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Danish-Czech wind resource know-how transfer project. Final report

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**Danish-Czech Wind Resource Know-
how Transfer Project**

Final Report

Ole Rathmann, Per Nørgård and Sten Frandsen

Abstract The course of the Danish-Czech Wind Resource Know-how Transfer Project is reported. The know-how transfer component of the project has consisted in performing a wind resource training workshop for about 13 individuals from the Czech Republic, ranging from scientists to wind farm project developers, and in donating modern software for evaluating wind resources. The project has also included a review of a Czech overview-study of wind speeds inside the country as well as an investigation of the electricity tariffs and their impact on wind energy utilization in the Czech Republic. A problematic existing Czech wind farm project, locked up in a no-production situation, was also addressed. Not until the purchase by a new owner-company, which initiated the necessary repair and maintenance, the wind farm resumed normal operation. As its last task, the present project assisted in consolidating future operation through a helping package consisting of a training course for the wind farm technicians and in a package of relevant spare parts.

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Executive Summary

The background for this technology transfer project was problems with the Ostružna demonstration wind farm, which had been built with Danish assistance in 1994, but which a few years after start broke down and in practice remained in an inoperative state. The present project was then established in 1999 with the aim of assisting in building up wind resource know-how in the Czech society. The actual possibilities for wind energy in the Czech Republic (CR) should also be treated.

This task was fulfilled through a 2x3-day training workshop for about 13 individuals ranging from scientists to wind farm project developers. It is the assessment of the project team that the participants have received an adequate introduction to modern techniques for estimating wind resources and practical training in using modern software in performing such estimating analyses. One set of wind resource software - WAsP and assisting software – was donated to the Institute for Atmospheric Physics of the Czech Academy of Science, where it is now being used in scientific work, but also in connection with approval of wind farm projects in the Czech Republic.

A Czech wind resource overview study “Czech Wind Atlas” had already been performed by the Czech authorities (1995-1996). This study was evaluated, and it was found to be a suitable tool for pointing out prospective wind farm areas. However, it was also found that when analysing wind power production and assessing the feasibility of specific wind farm projects the “Czech Wind Atlas” would not be sufficient. Instead detailed wind resource software tools – such as WAsP – would be required. In addition, the electricity feed-in tariffs and their impact on the deployment of wind energy in CR were investigated. This investigation showed, that with old tariffs of about 1 CzK/kWh (from before 2002), even at the most windy sites, wind energy would hardly be feasible. However, with the new tariffs for renewable energy in the CR - 3 CzK/kWh – wind energy seems to be feasible at sites where the average wind speed is at least 5 m/s in a height of 10 m above terrain.

It was not possible to assist the Ostružna wind farm (6 units of 500 kW Vestas wind turbines) in resuming normal operation until a new owner-company took over in summer 2002 under the conditions of the new, increased electricity tariffs for renewable energy. The new owners made the necessary repair- and maintenance work, and operation was resumed in early fall 2002. For consolidation of the future operation, the present project then initiated the establishment of a 46000 EUR assist-package, the major part financed by the present project and the remaining part by the wind farm company itself, and by Vestas A/S as the original supplier of the wind turbines. The assist-package consisted in a training course in 2003 for the technicians of the wind farm company, held with experienced Vestas technicians as instructors, and in a package of the most relevant spare parts. The wind farm is now in normal operation.

Resumé

Baggrunden for dette teknologi-overførelses-projekt var problemer med demonstrations-vindmølleparken Ostružna, der var blevet bygget med Dansk bistand i 1994. Nogle få år efter var møllerne blevet ramt af driftsstop og i realiteten var de aldrig kommet i gang igen. Nærværende projekt blev startet i 1999 med det formål at yde bistand til opbygning af generel viden i Tjekkiet om vindressourcer. Endvidere skulle de generelle muligheder for vindenergi i Tjekkiet også undersøges.

Dette formål blev opfyldt ved gennemførelsen af et 2x3-dages trænings-workshop for omkring 13 enkeltpersoner, repræsenterende hele området fra forskere til udviklere af vindmølle-projekter. Det er projekt-teamets vurdering, at deltagerne fik en dækkende introduktion til moderne metoder til at vurdere vindressourcer samt praktisk træning i anvendelsen af moderne software til at udføre sådanne vurderinger. Et sæt vind ressource software – WAsP med tilhørende hjælpe-software – blev doneret til Institutet for Atmosfærisk Fysik under det Tjekkiske Videnskabernes Akademi, hvor det nu bliver anvendt i forskningssammenhæng, men også i forbindelse med godkendelse af vindmølle-park projekter i Tjekkiet.

Et Tjekkisk vindressource oversigts-studie, ”Tjekkisk Vindatlas”, var allerede blevet udført på foranledning af de Tjekkiske myndigheder (1995-1996). Dette oversigts-studie er blevet gennemgået og vurderet egnet til udpegning af lovende områder til vindmølleparker. Imidlertid blev det fundet utilstrækkeligt til at analysere konkrete vindmøllepark-projekter med hensyn til produktionen af vindenergi og rentabilitet. Her vil detaljeret vindressource-software – så som WAsP – være påkrævet. Udover ovenstående gennemgang blev der foretaget en undersøgelse af el-tarifferne for uafhængig el-produktion og deres indflydelse på udbygningen af vindenergien i Tjekkiet. Denne undersøgelse viste, at med gamle tariffer på omkring 1 CzK/kWh (før 2002) ville vindenergi-anlæg selv på de mest vindrige lokaliteter næppe være rentabel; men at med de ny tariffer for vedvarende energi på 3 CzK/kWh (trådt i kraft Januar 2003) synes vindmølleparker at kunne svare sig, når blot middelvinden i 10 meters højde er mindst 5 m/s.

Det var ikke muligt at bidrage til at vindmølleparken Ostružna (6 stykker 500 kW Vestas vindmøller) kunne komme i drift igen, før et nyt ejerselskab købte parken i sommeren 2002, efter at de nye, mere gunstige el-tariffer for vedvarende energi var blevet indført. De nye ejere foretog de nødvendige reparations- og vedligeholdelsesarbejder, og mølleparken kom derefter i drift igen tidligt på efteråret 2002. Til konsolidering af den fremtidige drift iværksattes derefter etableringen af en ”hjælpe-pakke” på 46000 EUR (ca. 342 000 DKK). Heraf blev størstedelen finansieret gennem nærværende projekt mens resten blev finansieret af ejerselskabet selv og af Vestas A/S (som leverandøren af vindmøllerne). Hjælpepakken bestod i et træningskursus med Vestas instruktører for de Tjekkiske teknikere, der er tilknyttet vindmølleparken, og af en pakke med relevante reservedele. Vindmølleparken er nu i normal drift.

Souhrn

V pozadí tohoto projektu transferu technologií stály problémy se zkušební větrnou farmou v Ostružné, která byla postavena za asistence Dánska v roce 1994. Ta však za několik let začala mít technické problémy a nakonec zůstala mimo provoz. Současný projekt byl založen v roce 1999 s cílem asistovat při tvorbě know-how pro využívání větrných zdrojů v Čechách. Do projektu byly také zahrnuty současné možnosti využívání větrné energie v České republice (ČR).

Tento úkol byl splněn dvěma kurzy v délce tří dnů pro přibližně 13 lidí, od vědeckých pracovníků po odborníky pracující na vývoji projektů větrných farem. Po zhodnocení situace projektovým týmem bylo rozhodnuto seznámit účastníky s úvodem do moderních technik hodnocení větrných zdrojů. Praktická část byla zaměřena na používání moderního počítačového softwaru k provádění analýz odhadovaných veličin. Jeden soubor programového vybavení pro hodnocení větrných zdrojů (WaSP software s příslušenstvím) byl darován Ústavu fyziky atmosféry AV ČR, kde je nyní využíván k vědeckým výzkumům a rovněž při schvalování projektů větrných farem v ČR.

Přehledová studie českých větrných zdrojů "Větrná mapa ČR" byla již dříve zpracována českými orgány (1995-1996). Tato studie byla vyhodnocena a byla schválena pro použití k vyhledávání vhodných lokalit pro větrné farmy. Během analýz produkce větrných elektráren a posuzování proveditelnosti jednotlivých projektů větrných farem však bylo zjištěno, že informace obsažené ve Větrné mapě ČR nebudou dostačující. Detailní posouzení dostatečnosti větrných zdrojů bude nutno provést i posouzení pomocí počítače, např. programem WasP. Navíc bylo nutno vyhodnotit cenové tarify na výkup elektrické energie a jejich dopad na produkci větrné energie v ČR. Tento výzkum ukázal, že se starými tarify (1 Kč/kWh před rokem 2002) bude i na největrnějších místech produkce větrné energie téměř neuskutečnitelná. Jestliže je počítáno s novými tarify pro obnovitelné zdroje energie v ČR, tzn. 3 Kč/kWh, zdá se být reálné využití větrné energie v místech, kde je ve výšce 10 m nad zemí průměrná rychlost větru minimálně 5 m/s.

Pomoc větrné farmě v Ostružné (6 jednotek větrných turbín Vestas o výkonu 500 kW) při návratu do normálního provozu nebyla možná až do léta 2002, kdy farmu převzal nový vlastník, s podmínkou zvýšení cenových tarifů obnovitelných energií. Nový vlastník provedl údržbu a nezbytné opravy, takže farma mohla být na podzim roku 2002 znovu uvedena do provozu. Pro konsolidaci budoucího provozu bylo současným projektem iniciováno založení asistenčního balíčku v hodnotě 46000 EUR, financovaného z velké části z prostředků současného projektu s přispěním samotné větrné farmy a dodavatelem větrných turbín fy Vestas a.s. Prostředky z tohoto asistenčního balíčku byly použity na školení technického personálu větrné farmy pod vedením odborníků z Vestasu a na nejnutnější náhradní díly. Větrná farma je v současné době v normálním provozu.

1 Introduction

The present project has the title “*Transfer of Wind Resource know-how to and Reorganisation of Demonstration Project in The Czech Republic*”. It was initiated as a result of discussions between the Wind Energy Department of Risø National Laboratory and the Danish Environmental Protection Agency (DEPA) during the follow-up phase of a Danish evaluation [1] of wind energy projects in the Czech Republic (CR). Especially, a problematic 6-wind-turbine pilot project highlighted the importance of national wind resource know-how and expertise in CR.

The project, funded by the Danish Environmental Protection Agency under contract J.nr. M 124/043-0056, went formally into operation November 1999.

The scope of the project can be summarised as follows:

The project aims at an introduction of wind energy in the Czech Republic, thereby mitigating future air pollution caused by use of fossil fuels.

A central item is a training course where staff members from public institutions and private companies will get hands-on experience with modern techniques for wind resource assessment and establishment of wind farms, thereby enabling independent assessments of the wind resources in the Czech Republic. The training course will include a case study for the establishment of a Czech wind farm at a suitable site - where the participants will go through the entire process, from analysis of meteorological data to ensuring a proper connection of the wind turbines to the electrical grid.

The other main items of the project is a general assessment of the nation-wide wind resources and the economical effort that can be justified to exploit the potential wind energy, and the preparation of a plan for reorganisation of the pilot wind farm to improve its power production.

The achievements of the project will be presented at a seminar for interested parties.

Thus, the project was formulated to contain the following components:

- a) **Training** of 8 scientists or technicians from the Czech project participants in wind resource estimation;
- b) **Case study**: In continuation of the training the participants will perform an entire wind power study for already identified wind farm candidate sites.
- c) A **general assessment** (notably not specific) of the wind energy potential in the Czech Republic, and the preparation of a study of the impact of electricity tariffs on exploitable wind energy in CR. A **seminar**, to present the results of the project to interested Czech parties.
- d) An investigation Ostružna/Jesenik demonstration wind farm (6 pieces of Vestas V39-500kW turbines) and the preparation of a **proposal** for the future operation.

The wind resource assessment methodology, on which to base the training workshops and the analyses of this project, was, already in the project description,

chosen to be the “Wind Atlas Method” developed by Risø [2] and implemented in the wind resource software program WAsP [3], also developed by Risø.

The target persons and organizations of the project were expected to be the administrative bodies and the scientific community involved in wind energy as well as private wind project developers.

The outcome of the project was expected to be an upgrading of the wind energy expertise in the CR to perform national wind resource assessments, to obtain an independent overview of the national wind resources, and, if possible, a proposed plan for setting the Ostružna/Jeseník demonstration wind farm back in operation.

As could be expected, the above project components were partly changed during the project to the extent that changes in the assumed preconditions were experienced.

In addition to the know-how transfer activities the project was also expected to evaluate or come out with an overview of Czech wind resources; and also to investigate electricity tariffs and their impact on the possibilities for future use of wind energy in CR.

2 Progress until spring 2002

All the goals of the project, except assistance to reviving the Ostružna/Jeseník wind farm, had been fulfilled by the spring 2002, and has been reported separately in the Interim Report 2002 [4]. A short overview will be given in the following.

2.1 Wind Resource Know-how Training workshops.

The main objective of the project – transferring know-how on wind resource estimation to the Czech wind energy community – has been fulfilled through a 2x3-day training workshop for about 13 individuals ranging from scientists to wind farm project developers. According to the participants themselves they received a good introduction to modern techniques for estimating wind resources and practical training in using modern software in performing such estimating analyses.

2.2 Delivery of WAsP wind resource software.

One set of wind resource software - WAsP and assisting software – was delivered to the Institute for Atmospheric Physics of the Czech Academy of Science, where it is being used in scientific work, but also in connection with approval of wind farm projects in the Czech Republic.

2.3 Review of existing Czech wind resource overview.

The Czech wind resource overview study “Czech Wind Atlas” (1995-1996) has been judged and found to be suitable for pointing out prospective wind farm areas. However, for analysing wind power production and judging the feasibility of specific wind farm projects, more detailed wind resource software tools as WASP should be used.

2.4 Study of Czech feed-in tariffs for wind-produced electricity.

A study of electricity feed-in tariffs and their impact on the deployment of wind energy in the Czech Republic has been prepared. It confirmed the impression, that with old tariffs of about 1 CzK/kWh (from before 2002), wind energy would hardly be feasible even at the high-wind sites in CR. However, from January 2002 new tariffs for renewable energy has been introduced: 3 CzK/kWh. Consequently, wind energy seems to be feasible at all “sensible wind resource” sites (with 10-m average wind speeds not lower than 5 m/s) in the CR.

2.5 The Jeseník / Ostružna – wind farm.

Until spring 2002 no possibility of assisting the wind farm in getting out of the non-operation state was identified as the reasons for this passive state were rather of economic and ownership nature than technical.

3 Follow-up mission May 2002

A follow-up mission to Prague and Brno was performed May 21-23 by O.Rathmann, Risø, and Morten Petersen, the Danish Environmental Protection Agency [5].

A visit was paid to the Institute for Atmospheric Physics of the Czech Academy of Science to get an impression of the present state of Czech wind energy and to make sure the donated WASP wind resource software was properly in use. During discussions with the institute head it became clear that new feed-in tariffs of 3 CzK/kWh for wind energy the Czech Republic, valid since January 2002, could mean that a number of “sleeping” wind energy projects might now be expected to be set into action. The use of the donated WASP software was demonstrated by some of the institute staff. It was now being used regularly for evaluating submitted wind energy projects for official approval. Another use was in connection with a mapping of the wind resources at 10 m altitude over extended areas of the Czech Republic. In all, the installation and use of the donated software was found to be very satisfactory.

A second visit was paid to the Vestas representative in Brno, the Niko company, to get an up-to-date impression of the state of the Ostružna wind farm. As the Ostružna wind farm consisted of Vestas wind turbines the Niko company was well informed of the state. The head of the Niko company, Mr. Marek, could in-

form that the wind farm had just been purchased, at a public auction, by a new owner-company, which apparently intended to re-establish the operation. It was the impression that a strong reason for the purchase was the new profitable wind energy tariffs. An appointment for a meeting the following day with the new owners was made.

This made room for a visit to the very wind farm. It appeared that the 6-turbine wind farm was rather well situated in a broad valley going in the direction SSW-NNE. The wind farm was located on a rounded ridge going across the valley, and for winds along the valley this can be expected to create an increase of the wind speed just at the wind farm.

The meeting with the new owners of the Ostružna wind farm was very promising. They expressed their firm intention to make the necessary repair and maintenance to re-establish the operation. The new owners had managing and technical experience from re-establishment and operation small hydro-power plants. Since the present project had financial means left, it was natural to offer some assistance for consolidating future operation of the wind farm. The outcome of the meeting was that the present project could provide financial support for such a “helping-package”, on the conditions that the new owners took the first move to re-establish the wind farm operation at own cost; and the new owners were willing to accept such terms. Being the supplier of the wind turbines, Vestas A/S was also anticipated to contribute to the helping package. The most interesting elements of such a helping package were found to be a training course for technicians of the new owner company and a spare part package, but other elements like a wind measuring campaign were also discussed. An appointment was made that, after re-establishment of the wind farm operation, the present project, the wind farm owners and Vestas A/S should jointly formulate the helping package, make a contract and carry out the elements of the helping package.

4 Revival of the Jeseník / Ostružna – wind farm

Through the summer and the early fall of 2002 the new owner company, VE Ostružna, made the necessary maintenance and repair, and the wind farm was set in operation.

After that, contacts were made to VE Ostružna and to Vestas A/S for establishment of the helping package. During the discussions between the three parties, and based on the recent operating experience, it became clear that the helping package should consist only of a technician training course and a spare part package. Some delay happened due to misunderstandings in the spring of 2003, but finally in June 2003 an agreement regarding the contract was reached (See Appendix 1). The total budget was 46 000 EUR (about 342 000 DKK), of which slightly less than 25% (11 000 EUR) covered the course while the remaining sum (35 000 EUR) was reserved for the spare part package. The financing was shared as 7½ % / 9½ % / 83% (VE Ostružna / Vestas A/S / present project).

The training course in 2003 for the VE Ostružna technicians was split in two parts: 1-7 June and 10-15 November, with a senior Vestas technician as instructor, assisted by a simultaneous interpreter (see Appendix 2). The venue was – in

both parts – the very Ostružna wind farm site, the ideal place considering that the subject of the course was maintenance and replacement of spare parts.

A package of spare parts for the wind turbines was delivered to VE Ostružna by Vestas A/S, of course within the economical framework defined by the contract. Exactly which spare parts to constitute the package was decided on basis of the recommendations of Vestas after inspection of the wind turbines during the technician training course.

The continued operation of the wind farm has been confirmed by an inspection in December 2003 performed by the Danish Environmental Protection Agency coordinator in the Czech Republic and Slovakia (see Appendix 3).

5 Conclusion

The main objective of the project – transferring know-how on wind resource estimation to the Czech wind energy community – has been fulfilled through a 2x3-day training workshop for about 13 individuals ranging from scientists to wind farm project developers. It is our assessment that the participants have received an adequate introduction to modern techniques for estimating wind resources and practical training in using modern software in performing such estimating analyses. One set of wind resource software - WAsP and assisting software – was provided to the Institute for Atmospheric Physics of the Czech Academy of Science, where it is being used in scientific work, but also in connection with approval of wind farm projects in the Czech Republic.

The Czech wind resource overview study “Czech Wind Atlas” (1995-1996) has been evaluated and found to be suitable for pointing out prospective wind farm areas. However, for analysing wind power production and assessing the feasibility of specific wind farm projects, detailed wind resource software tools –such as WAsP - should be used.

A study of electricity feed-in tariffs and their impact on the deployment of wind energy in the Czech Republic has been prepared. The study showed, that with old tariffs of about 1 CzK/kWh (from before 2002), wind energy will hardly be feasible even at the high-wind sites in CR. However, with the new tariffs for renewable energy - 3 CzK/kWh – wind energy seems to be feasible at sites with 10-m average wind speeds of at least 5 m/s in the CR.

Regarding the problematic Ostružna wind farm, consisting of 6 units of 500 kW Vestas wind turbines, it was not possible to assist in re-establishing normal operation under the old wind farm ownership. However, a new owner-company took over in summer 2002 after the new, increased electricity tariffs for renewable energy were in place. As its first task the new owners made the necessary repair-and maintenance work, and operation was resumed in early fall 2002. The present project subsequently took the initiative to establish an assist-package, worth 46000 EUR, to consolidate the future operation of the wind farm. The major part of the package was financed by the present project and the remaining part by the wind farm company itself, and by Vestas A/S as the supplier of the wind turbines. As a result of the assist-package, in 2003 a training course for the technicians of the wind farm company was held with Vestas instructors, and a package of the

most relevant spare parts has been delivered to the wind farm project, which is now in normal operation.

6 References

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Appendix.1. Helping-package contract.

The DANCEE*-project: 08 July 2003

Transfer of Wind-Resource Know-how to and Reorganisation of Wind Farm Demonstration Project in The Czech Republic (TRAVIR)

(J.nr. M 124/043-0056; Risø J.nr. AMV-1999-121-55, psp 1105042-1)

Agreement

Help project "The Future" for consolidating the future operations of the Ostružna wind farm in the Czech Republic.

The agreement is between the following three parties:

1. VE OSTRUŽNÁ s.r.o., the owner company of the Ostružna wind farm;
2. VESTAS A/S, the turbine manufacturer and supplier of the Ostružna wind farm turbines; and
3. The DANCEE-project TRAVIR, managed by Risø National Laboratory.

The support package consists of the following two items:

	Items. Cost break-downs are given in attachment 1 and 2	EUR
1	Training of VE OSTRUŽNÁ technicians in the Czech Republic	
A	1-7.06.2003	6 300
B	5-11.10.2003	4 700
2	Wind turbine spare parts package	
A	Package A (before the training part A), up to a sum of	10 000
B	Package B (after the training part A), up to a sum of	25 000
	Total	46 000

The package is financed as follows:

	EUR
The DANCEE-Project	38 100
Vestas A/S	4 400
VE OSTRUŽNÁ s.r.o.	3 500
Total	46 000

(Date and signature Daniel Krušoft, for VE OSTRUŽNÁ s.r.o.)

(Date and signature John Jensen, for Vestas Wind Systems A/S)

(Date and signature Ole Rathmann / Søren Larsen, for the DANCEE-project TRAVIR)

* CENTRAL AND EASTERN ENVIRONMENTAL SUPPORT FUND
Danish Environmental Protection Agency
Division for Eastern and Central Europe

Appendix.2. Training course report.

OSTRUŽNÁ 1.6. – 7.6. 2003, Report Nr. 1

1.6. Su

arrival of VESTAS technician to Prague, transfer to the site, hotel

2.6. Mo

Tower num 3. repair of proporcional valve
description of torque arm system
description of gear box operation, manuals
rotor senzor function

3.6. Tu

testing of electronic system

Tower num. 3 Strip down of rotor senzor, hydraulic test

4.6. We

Control and fill up hydraulic system (tower num. 1,2,4,5,6)
Adjustment of pitch system
Tower num. 3 mounting rotor senzor

5.6. Th

One year maintenance (blades, pitch system ...)

! Thunderstorm ! Detail analysis of hydraulic system´s function

6.6. Fr

! Thunderstorm ! Plugging in TELECOM II, controlling communi-
cation lines,
line RS 422, control of highvoltages fuses

7.6. Sa

Completing of one year maintenance according manual :
(gear box, airfilter, torque arm system, hydraulic system, crane,
leadder ...)

OSTRUŽNÁ 10.-15.11.2003 – Report Nr. 2

10.11. Mo arrival of VESTAS technician to Prague, transfer to the site, hotel

11.11. Tu.

discussion about WPP Ostružná's present problems
error messages , problems with data's loading, hyperterminal,
VRP, completion of text messages - V 515

detailed descriptions of hydraulic system, emergency state
and
watchdog operation

12.11. We.

tower num. 6 – control of leading tube of shaft , crack in the
thread part
testing and practice according electric manual

tower num. 1 – Yawn system – possibilities of replacement tef-
lon parts,
gearbox – dismounting upper cover, trying to find out a reason
of its loud
running

13.11. Th.

tower num. 4 – Yawn system – searching of loud yawing's
reason,
replacement PT 100 (nacelle's outside temperature sensor)

tower num.6 – oil leakage, repeated dismounting of shaft's
leading tube
demonstration of changing processor, setting of parameters
without
RAM-DUMP

14.11. Fr.

VRP – Telecom II , SMS, setup the error messages

Tower num.6 - dismounting of crack thread (inside of the gear
box)
control of DHL delivery, discussing about optimal spare
parts's stock

15.11. Sa. tower num. 2 - testing of Ballof's sensors, replacement of out-
side

temperature sensor

tower num. 6. leading tube of shaft : finis of the repair

Appendix.3. Wind farm inspection report

Site visit report No. 2

Date: 19.12.2003

Place: Olomouc, Ostruzna

- 1. Project title:** Transfer of Wind-Resource Know-how to and Reorganisation of Wind Farm Demonstration Project in the Czech Republic Help Project “The Future” for consolidating the future operations of the Ostruzna wind farm in the Czech Republic.
- 2. Meetings:** First meeting was held with Mr. Daniel Krusoft from the VE Ostruzna s.r.o who is responsible for the implementation of the project and representing the owner of the Wind Farm. Mr. Krusoft provided information about the activities since June 2003.

The second meeting took place at the wind farm in Ostruzna with Mr. Zubala from Subrt Elektro company as the operator who informed about the activities of the project and delivery of spare parts.
- 3. Activities Completed:** Mr. Krusoft informed Michal Deraj from DEPA that Mr. Jiri Krajcik responsible for maintenance and operation of the wind farm was replaced by Subrt Elektro company. The two trainings courses provided by Vestas company from June 1. till June 7. and November 10. till November 15 were delivered. Both Mr. Krusoft, representing the owner and Mr. Zubala, representing the operator were very satisfied with the expertise of the trainer Mr. Paul Henning from Vestas. Experts from Subrt Elektro, especially Mr. Zubala had a chance to learn a lot when Mr Henning from Vestas worked with them on replacement of spare parts, on maintenance and diagnosis of different technical problems/failures. The spare parts from Package A and Package B were delivered according to the project proposal.
- 4. Problems Identified:** Two main problems were identified by the operator: First it would help them if they could have the list of spare parts for the type of wind power stations they have and also the software diagnosing malfunctions/failures of the technological units installed. However Vestas can not provide the software.
- 5. Conclusions:** Based on the personal meeting with the representative of the owner Mr. Krusoft and on the personal visit of the wind turbines of the Ostruzna, guided by Mr. Zubala, technician in charge I had seen the turbines rotating at operating wind speed, spare parts stored in the office warehouse. The others were already installed during the training. I can conclude that the The Future Help project goals were accomplished and activities/spare parts delivered.

Michal Deraj
DEPA DANCEE Local Project Coordinator Slovakia

Comment regarding the diagnosis software mentioned in point 4:

Vestas A/S has informed that this diagnosis software is internal Vestas software, which is only handed over to and used by Vestas technicians. No customers worldwide has access to this software.

The reason for this policy is that misuse may have catastrophic consequences for wind turbine performance, component protection and general safety.

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Abstract (max. 2000 characters)

The course of the Danish-Czech Wind Resource Know-how Transfer Project is reported. The know-how transfer component of the project has consisted in performing a wind resource training workshop for about 13 individuals from the Czech Republic, ranging from scientists to wind farm project developers, and in donating modern software for evaluating wind resources. The project has also included a review of a Czech overview-study of wind speeds inside the country as well as an investigation of the electricity tariffs and their impact on wind energy utilization in the Czech Republic. A problematic existing Czech wind farm project, locked up in a no-production situation, was also addressed. Not until the purchase by a new owner-company, which initiated the necessary repair and maintenance, the wind farm resumed normal operation. As its last task, the present project assisted in consolidating future operation through a helping package consisting of a training course for the wind farm technicians and in a package of relevant spare parts.

Descriptors INIS/EDB

CZECH REPUBLIC; DENMARK; RESOURCE ASSESSMENT; TECHNOLOGY TRANSFER;
WIND POWER