil fuels:
  - At coastlines wind energy will be the cheapest way to generate electricity
  - PV achieves „grid-parity" around 2015, afterwards electricity from solar energy is cheaper than from the grid
- The heat demand for buildings gets negligible, the solar heated house is standard
- The local traffic is operated predominantly electrical, biomass goes into combined heat and power (CHP)

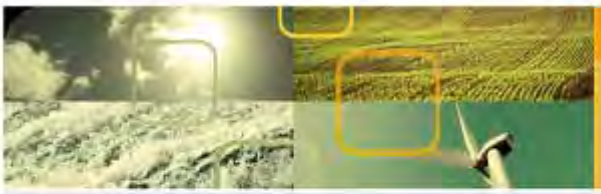
Regional Energy Supply as an Economical Pillar for Regions:

- An all-embracing approach allows the formation of new industrial complexes / clusters
- New structures of supply will be the **economical and social motor for regions**! Effects on…
  - Work and employment
  - Research and development
  - Construction and habitation
  - Tourism
  - Education and qualification
  - Finance
  - City marketing

➢ For this reason the regional energy policy is the **centre zone of business development**

Creation of new Jobs in Regions

- Preferably **wide value chains** in the region
  - R&D, purchase (raw materials), production (trade), sales etc.
- Application of RES / energy rehabilitation of buildings etc. in the region - **small trade firms**
- Participation of the sector in booming global markets for decentralized energy technology –**technology firms**
- Utilisation of the regional raw material base (wood, biomass etc.) – **agricultural sector**
- Successful marketing of regional generated products on regional markets – **strengthen regional cycles**
- Close networking and regular exchange, realization of synergy effects – **formation of clusters**



deENet – Competence Network Distributed Energy Technologies

deENet - Facts & Figures

- Founded in **2003** by regional Industry and University in Kassel as an association
- Today deENet has more than **110** members (Companies, University Departments, Research Institutes, Associations etc.)
- 9 fields of competence
- Main objectives is regional value creation: common R&D activities, joint initiatives to open new markets, development of demonstration and pilot projects etc.

Nothern Hesse – a model region

Development of a „Roadmap 2020" for Northern Hesse

Methodology:

- External Environment Analysis
- Trend Scenarios
- Interviews
- Best Practise Examples
- Workshops

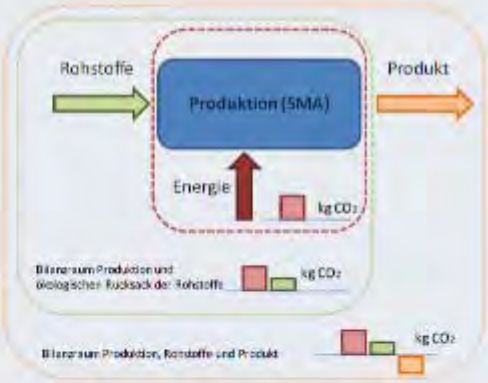
Main Objective:

- Creation of 20.000 new jobs (2020)
- 100% regional / decentralized electricity generation (2035)
- Innovation leadership for decentralized energy supply and energy efficiency

Carbon neutral production

Carbon neutral Factory

- Building and technical equipment
- Climate efficiency by RES
- Avoidance of CO_2-Emissions over the life-cycle of the product



Funded by: Hesse environmental Ministry

Duration: 2007-2008

Partners: upp, ZUB, Seeger, SMA

Thank you for your attention!

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Energie mit System
deENet


Offshore networks integration
Bogdan Gutkowski
Polish Wind Energy Society in Gdansk


Offshore networks integration
Creation of integrated European offshore network will contribute to construction of uniform, European electric power market, advantageous for all the customers.

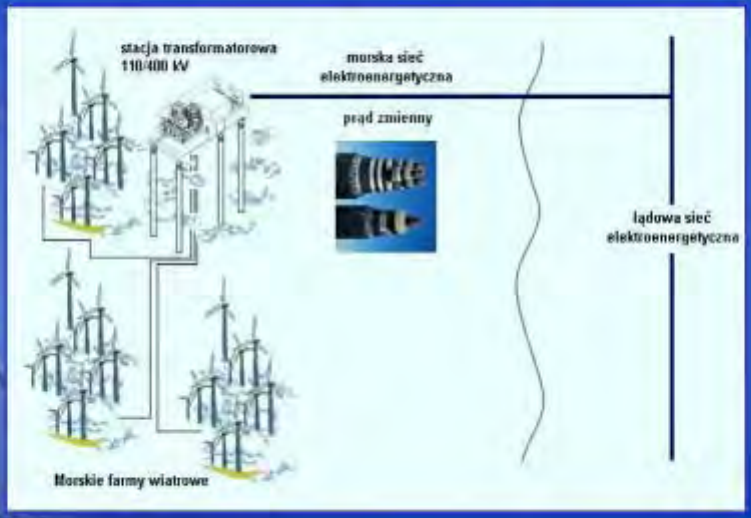
Goals / Effects

- Providing remote OWFs with access to network
- Increasing electric power transmission capacity at sea
- Possibility of selling power generated by OWF to more than one country, and trading it between individual countries
- Possibility of connecting with other offshore OZEs (waves, tides)
- Improvement of European energy safety

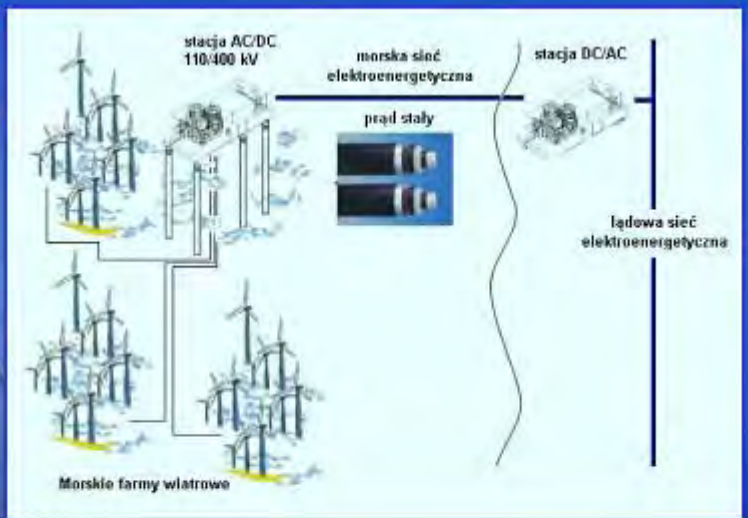
Basic terms

- **HVDC** technology (High Voltage Direct Current), i.e. Technology of electric energy transmission using direct current, with high enough voltage
- **HVAC technology** (High Voltage Alternating Current) technology of electric energy transmission using alternate current, with high enough voltage
- **VSC - Voltage Source Converters** (Light) state of the art generation of AC to DC and DC to AC converters, based on a new type of thyristors, allowing to generate almost perfect sinusoids
- **FACTS devices** enable better use of the existing infrastructure by increasing its flexibility and control capabilities

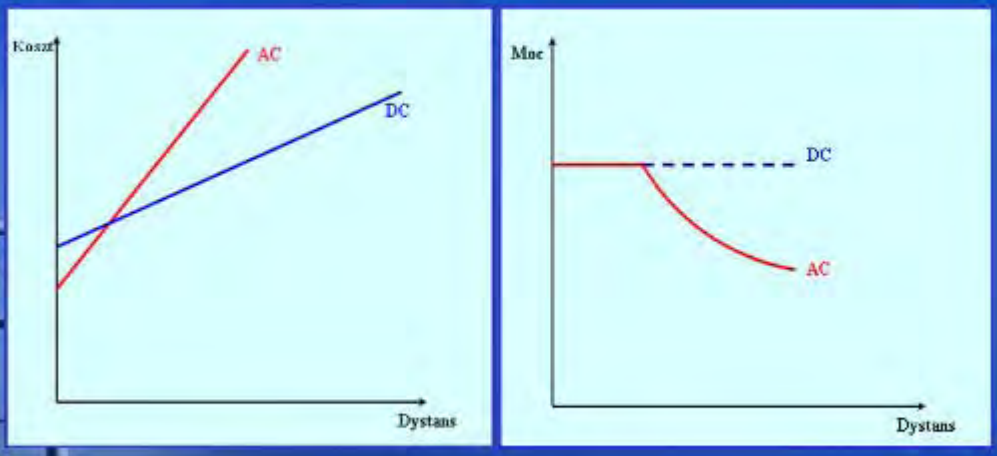
Example of connecting OWF via cable network using HVAC



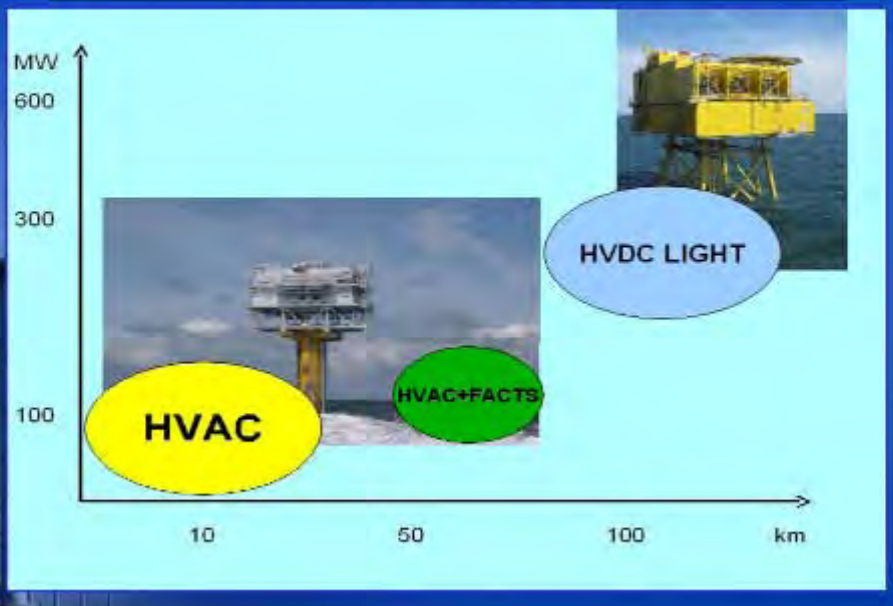
Example of connecting OWF via cable network using HVDC



Reasons for switching from HVAC to HVDC



Offshore transmission technologies



Connection methods, e.g. Kriegers Flak

	(A) Odzielny, połączenie MFW z sieciami krajowymi	(B) Połączenie kombinowane w technologii AC	(C) Połaczenie HVDC oparte na technologii VSC (bez Kriegers Flak 1)	(D) Połaczenie hybrydowe oraz wydzielone połączenie AC Kriegers Flak 1
Koncepcja				
Typ rozwiązania	Oddzielny	Kombinowany	Kombinowany	Kombinowany
Maks. moc wymiany międzysystemami Nordel - UCTE	0	400 MW	600 MW	1000 MW

Probable development

Stage I: Local Networks (domestic)

Appointing and implementing coordinated connection of wind power stations at the national level

Stage II: Switching to international network

Multilateral network planning process. Completing pilot projects of connecting wind power stations to various energy markets (e.g Kriegers Flak). Optimization of the HVDC VSC technology based on the acquired experience, followed by adjusting subsequent planned offshore connections to the OWF connection

Stage III: International network

Step-by-step completion of the planned investments which form international integrated offshore network

Concept of integrated offshore networks system

International connection projects recommended by EAEC

Lp	Nazwa Projektu	Kraje	Moc (MW)	Status	
1	NorNed	Norwegia - Niemcy	700	Uruchomione	
2	Skagerak	Norwegia - Dania	940		
3	Linia HVDC	Francja - Wlk. Brytania	600		
4	Kontek	Niemcy - Dania	600		
5	Linia HVDC	Niemcy - Szwecja	300		
6	SwePol	Szwecja - Polska	600		
7	Linia HVDC	Szwecja - Wyspa Gotland	260		
8	Estlink	Finlandia - Estonia	350		
9	Fenno Skan	Szwecja - Finlandia	500		
10	Moyle	Irlandia Płn. - Szkocja	500		
1	Great Belt	Dania	600	2010	Planowane/w budowie
2	Fenno Skan II	Szwecja - Finlandia	800	2011	
3	BritNed	Wlk. Brytania - Holandia	1000	2011	
4	EastWest	Irlandia - Walia	500	2012	
5	Estlink II	Finlandia - Estonia	700	2013	
6	Upgrad	Norwegia - Dania	350		
7	Nordbalt	Szwecja - Litwa	700 - 1000	2016	

Needs for standardizing solutions

- Involvement and coordination of interested countries' actions
- Improvement of land networks
- Technology development and optimization of VSC network
- Common procedures regarding the electric energy market
- Balancing: contracts and agreements between countries
- Agreements with OSP
- Various domestic systems of supporting wind power stations
- Diverse, free and complex system of entitlements

Concept of „Polish Offshore Networks"

The concept of **Polish Offshore Networks** anticipates construction of undersea high voltage cable lines, together with the necessary infrastructure.

The role of **Polish Offshore Networks** is to transfer electric power generated by the offshore power stations to the land National Power System, or to other European countries.

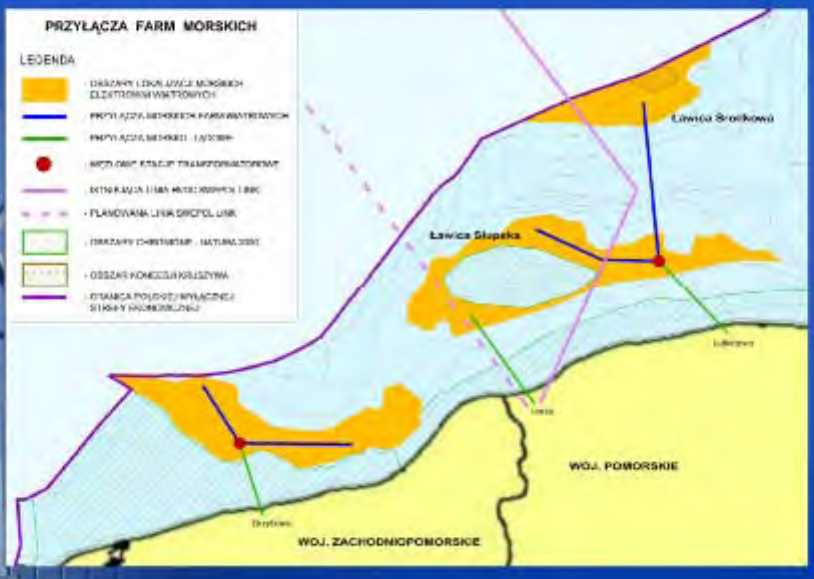
Concept of „Polish Offshore Networks”

The simplified system of *Polish Offshore Networks* consists of two basic network elements with separate functions :

- Service Lines of Sea Wind Farms
- Sea-Land Service Lines

Transformer stations are included in the system.

Concept of „Polish Offshore Networks”

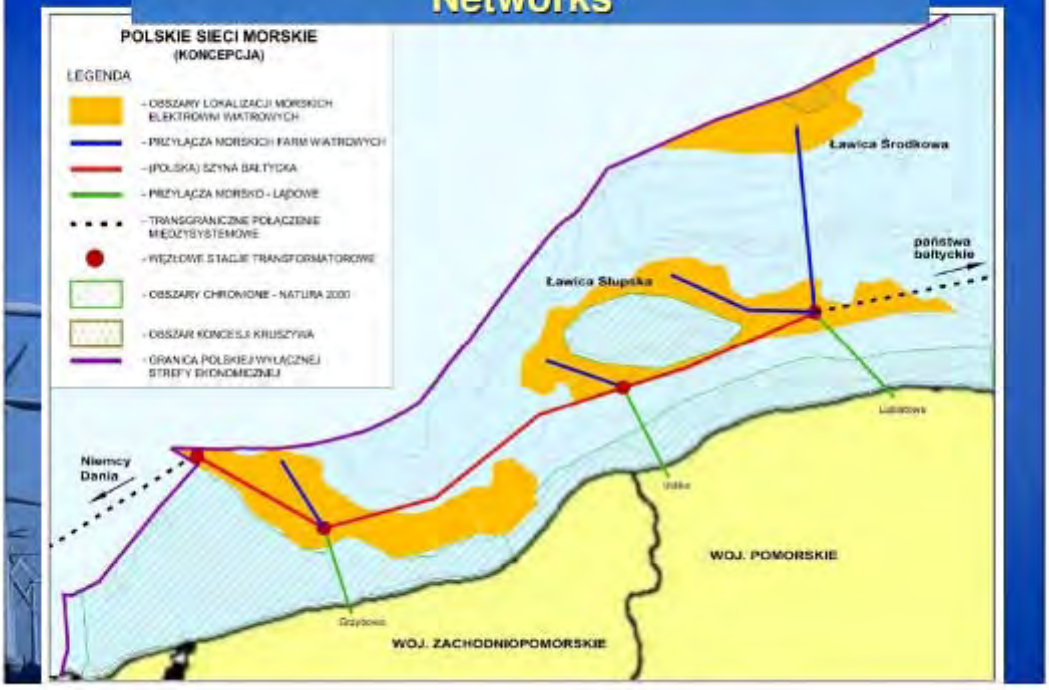


Concept of „Polish Offshore Networks"

Depending on the European Offshore Networks development direction after 2030, the completed system of *Polish Offshore Networks* (vision until 2050) may consist of additional network elements:

- (Polish) Baltic Rail
- Cross-border line towards Baltic States Denmark and Germany (elements of BalticGrid)

Concept of „Polish Offshore Networks"



Thank you for your attention

Polish Wind Energy Society in Gdansk
ul. Jaśkowa Dolina 75, 80-286 Gdańsk, Poland
www.ptew.pl
e-mail: ptew@ptew.pl

Innovation Forum – Renewable energies
German-Polish Cooperation in favour of Innovations and Sustainable Development
25 November 2009, Poznań

Solar thermal power engineering in Poland: market and concept of development rom the perspective of industry and fitters

based on report

Concept of solar power industry development with a plan of actions until 2020

Aneta Więcka

Institute for Renewable Energy

Solar Panel 20x2020

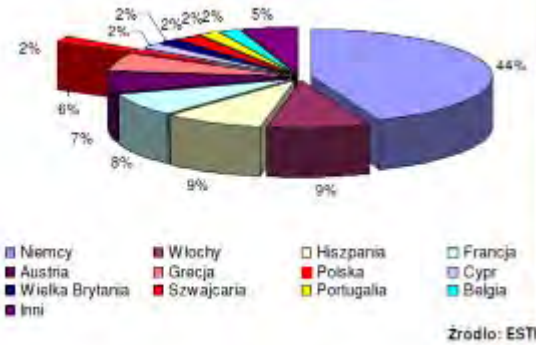
www.ieo.pl

Presentation plan

- Current status
- Financing and public support
- Thermal solar power industry development scenario until 2020
- System of proposed support instruments
- Advantages for the economy

Solar collectors sales market

- Poland at the 7th place in respect of sales of solar collectors (at present, 365 000 m2 of solar collectors have been sold in Poland, and over 27 million m2 in Europe)
- 2 % share in the European sales market
- 40 manufacturers of solar collectors



Źródło: ESTIF

Location of the largest manufacturers of solar collectors

Surface area of solar collectors installed in 2000-2008

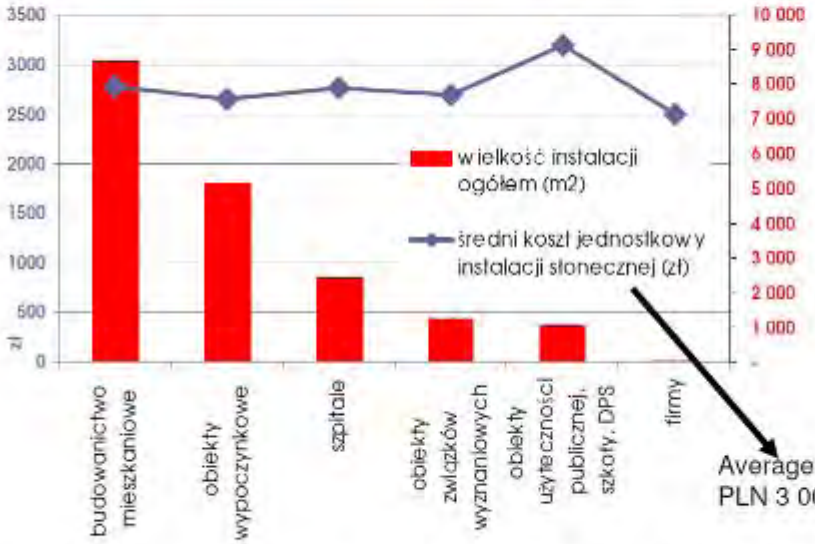
Average return rate – 43%

Source: Institute for Renewable Energy market research

Financing and public support for the sector

www.ieo.pl

Ecofund



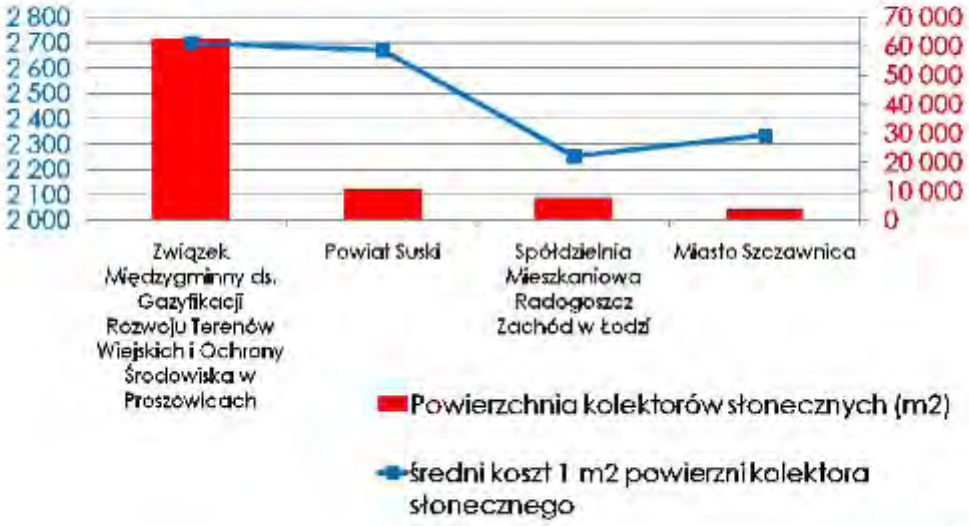
Total active surface area installed in 2008-2009 thanks to support from the Ecofund - 18,5 thousand m2

Average unit cost – about PLN 3 000

Źródło: opracowanie własne na podstawie danych Ekofunduszu

www.ieo.pl

NFOŚiGW



PLN 24 million /year – amount of support for the solar thermal power industry in Poland in 2005-2008

Renewable power industry sectors operating on green electric power and biofuel markets, apart from subsidies at the investment stage can count on support at the operation stage, in the form of excise tax relieves and sales of the so-called green certificates.

For comparison, over PLN 700 million were alloted for supporting the green energy at the operation stage!!!!!

Estimated percentage shares in financing of solar investments until 2013

Fund	Estimated share of the funds in financing of solar investments
ROP	48,0%
WFOŚiGW	28,4%
POIŚ	12,1%
NFOŚiGW	4,9%
County and commune environmental protection funds	6,7%
Total	100%

The estimated total possible scale of subsidizing investments in the solar power engineering in this period (until 2013), which is about PLN 280 million, will be available via national environmental protection funds, with smaller share of the UE funds than in the case of other RES technologies.

www.ieo.pl

Concept of solar power industry development with plan of actions until 2020 – contribution of the Polish industry towards the Executive plan: Path of developing use of renewable energy sources until 2020 (Plan of actions)

Panel of Solar Power Systems Device Manufacturers and Fitters
(Solar Panel *20x2020*)

ACTION · Ferroli · JUNKERS Grupa Bosch · RAPID · SCHÄFERSOLAR · sunex · Vaillant · VIESMANN climate of innovation · watt

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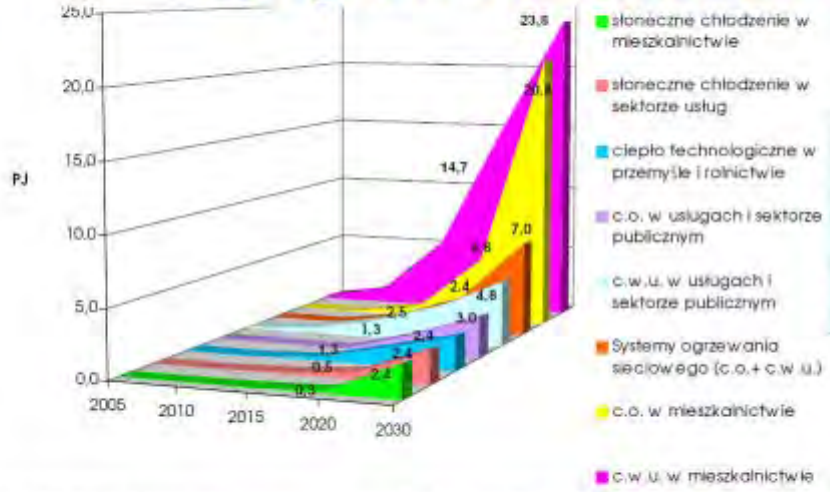
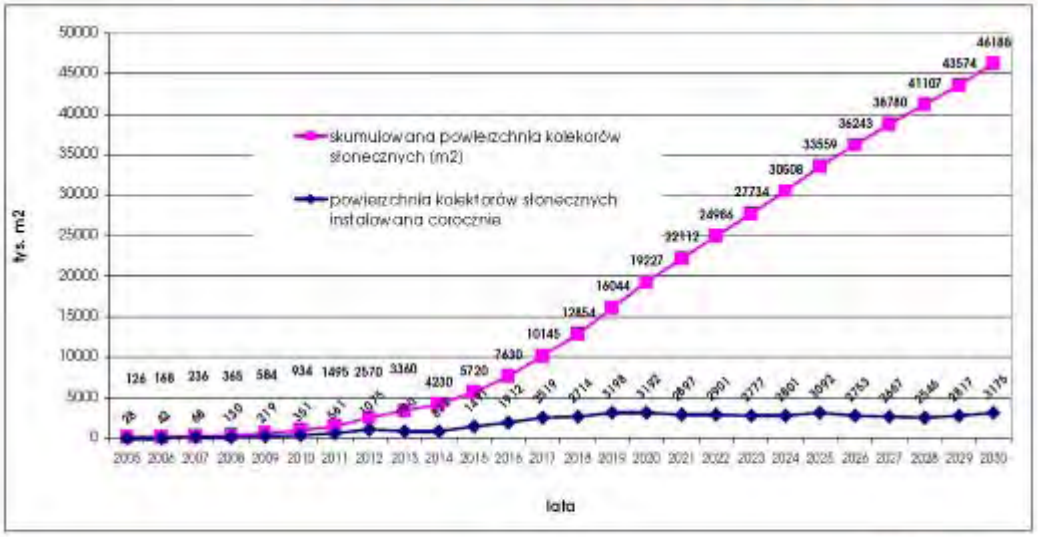
Contribution of the solar power industry towards coverage of local energy demand in Poland until 2030



Total of 28 PJ (20 million m2) until 2020

Share of solar power in:	2005	2010	2015	2020	2030	2040
Use of green heat	0,1%	0,7%	2,9%	7,5%	14,1%	23,0%
total use of green power	0,1%	0,4%	1,5%	4,4%	7,9%	11,5%
total use of heat	0,0%	0,1%	0,5%	1,8%	4,2%	8,3%

20 million m2 of solar collectors for 2020



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Proposed new instruments for support of the solar power industry sector

Support instruments	Expected result	Target group	Starting and finishing date
1. Subsidies, 30% of investment expenditures	5 million m^2 surface area of installed solar collectors	Single-family houses' owners	2011-2013
2. Subsidies, 50% of investment expenditures	1,2 million m^2 surface area of installed solar collectors	Public sector, industry and farming	2011-2013
3. Income tax relieves PIT, up to PLN 10 000	13,7 million m^2 surface area of installed solar collectors	Single-family houses' owners	2012-2017
4. Training fitters and certifying them as part of 50% subsidy provided by ecology funds	30 thousand trained fitters	Solar system fitters, manufacturers and distributors of solar collectors	2013-2020
5. Nation-wide education and information campaign financed by ecology funds, PLN 10 million	Change in social behaviour of potential solar system users	Owners and administrators of dwelling houses, tourist facilities, schools and other educational centres	2010-2020
6. Supporting development works concerning solar power industry, PLN 100 million, budget for research	Reduction of solar system cost and more extensive use in the building industry	Colleges (polytechnics), Institutes, Research laboratories Bodies certifying solar power industry devices	2010-2020

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PLN 180 million /year for solar power industry

In order to maintain public funding support for the solar power industry sector in the years 2009 – 2014 at the required average level of 12% of total investment funds, the annual amount of subsidies in that period should reach PN 180 million per year (this is the scale of subsidies which are currently granted to 4-5 other projects in other RES sectors) and it should be allocated in a cost-optimal manner, which guarantees the highest number of new installations with the given pool of resources for subsidizing, as well as the highest quality of the traded goods and services.

The solar power industry should be treated fairer and more seriously than it is now, it should be considered as a beneficiary in the next period of UE funds programming (2014-2020).

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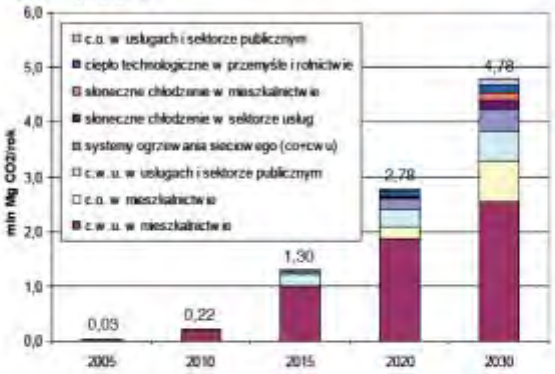
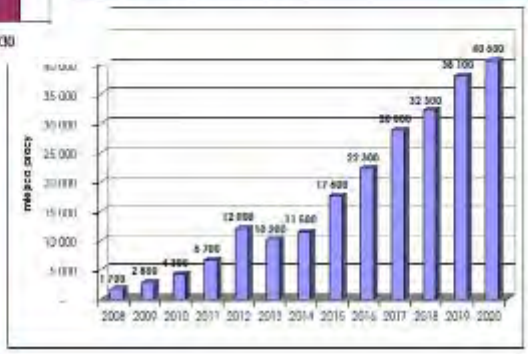
Advantages for the economy



In 2020, the number of jobs in Poland will increase to over 40 000 full-time positions, whereas, according to a forecast of the European Renewable Energy Council (EREC), employment in the solar thermal power industry in UE in 2020 will increase up to 660 000 jobs, being the highest in the whole RES sector.

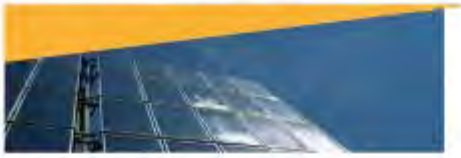
Reduction of emitting CO_2 to the atmosphere, amounting to 30 thousand tons / year in 2005 thanks to the solar thermal power industry, with the assumption of realizing the proposed scenario will increase to almost 2,8 million tons/year in 2020 and 4,8 million tons/year in 2030.



Solar Panel Declaration

Deklaracja

Panelu Producentów Urządzeń i Instalatorów Systemów Energetyki Słonecznej



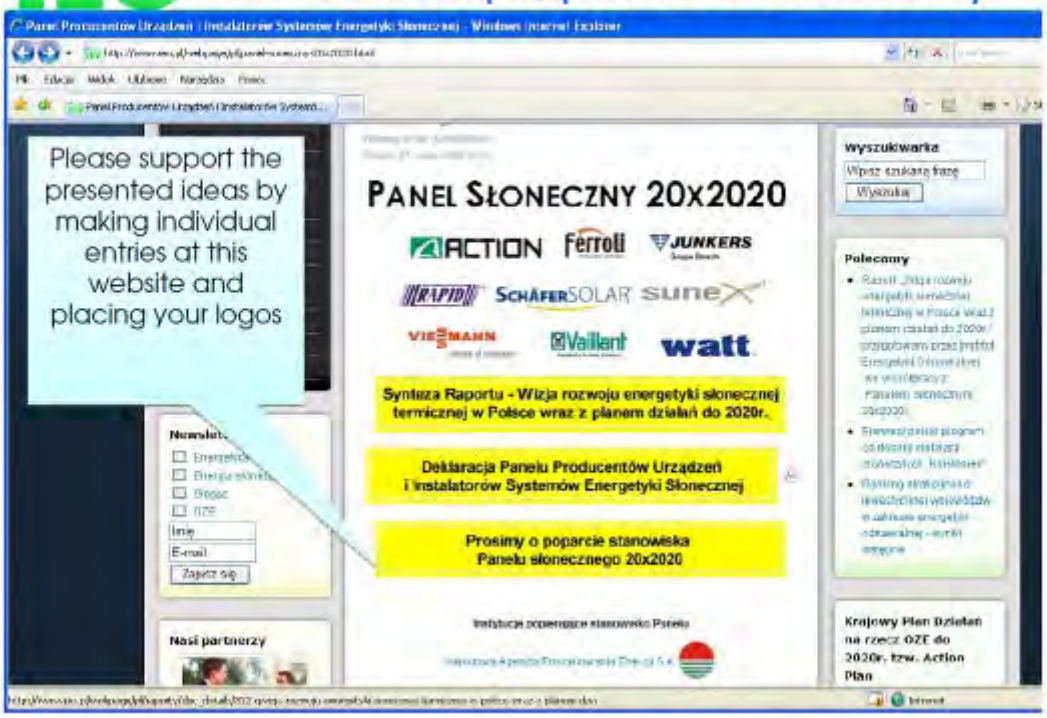
My, niżej podpisani członkowie Panelu deklarujemy, że:

Oraz apelujemy:

Członkowie:

ACTION
Ferroli
JUNKERS
RAPID
SCHÄFER SOLAR
sunex
Vaillant
VIESMANN
watt

www.ieo.pl/panelsloneczny



Thank you for your attention

Contact:

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More information:

www.ieo.pl/panelsłoneczny

German – Polish- cooperation
In the field of Solar Heat

NARVA GmbH + Co. KG
Germany

www.narva-bel.de

HEWALEX SOLAR COLLECTORS
Poland

www.hewalex.pl

Products / Portfolio

NARVA
Manufacture of fluorescent lamps and Vacuum tubes

→ Fluorescent lamps since 1966
→ Vacuum tubes for solar thermal applications since 2005
- Direct Flow
- Heat Pipe

HEWALEX
Manufacturer of Solar Collectors

→ Solar Collectors and Fixtures
→ Water heaters and fixtures
→ Installation materials
→ Solar Systems Accessories
→ Solar kits

NARVA

HEWALEX
SOLAR COLLECTORS

Form Follows Function

Sullivan 1896, US-American Architect

1. Vacuum tubes
2. Module
3. System-Integration
4. Architecture




NARVA

HEWALEX
SOLAR COLLECTORS

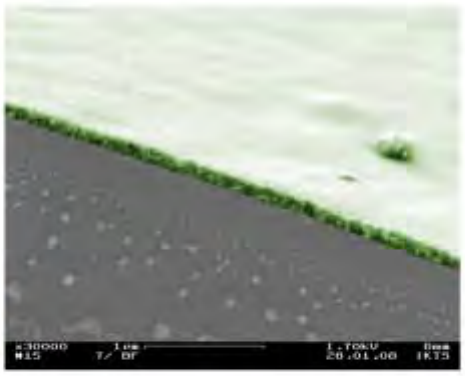
1. Vacuum tube

- Cladding tube
- Glass-metal connection
- Absorber
- Direct flow / Heatpipe


NARVA

HEWALEX
SOLAR COLLECTORS

1. Vacuum tube - Anti Reflex Coating

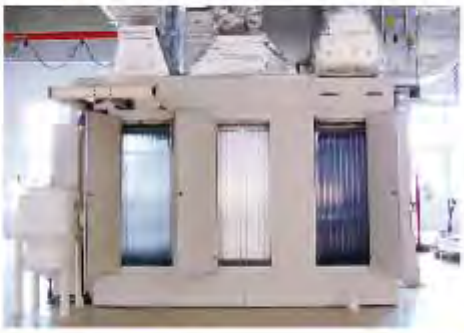


NARVA

HEWALEX
SOLAR COLLECTORS

1. Vacuum tube – Coating- Functions

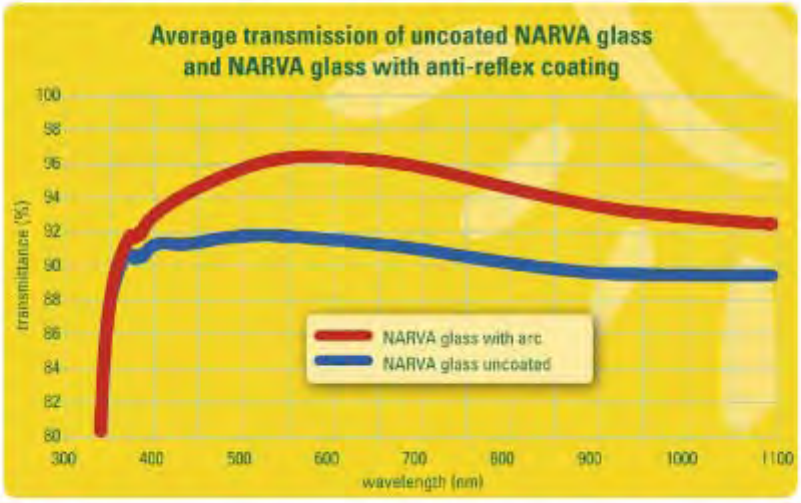
- increases the transparency
- increases the hydrolytic resistance (comparable to Borosilicate glass)
- increases the resistance to impact
  (no implosion because of surface tension)



NARVA

HEWALEX
SOLAR COLLECTORS

1. Vacuum tube – Coating- Functions



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HEWALEX
SOLAR COLLECTORS

1. The coating of the absorber

The coating of the absorber:

- single sided (Standard)
- double-sided (Power) coating.

→ used with reflector systems
→ increase in performance of up to 30%
(Depending on the design of the reflector)

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HEWALEX
SOLAR COLLECTORS

1. Vacuum tube - Heatpipe

at night | in operation | in stagnation

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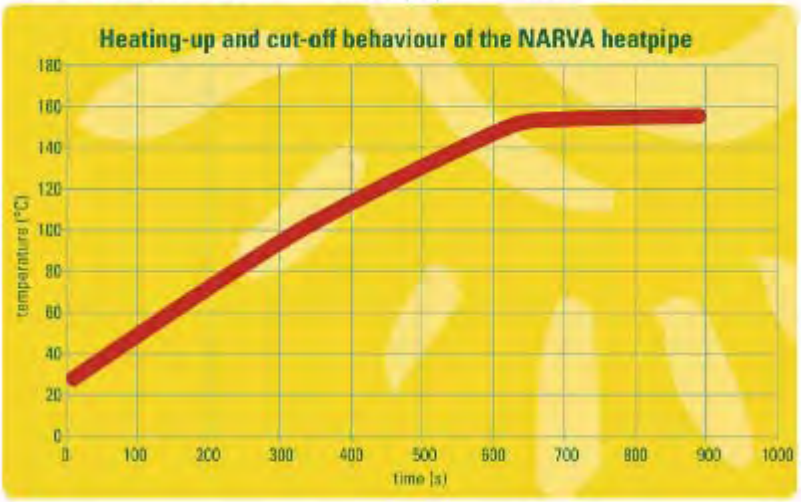
HEWALEX
SOLAR COLLECTORS

1. Vacuum tube – Heatpipe – cut- off



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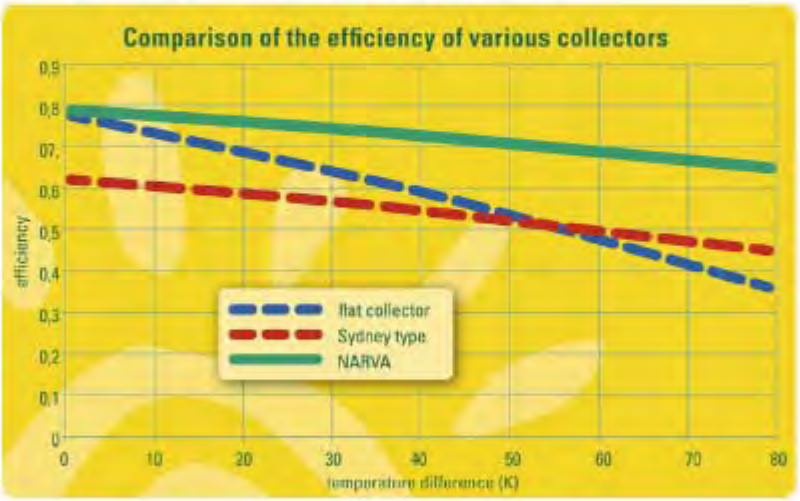
SOLAR COLLECTORS

1. Vacuum –tubes - comparison



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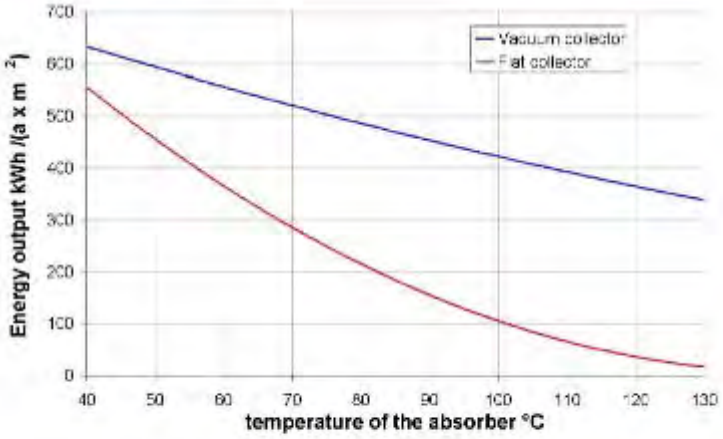
1. Vacuum tube – flat collector comparison Energy Output

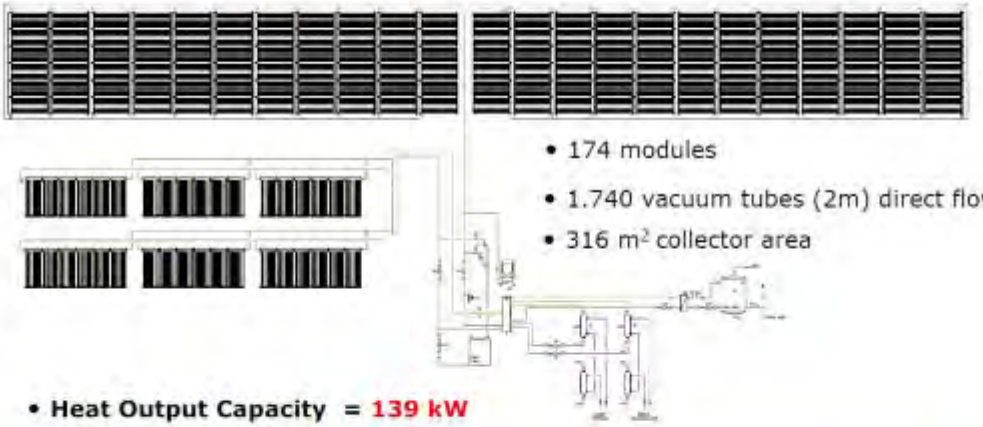


2. Solar Collector Modul - Hewalex

Solar collector KSR10

Length:	2130 mm
Width:	860 mm
Height:	116 mm
Weight:	30 kg
Cross surface:	1.823 m²
Aperture area:	1.014 m²

3. System Integration - Open air pool Wodny Raj ŁÓDŹ
Hydraulic flow chart



- 174 modules
- 1.740 vacuum tubes (2m) direct flow
- 316 m² collector area

- **Heat Output Capacity = 139 kW**

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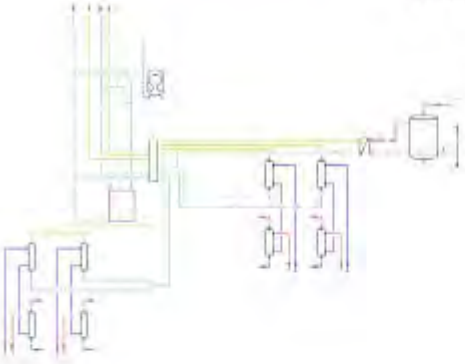
HEWALEX SOLAR COLLECTORS

3. System Integration - Wodny Raj ŁÓDŹ



The solar thermal installation supplies:

- 4 swimming pools
- Hot water supply for shower and washrooms

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HEWALEX SOLAR COLLECTORS

4. Architecture Wodny Raj ŁÓDŹ

4. Architecture

Wodny Raj
ŁÓDŹ

Thank You for Your Attention!

Using geothermal energy for heating and cooling - example Warszaw

Mr. Ruediger Grimm

geoENERGIE Konzept GmbH Freiberg

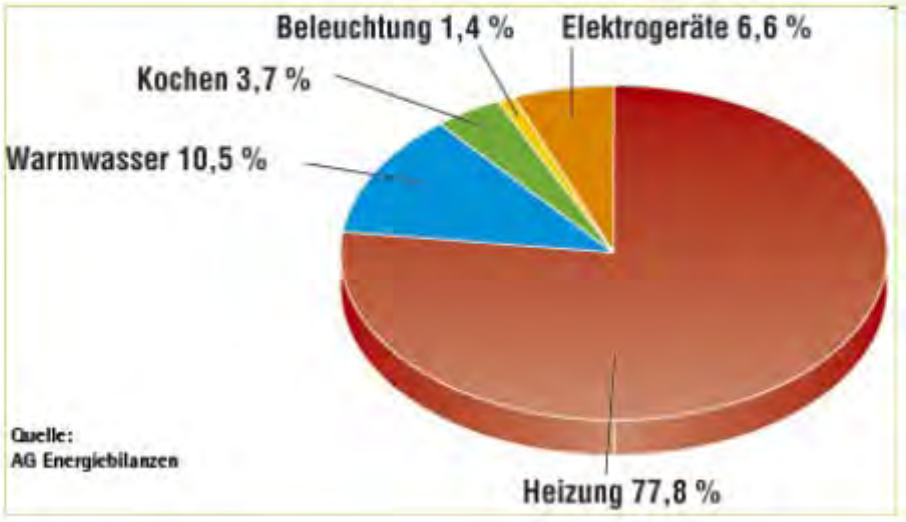
The Company

- Ruediger Grimm
- Geologist (Mining Academy Freiberg)
- Managing director of geoENERGIE Konzept GmbH
- Founded in 2007
- 5 employees
- 700 geothermal projects
- Consulting, feasibility, planning, tests, monitoring
- Since September 2008 joint venture in Albacete/Spain - FOURTEC GEO ENERGIE S.L.

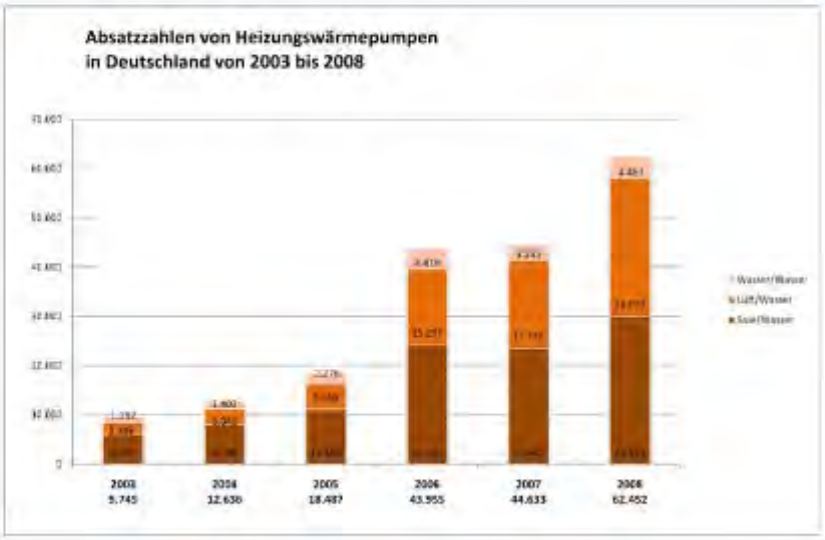
The German Market

- Important heat sector
  - 75% of total energy consumption
- Increasing prices for energy
  - Prognostics?
- Fast growing market for GHP
  - 30.000 in 2008

The German Market



German Market

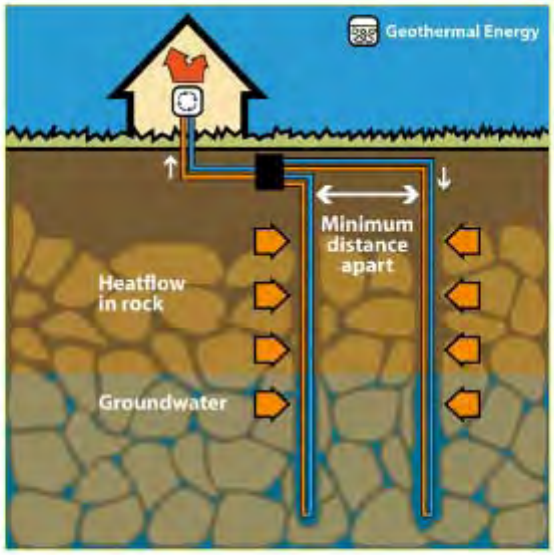


The Technology

- BHE are the most popular geothermal systems
- Heating with heat pumps
- Direct cooling

The Technology

- Double U-pipes 32 mm
- Mostly 100 meters deep
- Fluid (Water + Glykol)
- Thermal activated grouting

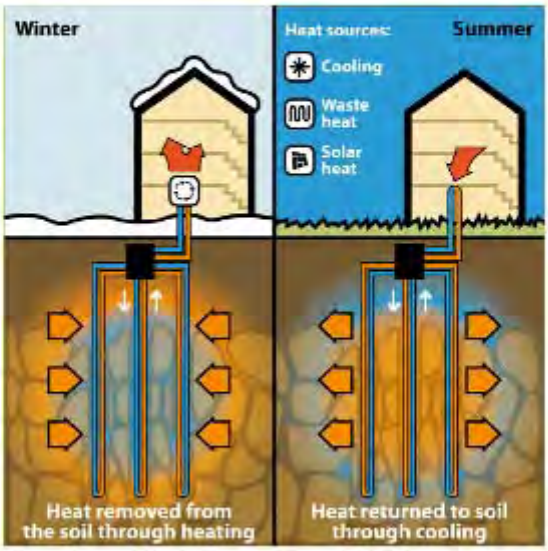


Carbon Asset Management

- Heat pump
- COP (coefficient of performance) = 4,0
  - 25% electricity (to be paid)
  - 75% geothermal energy (for free)

Heating & Cooling

- Heating with heat pump in winter
- Direct cooling in summer
- „Storage system“
- High efficiency
- ROI - around 4 years



Seven Steps

- Easy technology
- Important to follow the 7 steps
- geoENERGY Konzept offers support throughout these 7 steps

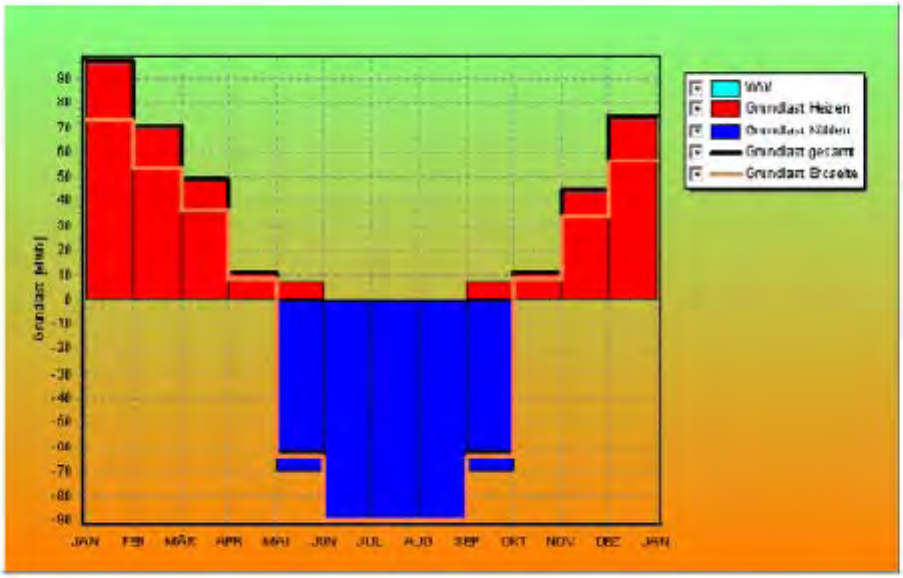
Seven Steps

1. Determine energy requirements
2. Underground assessment
3. Evaluate feasibility
4. Plan the site
5. Carry out sample tests
6. Installation
7. Monitoring

Example Warszaw-Pruszkow

- Project: January 2009
- DORSYSTEM Jelenia Góra
- Test and design BHE
- Office building
- 350 kW heating & 370 kW cooling
- 51 x 140 m

Energy demand



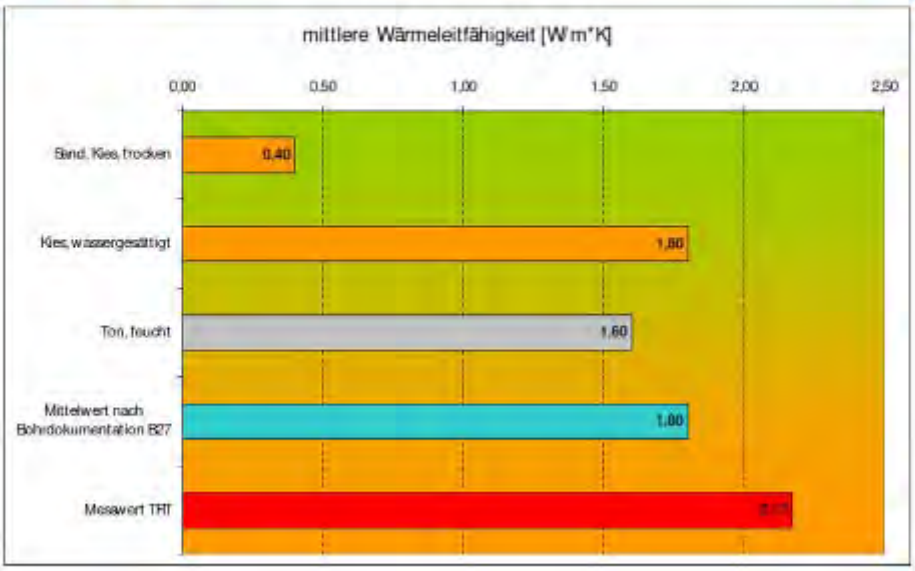
Office Building „STRABAG“

Thermal Response Tests

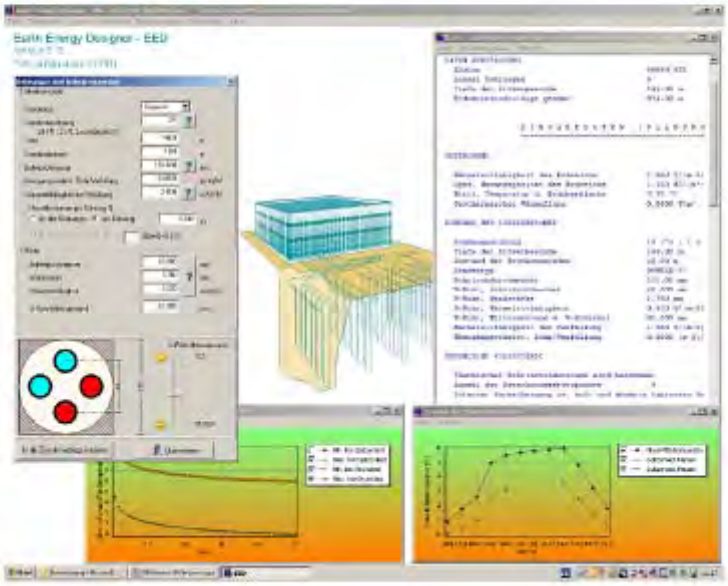
- 72 hours
- smarTRT
- parameters
  - Thermal conductivity
  - Ground surface temperature
  - Thermal resistance

Test

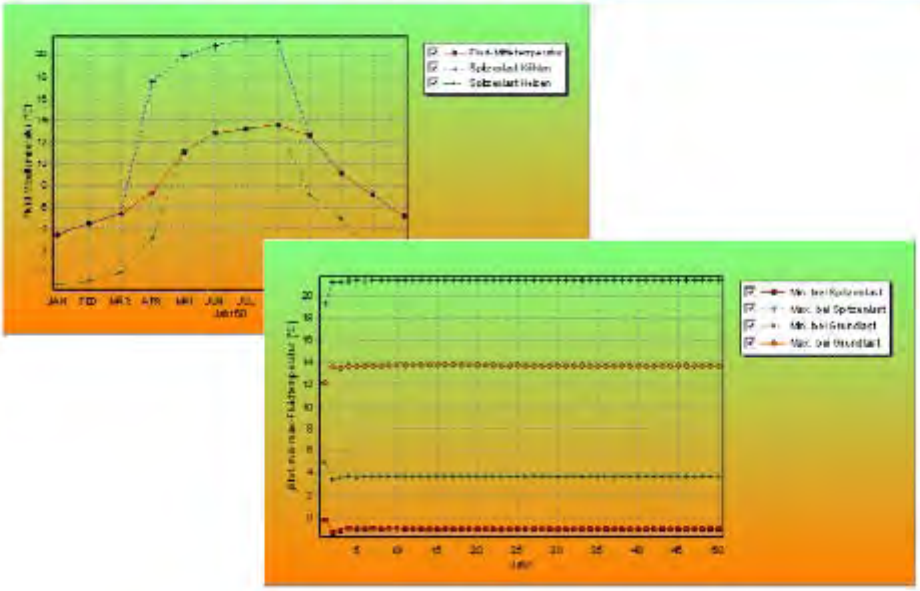
Results TRT



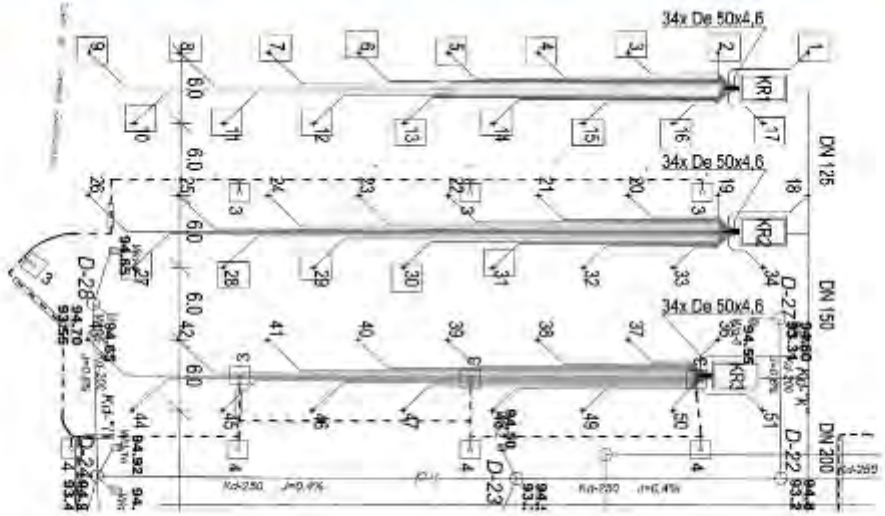
Design of BHE



Modelling of temperatures



Drilling plan



Drilling, Material...

Facts for geothermy

1. Higher invest costs than gas or oil (boreholes).
2. Lower costs of operation (25% of elecricity).
3. Price for energy plays the main role.
4. Design and planning are important facts for optimized systems.
5. We need to take a lot of preliminary assumptions. We minimise the risk with field tests.


Keine Angst!
Es ist genug
Erdwärme
für alle da!
geoENERGIE
Konzept
www.geoenergie-konzept.de

Research in Germany
Land of Ideas

Podsumowanie:

Szybka i efektywna rozbudowa odnawialnych źródeł energii może być realizowana poprzez:

- Ciągły wzrost efektywności energetycznej
- Badania i rozwój innowacyjnych technologii oraz ich szybkie dynamiczne wprowadzanie na rynek
- Stworzenie korzystnych wytycznych ramowych, które wspierają szeroko pojęte innowacje i wzrost gospodarczy
- Kształcenie wykwalifikowanego personelu

Research in Germany
Land of Ideas

Bilateralna współpraca może być kontynuowana poprzez:

- udział w **europejskich platformach technologicznych**, jak na przykład nowo powstałej sieci na rzecz innowacji energetycznych pod przewodnictwem Politechniki w Graz. Obecny budżet wynosi 1,3 Mrd Euro; uczestnicy: 10 krajów, w tym: Niemcy, Finlandia, Francja i Wielka Brytania (www.eesa-set.eu).
- **Progamy ERA-NET** umożliwiające międzynarodowym konsorcjom naukowym prowadzenie innowacyjnych badań w dziedzinie odnawialnych energii i stymulujące transfer wiedzy i technologii.
- intesywna **wymiana naukowców polskich i niemieckich**, która umożliwi im wgląd i dostęp do badań ich kolegów w danym kraju.