

	<b>Name:</b>	Per Nielsen
	<b>Date of birth:</b>	February 5, 1957
	<b>Nationality:</b>	Danish
	<b>Profession:</b>	Managing Director, EMD International A/S
	<b>Education:</b>	Electrical Engineering, M. Sc.
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### Education

Time period	Content	Place
1979-1984	Electrical Engineering, M. Sc.	Aalborg University (AAU), Denmark
2001	Certified WAsP user	Risø National Laboratory

### Employment Record

1986-	Managing Director	EMD International A/S (before 2004: Energi- og Miljødata)	<p>Head of Wind Energy Department. Senior wind energy consultant and course instructor within the following areas:</p> <ul style="list-style-type: none"> <li>• Wind analysis/energy production calculation</li> <li>• Site suitability/loads etc.</li> <li>• Grid connection</li> <li>• Economy</li> <li>• Noise and flicker</li> <li>• Visualization and ZVI Planning</li> </ul> <p>Responsible for development of the WindPRO software for wind energy project design and planning. Consultancy experience (wind data analysis, wind resource assessment, micro-siting, bankable energy yield calculations, feasibility studies and due diligence) from more than 1,000 sites in Denmark, Sweden, Norway, Germany, Netherlands, Luxemburg, England, Ireland, Greece, Spain, Portugal, Italy, France, Poland, Hungary, Rumania, Bulgaria, Croatia, Estonia, Lithuania, Latvia, Russia, Austria, Czech Republic, Slovakia, Egypt, Kenya, Canada, USA, Nicaragua, Honduras, Mexico, China and Thailand.</p> <p>Responsible the Danish Wind energy index and WTG database, where every WTG is registered with detailed coordinates, technical data and energy yield - Inventor of the "Goodness</p>
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			factor" (evaluation tool for wind energy yield calculations benchmarking).
1985-1986	Project manager	Aalborg University, Institute of Industrial Construction and Energy Technology	Feasibility studies for a software house within the field of renewable energy. (Subsequently established as Energi- og Miljødata, EMD).
1984-1985	Technical adviser	Dansk Andels Energi/ Co. P. N. Eriksen	Project manager for manufacturing and erection of 100 kW wind turbines on the Danish island of Bornholm. Manufacturing took place by ten small scale local industries.
1980-	Consultant	Danish Wind Turbine Owner Association  (Danmarks Vindmølleforening)	Independent wind energy consultant for this association within wind resource assessment, project development and economic calculations during the establishment of many Danish wind farm projects.

### Experience Record

Time period	Title	Place/company	Description
2010			Due Diligence for wind farm in Poland. Study of wind energy integration at Bahamas. Consultant for Egyptian Electricity Transmission Company setting up a wind measurement program for BOO project
2009			Instructor at Advanced WindPRO course, Chicago, USA. Project manager for Due Diligence assignment covering more than 25 wind farm projects in Eastern Europe. Offshore wind course, Risø. Project manager for "WTG economics", funded by Danish Government. Layout/design of several large wind farm in Egypt, El Zayt area
2008			Presentations in Beijing at launch event for Chinese version of WindPRO software. WASP Engineering course, Risø. Full AEP and site compliance study for wind farm project in Honduras. Project manager for "Wind turbine economics" project. Project manager during Due Diligence of two wind farm projects in Romania. WED project "post construction evaluation" for six wind farms in China. Instructor at Advanced WindPRO

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			courses 2 x Aalborg, Denmark, 1 x Houston, USA
2007			<p>Implementation of new noise model, NORD2000 in WindPRO (start-up).                      Project manager for Havgul offshore wind measurement campaign – including field test of LIDAR measurement equipment.                      Implementation of new software development strategy at EMD based on the Agile concept.                      Instructor at two Advanced WindPRO courses, Aalborg, Denmark.                      Test of METEODYN CFD software for wind energy calculations.</p>
2006			<p>Leader of Workshops within wind project development in Nicaragua, Cuba and Norway.                      Revision of Danish wind energy index - long term correction based on NAO index etc.                      Several wind studies in different countries, mainly in complex terrain, but also offshore (Italy, Egypt, Germany, UK, Sweden, Denmark, and Nicaragua).                      Assistance to wind measurement campaigns in Poland and Norway.                      Participation in Risø project SATWIND.                      Part of wind resource mapping team for Aceh province, Indonesia.                      Conference contribution at Estonia Wind Energy conference.</p>
2005			<p>Instructor at WindPRO course in Denver, USA and Offshore Course in Copenhagen, Denmark.                      Micro-siting and wind analyses for Havgul, world largest offshore wind farm in Norway.                      Manager of wind measurement campaign in Nicaragua (Danida).                      Conference contributor, Gotland, Sweden.                      Reanalysis of the German wind energy index resulting in large change in expected performance for German WTG in North and Western part of Germany.                      Speaker at three different public arrangements in Denmark concerning investment in wind farms in Germany.                      Speaker at annual meeting for Danish Wind Turbine owner organisation;</p>

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			<p>Topic: Electricity tariffs for WTG projects world-wide with focus on Europe.</p> <p>Wind index analysis tools for SATWIND project, Risø.</p> <p>Wind analyses for Andalusia, Spain along the entire south coastline for Spain.</p> <p>Course instructor, University of Managua, Nicaragua.</p> <p>Manager of PARK calibration project for fine tuning of array loss calculation models based on latest large scale wind farm experience.</p>
2004			<p>Instructor at WindPRO courses in Chicago, USA, Montreal, Canada, Rome, Italy and Cairo, Egypt.</p> <p>Start up of new wind power development project in Nicaragua (Danida).</p> <p>Participation in Interreg III B project "Wind energy in the Baltic States" including site visits in Estonia and Finland.</p> <p>Participation in Interreg III B project "Wind energy in the Baltic States" including site visits in Estonia and Finland.</p> <p>Development of test cases for "the new WAsP" (RISØ).</p> <p>Study of wake losses etc. in world largest wind farm in plain terrain, Zafarana (222 WTG's) in Egypt.</p> <p>Calculation of Energy production and economics for wind farm projects in Zafarana region.</p> <p>Several studies of new wind farm proposals (energy calculation, environment and economics) in several different countries.</p> <p>Calculations and documentations for new large off-shore windfarm in Denmark, "Horns Rev 2".</p> <p>Start up of new project "SATWIND", using satellite images for wind power purposes (Risø).</p>
2003			<p>Instructor at WindPRO Courses in Madrid, Spain, Austin, TX and Grand Forks, ND.</p> <p>Participant in Project: Large Wind farms (RISØ) – development of new improved calculations models for large-scale wind farms.</p>

			<p>Speaker at Repower seminar in Flensburg, Germany.</p> <p>Development of new Wind Energy Index calculation system for Denmark.</p> <p>Manager of development of GRID analyse software tool (Module eGRID in WindPRO), partly sponsored by the EU project DISPOWER.</p>
2002			<p>Kick off meeting for Dispower project (EU).</p> <p>Instructor at WindPRO Courses in Portland, OR, Grand Forks, ND and Morelia, Mexico</p> <p>Participant in Altener Project: SEAWIND, Feasibility Study Guidelines for Off-shore wind farms.</p> <p>Participant in Project: The new WASP (RISØ) – development of new improved calculations models.</p>
2001			<p>Instructor at WindPRO Course in Madrid, Spain.</p> <p>Project manager for “WindPLAN – GIS integration etc.”</p> <p>Participant in development of “The new WASP”, the industry standard in wind energy calculation models.</p>
2000			<p>Instructor at WindPRO Courses in Leon, Spain and Dublin, Ireland.</p> <p>Project manager for “WTG-Energy calculation project - model test and verification”</p>
1999			<p>Instructor at WindPRO course in Madrid, Spain.</p> <p>Participant in EUWINet Project, ISET, Germany.</p> <p>Participant in Altener Project: Developing WindPlan for Castalia Y Leon, Spain.</p> <p>Project manager for “WTG’s at Technical landscapes”.</p>
1998			<p>Instructor at WindPRO course in Barcelona, Spain.</p> <p>Project manager for main part of development of detailed and verified Wind resource map of Denmark.</p>
1997			<p>Instructor at WindPRO courses in North Dakota, US and Göteborg, Sweden.</p> <p>Conference contributor at AWEA Windpower '97 in Texas</p>
1996			<p>Instructor at WindPRO course performed in Minnesota, US - Calculation of Wind Energy Projects in Mid-West States.</p>

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1994-1995			Investigation of Wind Energy Potential on Eastern Crete, EU financed RECITE-project.
1994			Investigation/selection of suitable Sites for Wind Energy Project in the hinterland of Portugal.
1993-1994			Developing WINDATLAS for the Baltic States (Estonia, Lithuania and Latvia), financed by the Danish Ministry of Environment. Project reopened in 2000 under leadership of Carl Bro Consultants.
1992			Team Member on UNDP mission in NEPAL (one month), for wind energy feasibility study.

### Publications

Date	Title
2010	WTG Economics, Feb. 2010
2008	New wind calculation basis for wind turbines in Denmark
2008	Adapting and calibration of existing wake models to meet the conditions inside offshore wind farms, EMD Feb. 2008.
2006	Co-author/participant in project: SAT-WIND project, Risø National Laboratory, Roskilde, Denmark, 2006
2005	Identification and development of "repair kit" for problems with German wind energy index.
2004	Co-author/participant in project: The necessary distance between large wind farms offshore – study; Risø National Laboratory, Roskilde, Denmark, August 2004
2004	Case studies for "The new WASP"
2004	Report: Wind power production analyses, Zafarana, Egypt
2004	Financial sustainability analyses for wind power (BSR-project)
2003	Report: WindPLAN – software for Spatial planning for WTGs and wind farms
2003	Report: Feasibility Study Guidelines for Offshore wind farms. (SEAWIND EU-project)
2002	Report: 20 Case studies calculating wind farm production
2001	Wind atlas and wind resource map developed for the Northern part of Poland
2001	Analyses of WTG economy based on large questionnaire among DK WTG owners (together with RISOE, Utilities etc.)
2001	Wind Atlas for Latvia and course + wind resource maps for The Island Hiiumaa,

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	Estonia.
2001	Energy calculation, Build up of case collection and testing different models and parameters on 20-30 existing WTG projects worldwide.
2001	Renewing (re-powering) of older WTG's in Denmark.
2000	WTG siting near Technical Landscapes
1999	Wind Resource Map for Denmark
1997	Den kommunale vindmølleplanlægning, Status pr. Jan.97.1995. (Evaluation of Danish Municipality planning for Wind Turbines, Performed for Danish Energy Agency).
1997	Landsdelskorrektion for beregning af vindmølleproduktioner i DK - FASE 2. (Verification of the method developed in 1992 to improve Windatlas Calculation Method (WASP) for use in Denmark).
1995	Status for den kommunale vindmølleplanlægning December 1995.(Evaluation of Danish Municipality planning for Wind Turbines, Performed for Danish Energy Agency)
1993	VISUAL (Manual to Software product for visualizing WTG's and guidelines to perform visualizations.)
1992	NEPAL, Study of Wind Power possibilities. (for UNDP)
1992	Landsdelskorrektion for beregning af vindmølleproduktioner i DK (Improvement of the Windatlas Calculation Method( WASP) for use in Denmark).
1989	Forfattervejledning. (Guidelines for programming user friendly software)
1984	Elforsyning af Anholt med vindkraft (Study, final report)
1983	Vindmølleparker (Guidelines for establishment of Wind farms, especially grid connections, study financed by government funds)
Every year	Manuals for WindPRO software products and documentation of calculation methods - continuously updated.

## Articles

Date	Title
February 2010	WTG Economics, "Naturlig Energi"
December 2005	New wind index for Denmark, "Naturlig Energi"
Madrid 2003	Presentations on workshops regarding wind resources and WTG operation costs at EWEC
Madrid 2003	Co-Author on Paper on 3D animated presentation of WTGs, presented at EWEC

## EMD International A/S

Copenhagen 1999	Co-Author on Paper on Wind resource map of Denmark, presented at EWEC, Nice 1999 and ICWE
Since 1993-	4 Annual articles in "Naturlig Energi", The leading Danish Wind Turbine magazine. More of them are published in other Magazines, e.g. Wind Energie Aktuel, Germany
Each Quarter from 1992 to present:	Editor and contributor to the magazine "Energi og Miljødata" with updated information on the energy situation in Denmark

### Software Abilities

Program	Level
WindPRO	Expert user
WAsP	Expert user
WAsP Engineering	Expert user
MS Office (Excel, Word, Access, Power point, Outlook)	Expert user
Surfer	Expert user
PaintShopPro	Expert user
CFD software tools	Test user
WindSIM	Test user
METEODYN	Test user

### Language Skills

Language	Speaking	Reading	Writing
Danish	Mother tongue	Mother tongue	Mother tongue
English	Excellent	Excellent	Excellent
German	Excellent	Excellent	Average
French	No	Fair	No