

RENEWABLE ENERGY RESOURCES - WIND POWER ENERGY

Lucie Noháčová

ABSTRACT

The energy generation, especially electrical energy generation from the renewable energy resources is supported. In the most lands will be the building of new wind farm and parks prepare. The European scenario from the European conference about the wind power plants (EMEC 2007) assume increase of installed power of WPP in EU. The integration of renewable energy resources in a distribution system poses the necessity of a considerable change in the coordination procedure. This article talks about current situation of renewable energy resources in the EU from the point of view of wind energy. It describes some of the technical problems that the development of this renewable energy resource is facing.

1. INTRODUCTION

The utilization of renewable energy resources for the electrical energy generation is known. The building of these wind power plants is economical and political supported. The current power of this wind power plants are 2 – 3 MW, experimentally are tested the operation with the power of 5 MW. The technology allowed using this plants also in the area with less opportune wind condition.

In beginning of 2007 was the installed power of Wind Power Plants (WPP) in Europe 41000 MW. The most WPP were builded in Germany, Spain, Great Britain, Ireland, Portugal and some other lands, which are located be the see.

2. WIND POWER PLANTS IN EUROPE

The exploitation of renewable resources as one of the possibilities of providing for a sufficiency of so-called “clean” energy is the priority focused on by the energy industry in the EU.

The energy consumption is growing. Therefore is necessary to find a way of utilization of renewable energy resources for the energy generation. In the EU are given so-called “indicative goals“, which the EU lands would like to carry out. Their value is given of proportion of energy generation form the RER and domestic brutto energy consumption.

The directive of European parliaments and advice 2001/77/ES determined these indicative goals for the whole European Union 22%. The share is different for the individually states and countries. For the Czech Republic is the given value 8%.

2.1 Prediction of next building and development of WPP in Europe

The energy generation, especially electrical energy generation from the renewable energy resources is supported. In the most lands will be the building of new wind farm and parks prepare. The European scenario from the European conference about the wind power plants (EMEC 2007) assume increase of installed power of WPP in EU:

- 80 000 MW before 2010
- 180 000 MW before 2020
- 300 000 MW before 2030

End of study shows the possibility of next future value of installed power from WPP and the maximum in the peak consumption in some lands in 2015:

- Germany 78 GW – in peak of consumption 36 GW in WPP (46%)
- Scandinavia (Nordic) 69 GW – in peak of consumption 20 GW in WPP (29%)
- Great Britain 65 GW - in peak of consumption 26 GW in WPP (40%)
- Denmark 100/% of penetration
- Ireland 7 GW - in peak of consumption 3,5 GW in WPP (54%)
- Portugal 10 – 12 GW - in peak of consumption 5 GW in WPP (50%)

The Figure No 1. shows the expected development of whole installed power European WPP and their localization in 2015. (colour – speed of wind in Europe)

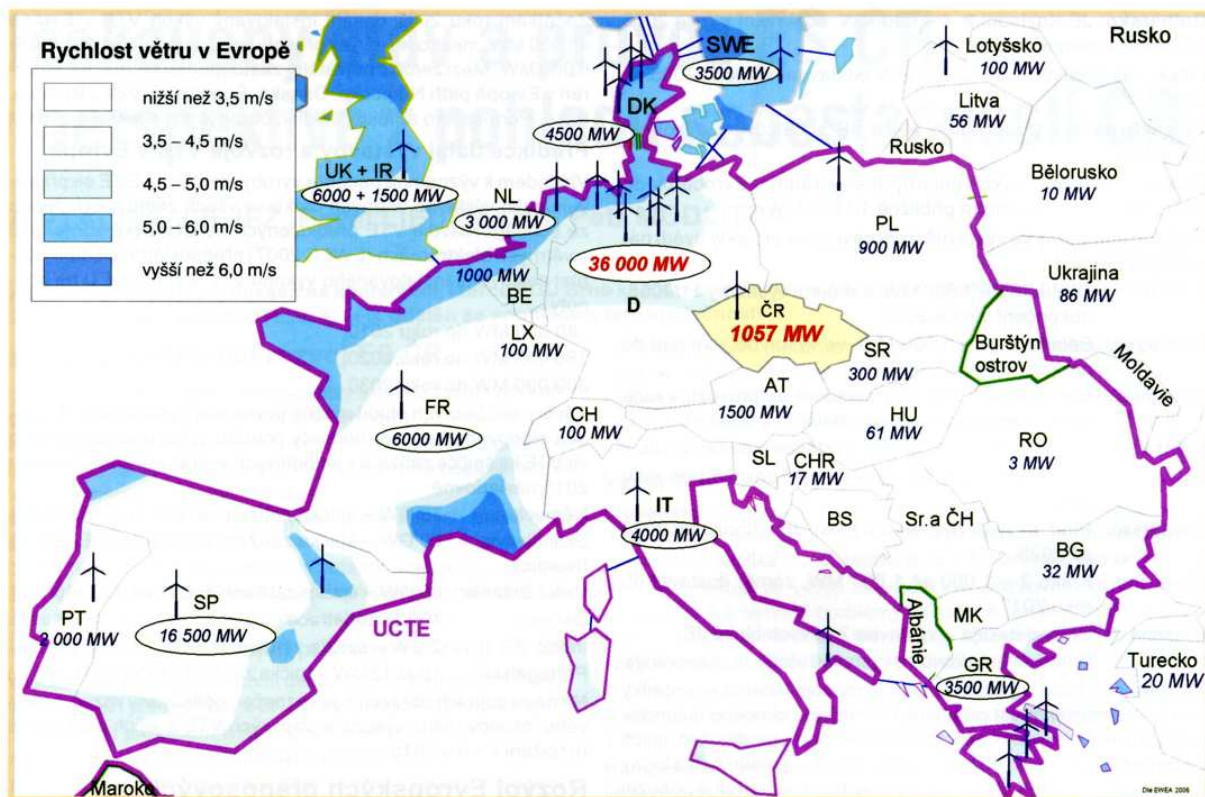


Fig. 1

2.2 Development of European transmission networks and lines

The next future shows the necessity of:

1. Amplify of interstate line and networks, main transmission networks, because the Saldo is growing
2. Big development of WPP
3. Renew of topology of transmission lines, (the consumption is growing, the new small plants are connected in the networks and in the future they will be in operation, from the point of reliability)
4. Co-ordination of transmission line operation between different countries
5. Preparation on next dissemination of UCTE
6. Amplify of reconstruction of distribution networks. The WPP would be connected in the distribution networks and in operation. (The transfer of high power)

The next Figure No 2. below shows the Example Reconstruction of electrical transmission networks in Germany before 2020 (which was necessary because of the new WPP will be in operation).

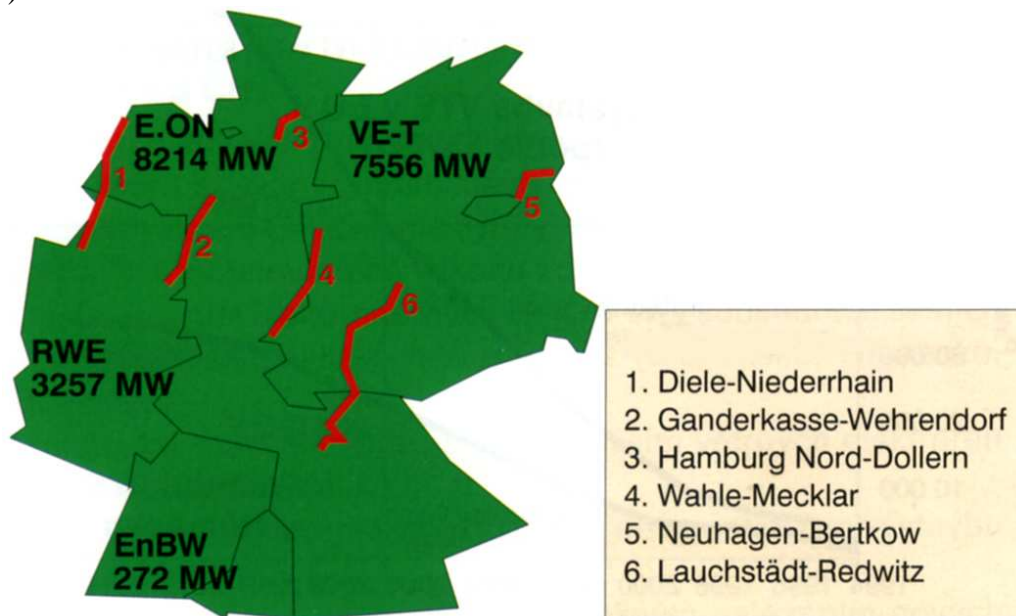


Fig. 2

The expected development of installed power WPP in Germany before 2020 shows the Table 1.

Time horizon	WPP on land	Repowering WPP	WPP offshore	General installed power in WPP
2007	21 264 MW	504 MW	651 MW	22 419 MW
2010	23 264 MW	1 083 MW	5 439 MW	29 787 MW
2015	24 386 MW	1 799 MW	9 793 MW	35 978 MW
2020	24 386 MW	3 468 MW	20 358 MW	48 212 MW

Tab. 1 – The expected development of installed power WPP in Germany before 2020

3. A COMPREHENSIVE VIEW OF THE ISSUE

Renewable energy resources from the point of view of supply energy are supplement resources. For this Reason, Balance of electrical Production and Consumption cannot be build on these Resources in the Future. That not means, that these Resources are important.

At present time the building of the new wind power plants is supported by the state provision of government and also by the support provision of power energy companies in EU.

These and many other problems with connection, expansion, financing, economic benefits and ecological relief for the environment in using the potential of energy renewable resources have been and still are the topics of the discussions in national and international conferences which focus on the issues of power engineering. But mainly, they are the topics in the meetings of individual energy companies not only in the EU countries but throughout the world.

4. REFERENCES AND BIBLIOGRAPHY

- [1] Mühlbacher J., Noháčová L.: Distribuované zdroje energie-možnosti využití obnovitelných zdrojů v ČR, article- The 2nd International Scientific Symposium "EE 2003 Elektroenergetika ", Stará Lesná 2003, Slovak Republic, 16.-18. 9. 2003 S. 1-5, Košice ISBN: 80-8906180-X
- [2] Mühlbacher J., Noháč, K., Noháčová, L.: Distributed power systems, article-12th International Expert Meeting "Power Engineering 2003", Maribor 2003, Slovenia Republic, 7.-8. 5. 2003 S. 1-4, University of Maribor ISBN: 8643505447
- [3] Kolcun M., Mühlbacher J., Haller: Mathematical analysis of electrical networks, specialized technical book 2004, Czech Republic, ISBN: 80-7300-098-9
- [4] Krasl M., Tesařová M.: Technické využití supravodivosti v energetice, article-Meeting Racio 2002 Scientific-technical association of Westbohemia, Plzeň
- [5] Noháčová L., Noháč K.: Some cases of distributed resources connected to the distribution network, article-13th International Expert Meeting "Power Engineering 2004", Maribor 2004, Slovenia Republic, 18.-20. 5. 2004 S. 1-6, University of Maribor ISBN: 86-435-0617-6
- [6] Noháč K., Noháčová L.: Overview of today possibilities of computer simulation in power engineering, article- 6th International Conference "Control of power systems 2004", Štrbské Pleso, Slovak Republic, 16.-18. 6. 2004, Slovak University of Technology in Bratislava, ISBN: 80-227-2059-3, S 1-8
- [7] Noháčová L., Tesařová M.: The utilization of renewable energy resources for electrical energy generation, article- 6th International Conference "Control of power systems 2004", Štrbské Pleso, Slovak Republic, 16.-18. 6. 2004, Slovak University of Technology in Bratislava, ISBN: 80-227-2059-3, S 1-4

- [8] Martínek Z.: Plánování přenosu elektrické energie užitím kritéria spolehlivosti, Use of technical Measurements in solving Environmental Problems, ZČU Plzeň 2001, ISBN 80-7082-764-5, pp. 84-88
- [9] Tesařová M., Noháčová L.: Voltage dip matrices – calculation, interpretation and using, article-13th International Expert Meeting "Power Engineering 2004", Maribor 2004, Slovenia Republic, 18.-20. 5. 2004 S. 1-6, University of Maribor ISBN: 86-435-0617-6
- [10] Dvorský E., Hejtmánková P.: Economical evaluations of combined heat and power decentralized sources operation, article- 6th International Conference "Control of power systems 2004", Štrbské Pleso, Slovak Republic, 16.-18. 6. 2004, Slovak University of Technology in Bratislava, ISBN: 80-227-2059-3, S 1-5

5. ACKNOWLEDGEMENT

This paper was written within the solution of GAČR science project No. 102/02/0949

Authors' Address

Ing. Lucie Noháčová Ph.D.

University of West Bohemia in Pilsen, Faculty of Electrical Engineering, Department of Electric Power Engineering and Ecology

Establishment: Univerzitní 26, 306 14, Plzeň, Czech Republic

Tel: + 420 377634301

Fax: + 420 377634302

E-mail: nohacova@kee.zcu.cz

Tel: + 420 377634358