



"As a family man, I want to help the future of my children and their children. The energy transition is an essential step, particularly as we now have access to a supply of clean, inexhaustible and affordable energy. This goal renews my resolve to play a leading role in the wind power industry every day.

In the early days of DunoAir, I started out purely as a project purchaser. Since then, the business has evolved dynamically and is now an established and successful player in the renewable energy market.

The qualified and motivated employees who have accompanied me along this path and supported me with their professional

expertise, have been huge assets. Without them, DunoAir could not have become the international business it is today, with operating companies in Germany, the Netherlands, Ireland and now California.

Our professional planning and design department in Trier, Germany has many years of experience in implementing wind power



projects and focuses exclusively on selected sites with optimum wind power potential. This approach ensures a high return in the long term.

I look optimistically to the future because DunoAir, as a professional wind power company with a consistent commitment to renewable energy, and its team of professionals have contributed substantially to the emergence of a sustainable and responsible policy."

Arjen Ploeg
Managing director DunoAir

# **DunoAir - our philosophy**

Our business philosophy focuses on intensive contact and constructive collaboration with all project stakeholders. We ensure that both the municipalities and the landowners are closely involved in the project development process, and regularly inform them about project progress. This level of transparency is of key importance to us as it generates confidence and forms a strong base for good collaboration.

Our main priority is to ensure that these projects benefit residents living in the vicinity of DunoAir wind farms and stimulate the local economy. Our rental contracts are formulated in a way that directly links high-energy production to a high return. In addition, we make every possible effort to involve local businesses in our wind farms by awarding them orders for infrastructure and the mandatory compensation measures during the design and construction phases.

We are also aware of, and gladly embrace, our responsibilities with respect to the welfare of humanity and the health of the planetf. We want to contribute to securing a reliable, economic and above all environmentally friendly power supply, both today and for future generations. DunoAir's vision is in alignment with the Californian and German governmental goals, as they aim

to abandon nuclear power and strive for climate protection.

In addition to protecting People, protection of flora and fauna is also a primary objective in our philosophy. When designing and implementing our projects, we attach great importance to a complete and professional survey of the area to identify protected species of flora and fauna and always consider how our wind farms can make a positive ecological contribution.

The nature conservation surveys that are carried out as part of the planning permit procedure include identifying migratory, resting and breeding birds, bats, wildcats and further relevant species in each individual case.

In addition, we initiate scientific research. When we build one of our wind farms, we collaborate with Manfred Trinzen, a wildcat expert.

Our joint goal is to obtain information about the wild cats' behaviour and any behavioural changes that become evident during the construction and operating phases of a wind farm in a long-term study that continues for three years.

This measure far exceeds the requirements set by the authorities and is an impressive demonstration of our commitment to nature and the environment.







# DunoAir: Your perfect wind power partner because:

- we maintain a close and personal relationship with all stakeholders from day one
- we regularly discuss project progress with all those involved in the project
- we offer solid and professional project development
- we focus on selected sites with optimum wind power potential
- we guarantee sound financing
- we ensure professional operational management
- we deliver 100% green electricity from renewable energy sources



# **DunoAir - from operator to full-service company**

Renewable energy sources are becoming increasingly important in the light of increasing demand for energy and the finite nature of conventional energy reserves. It was against this backdrop that Arjen Ploeg founded DunoAir B.V. in 2004. A company, which dedicates its complete commitment and know-how to renewable energy, with a primary focus on wind power plants.

A long-standing cooperation between Arjen Ploeg and project developer Marc Wie-

mann ultimately resulted in a decision to develop wind power projects independently and manage all aspects of design and construction.

The foundation of DunoAir Windpark Planung GmbH in the summer of 2009 marked the organisation's transition from a dedicated wind farm operator to a full-service company. Since then, the design department team has increased steadily in size and now focuses all its commitment and







professional competence on developing and operating wind farms at preferred wind power locations in Germany and abroad.

# **Project development:**

DunoAir Windpark Planung GmbH, Trier (D)

# **Operating management:**

DunoAir Windpark Management BV, Oosterbeek (NL)
DunoAir Windverwaltung GmbH, Rees (D)

# **Electricity trading**:

DunoAir Strom-Handels-GmbH, Rees (D)



# **DunoAir Windpark Planung GmbH**

## **Design department in Trier**

DunoAir's team at the company's facility in Trier has grown steadily in recent years. In addition to Marc Wiemann, who manages the design department in Trier, Thilo Wemmer-Geist has been responsible for project management since 2010. Both have long-standing experience in the wind power sector and use their extensive knowledge to develop individual solutions for each project.

The design department's professional project development capabilities were further

strengthened by the arrival of Christiane Würtz, a qualified geographer, in 2012. Laura Schmidt, who has an MSc in geography, has provided project support with great commitment and know-how since 2016.

A qualified business and industrial engineer, Sonja Stauter has contributed new perspectives and brought her professional knowledge to bear in the area of project support since the spring of 2017. The latest arrival, Isabelle Saar, who has an MA in geography, has been responsible for providing project support in the design and construction phase since the summer of 2017.

The increase in staffing necessitated a move to larger premises. Since the end of September 2017, the team in Trier has worked from newly built offices in a former tobacco warehouse built in the Wilhelminian era.

The office area, which features an interactive touchscreen interface, mobile workplaces and a large conference room with a video communication system, provides a dynamic working environment with state-of-the-art technology.



## Our project development in detail

Developing one of our projects is an intensive process that requires continuous adaptation to site requirements. The same employee coordinates our projects from beginning to end. This guarantees full knowledge of all the details and is the basis for a productive cooperation based on trust. Consequently, we are capable of reacting flexibly and quickly to requests and change proposals and always remain in close contact with all those involved.

#### It starts with an idea

The main details of the project are discussed and formulated in conjunction with all project stakeholders. The search for a suitable site involves studying maps and analysing zoning and land-use plans.

This analysis indicates which areas can be excluded and which areas are suitable for developing a wind farm. Areas where raw materials extraction take place, nature preservation areas, or areas designated as biotopes are basically unsuitable. Particularly accurate and intensive research is required in bird sanctuaries and flora/fauna habitat areas.

If consensus is reached with the partners, we engage independent auditors to perform the required research. Since 2004, wind turbines have to be applied for and approved under the German Federal Immission Control Act (Bundesimmissionsschutzgesetz/BmSchG).

In comparison to the situation before 2004, when turbines could be designed and constructed without major investigation, the level of effort that has to be put into research has now increased substantially. For example, the standard programme for each project includes preparing an environmental impact study, various nature conservation audits and an assessment of noise generation and shadow impact.

## **Project realization**

The construction works begin after planning permission and funding have been obtained. During the first phase, roads and support surfaces for the heavy vehicles are built and trenches excavated for the foundations. In the next phase, work starts on erecting the wind turbines and installing electricity lines. At the end of the construction process, we restore the areas surrounding the wind turbine foundations to their original condition as far as possible so that they can be used again for agriculture or as a nature area.

We collaborate exclusively with Enercon, Germany's leading wind turbine manufacturer, when building our wind farms. We only use direct-drive turbines: a design that does not require a transmission. This policy not only guarantees an extremely long service life, it also protects the environment because no gearbox oil is required.

The availability of a wide range of different wind turbines allows us to select the optimal units for each individual site.



As we have a framework contract with Enercon, we are able to put our wind farms into operation in a relatively short space of time. Our contractually agreed, short delivery lead times offer significant economic benefits when compared to the delivery lead time of 1.5 years that is currently normal in the sector. In the light of the phased reduction in reimbursement rates under the German Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz/EEG), our ability to commission and put the equipment into operation quickly has a significant impact on the reimbursed amount.





# DunoAir - technical management service for customers

- DunoAir saves and archives the operating data every 10 minutes and evaluates the results for you on a daily, monthly and annual basis.
- DunoAir benchmarks the systems and generates monthly and annual comparisons.
- DunoAir specifies and evaluates the performance characteristics of the individual turbines.
- DunoAir generates a target/actual comparison based on forecast data and the wind index.
- DunoAir generates monthly operating reports that concisely present all relevant system parameters (in tabular form and graphically).
- DunoAir monitors and stores all the operating parameters in order to assess current turbine condition and also detect potential damage at an early stage.
- DunoAir calculates and communicates the returns in kWh and euros and US dollars
- DunoAir records wind speed data and turbine availability.
- DunoAir records status and error messages and faults.Störungen.

# DunoAir Windpark Management BV - DunoAir Windverwaltung GmbH -

## We ensure a smooth operation

Continuous maintenance and inspection of the turbines is required in order to keep the rotors in our wind farms turning as smoothly as possible. Our wind turbines are our capital that we take care of personally. Enercon guarantees an availability of 97% and our objective is to achieve an availability of 98% to 99 % at our wind farms. We achieve this through constant monitoring of the wind turbines and fast response if a fault occurs.

We collaborate with a local 'technical manager' at each wind farm. In addition, a local person receives basic training and can react quickly to any problems that arise in close coordination with the technical manager.

In addition to the visual inspections carried out by the local technical manager, our turbines are also remotely monitored on a regular basis. If irregularities are detected, both the technical manager and the turbine owner/operator are informed of the duration and type of fault by text message and email. Incoming faults are immediately analysed and resolved without delay. This approach ensures that minor faults (90% of the reports) can generally be resolved

in less than two hours, thereby guaranteeing that the turbines can be kept running smoothly. We supervise and coordinate any maintenance and repair work that is required until the fault has been rectified. In the case of complex faults which we are unable to resolve ourselves, we inform the manufacturer, Enercon, and request immediate intervention.

This ensures high availability which ultimately also has a positive effect on the rental payments.

## Maximum energy output

Depending on the type, a wind turbine starts to produce electricity from a wind speed of approximately 3 metres per second (m/s). The maximum energy output is achieved at a wind speed of 12 to 13 m/s. When the wind speed exceeds 28 m/s (hurricane force), the turbines are automatically switched off. The turbines only switch on again when the wind speed has subsided to an acceptable value.



## **DunoAir Strom-Handels-GmbH**

## We market your electricity

DunoAir Strom-Handels-GmbH was founded in 2011. The company has its headquarters in Rees, Germany and is responsible for brokering and trading electricity from renewable energy sources.

To ensure that the energy that has been generated is available to you, we also market the electricity. If the turbine owner/ operator does not sell the electricity to the network operator responsible for the region, the electricity fed into the system can be sold - in non-subsidised form - to a buyer via a public grid. Direct marketing is mandatory in the case of new wind turbines. The electricity sold in this way can be subsidised via the market premium. At the instruction of the wind farm operators, DunoAir Strom-Handels-GmbH negotiates

with various direct marketing parties, such as Statkraft Markets GmbH, E.ON Energie Deutschland GmbH or EnBW Energie Baden Württenberg AG, in order to negotiate contracts at the best possible prices.

Because the wind turbines are remotely controlled, integration in the electricity market is so precise that they can even be used for energy balancing via the minute reserve arrangement. This makes even higher returns possible. So wind turbines play an increasingly important role in creating a functional electricity market based on a high proportion of different forms of renewable energy.

# The advantages of DunoAir Strom-Handels-GmbH's brokering services:

- Many years of experience in the wind energy industry;
- Circumvention of negative stock market prices through intelligent direct marketing;
- Increased profitability for wind farm operators;
- 100% renewable electricity at attractive rates;

# **DunoAir - Operational Wind farms**

	Turbines	Nominal capacity	output p/a	Electricity for	Operational
		(MW)	(Forecast in kWh)	(Households)	(Month/year)
Brimingen	1	0,8	1.290.000	360	05 / 2009
Büren	10	20	59.735.000	16.800	08 / 2009
Dahlem-Baasemer Wald	10	28,7	91.800.000	26.250	09 / 2016
Hohe Lei	1	2,3	4.411.000	1.260	11 / 2017
Kappel	7	16,1	28.365.000	8.100	08 / 2013
Kappel-Faas	2	4,6	11.491.000	3.300	09 / 2013
Krastel-Leideneck	4	12,2	26.596.000	7.600	09 / 2014
Kuhbett	4	12	38.000.000	10.850	12 / 2017
Kürrenberg	5	15	36.787.000	10.500	06 / 2 <mark>01</mark> 5
Mastershausen I	7	16,1	26.890.000	7.700	07 / 2007
Mastershausen II	3	6,9	14.020.000	4.000	09 / 2010
Mastershausen IV	4	9,2	17.429.000	5.000	01 / 2013
Nienhagen	4	9,2	14.570.000	4.200	10 / 2008
Springe-Bennigsen	5	10	23.312.000	6.700	01 / 2009
Weibern-Rieden	6	13,8	24.193.000	6.900	08 / 2011
IN TOTAL	73	176,9	418.889.000	119.520	



# **DunoAir - Windpark Mastershausen**

## **Stage I - 2007**

The municipality of Mastershausen recognised the potential that wind power could have for the region at an early stage. Over a period of several years, three wind farms have been constructed in the vicinity of this town in close collaboration with DunoAir. The entire rental sum paid by DunoAir is used to benefit the local community. As a result. Mastershausen is one of the few debt-free municipalities in Rhineland-Palatinate and its residents are proud of their wind farms. Construction work for the turbines started in the spring of 2007 and Windpark Mastershausen I was connected to the electricity grid just a few months later.

Windpark Mastershausen I generates enough electricity for approximately 7,000 households. In comparison to conventional forms of energy, the wind farm also reduces the amount of CO<sup>2</sup> and sulphur dioxide emitted into the environment by 14,200 tonnes and 14 tonnes respectively.

## **Stage II - 2010**

The success of Windpark Mastershausen I and the resulting relationship of mutual trust between the municipality and DunoAir led to installation and commissioning of three further Enercon Type E-82 wind turbines in the summer of 2010.

## **Stage III - 2010**

DunoAir ventured into uncharted territory for the first time when it was awarded a contract for building a photovoltaic (PV) system in the familiar surroundings of the municipality of Mastershausen. After intensive discussions with the municipality of Mastershausen and preparation of a development plan, the project was submitted for and awarded planning permission during the course of 2010.

This marked the start of a race against time, because the German federal government had also announced an unanticipated reduction in the financial support provided under the Renewable Energy Sources Act and a complete ban on free-standing systems in open spaces in 2010. Fortunately, planning permission was awarded in good time and the construction works for the joint project with investor ENN started before the end of 2010.

The PV system covers an area of 12 hectares, has a capacity of 2.75 MW and produces approximately 3.3 million kWh of electricity each year.

## Stage IV - 2012/2013

The success story of our collaboration with the municipality of Mastershausen continued in 2012. The borders of the land-use plan for the municipality of Kastellaun still offered enough space for four further wind turbines. We expected the new systems to generate an additional 19 million kWh. The construction works started in the summer of 2012 and reached completion in the spring of 2013. This expansion brought the total energy output in Mastershausen up to an impressive 60 million kWh. Today, the wind farm supplies renewable electricity to approximately 15,000 households.

# Mastershausen transformer substation

Building substations has now become routine for wind farm owner/operators. Because the capacity of the medium voltage networks (20 kV) is often completely used by smaller existing wind power and photovoltaic facilities, the operators of larger wind farms have to transform the electricity they produce to a higher voltage (110 kV) in order to feed it into the grid. As a result, the electricity generated by the wind turbines has to be transformed from 20 kV to 110 kV at a substation on site.

By putting a further transformer into service in the substation at Mastershausen, DunoAir has created a basis for further expansion in renewable energy in the Hunsrück area. Because additional DunoAir wind farms in neighbouring municipalities are



expected to be connected to the electricity grid during the coming months, the existing 80 MVA transformer system has been upgraded to 104 MVA. As a result, renewable electricity for up to 75,000 households can now be fed into the electricity grid at the Mastershausen site.





## Windpark Dahlem-Baasemer Wald

In 2012, the municipality of Dahlem in the Euskirchen region and DunoAir signed a contract for building wind turbines within the municipality's boundaries. Wind measurements taken over a period of 16 months from July 2013 confirmed our optimistic expectations in one of the windiest locations in North Rhine-Westphalia.

Since then, we have developed the project in close collaboration with the municipality. The exact wind turbine locations were determined in accordance with strict criteria in an intensive process. The telemetry data that we had obtained during our unique wildcat research study played an extremely important role at this stage of the project.

Our objective from the outset was to create the greatest possible degree of transparency and acceptance. So, on our own initiative, we decided to involve the public in the procedure for obtaining planning permission. Because of the different challenges, the Dahlem-Baasemer Wald Project was broken down into three sub-projects.

The construction works started in August 2015, when we received preliminary authorisation for a number of the wind turbines. We subsequently received full planning approval for the projects during the period from January to July 2016.

Windpark Dahlem-Baasemer Wald consists of eight Enercon type E-115 wind turbines, each of which features a rotor hub height of 149 m and is capable of generating 3.0 MW, and two type E-92 wind turbines with a rotor hub height of 138 m and an output per unit of 2.35 MW. DunoAir also constructed a dedicated on-site substation to ensure smooth feeding into the grid.

At the end of the construction phase, Mr Johannes Remmel, the former federal-state Minister for the Environment, officially declared the "Dahlem-Baasemer Wald" wind farm open as the largest forest facility of its type in North Rhine-Westphalia.

Since December 2016, the ten wind turbines at the wind farm have generated an annual output of approximately 92 million kWh of electrical wind power.











The former Minister of the Environment for Rhineland-Palatinate, Eveline Lempke opened Windpark Weibern-Rieden together with Arjen Ploeg (r).

# **DunoAir - Wind farms under construction**

Windpark	Turbines	Nominal capacity	Output p/a Electricity for		Operational	
		(MW)	(Forecast in kWh)	(Households)	(Month/year)	
Bous	3	9	22.650.000	6.450	Q1 / 2018	
Dahlem	5	19,8	55.000.000	15.700	2018	
Schwalbach	4	12	31.000.000	8.850	Q1 / 2018	





## **DunoAir California**

## **New projects in California**

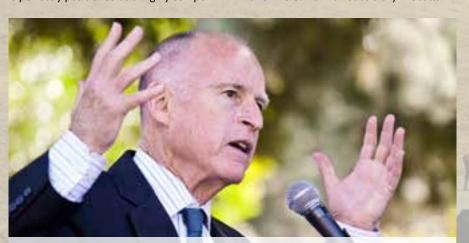
So far, DunoAir has operated exclusively on the European wind energy market and currently delivers green electricity to many tens of thousands of households. DunoAir now wants to expand its activities to the United States of America. DunoAir intends to support California's future vision, which calls for a full conversion of the state's power supply grid to green electricity by 2045.

With its broad portfolio of capabilities, encompassing all aspects of designing, building and operating wind farms, DunoAir is perfectly positioned as a highly competent partner for successfully realizing wind power projects in the USA. The focus will lie on building modern wind power turbines based on state-of-the-art technology at all sites that have been zoned as priority wind power areas.

In concrete terms, DunoAir plans to build a wind farm at Altamont Pass, to the east of the San Francisco Bay Area in California, in the next two years. This project will be led by Niels Ploeg and Peter Bottemanne. Peter Bottemanne will manage the activities from DunoAir's Californian subsidiary in Scotts



Valley. DunoAir's specialists are currently assessing the potential offered by California's wind power market for economically building and operating local projects. With this in mind, DunoAir has purchased suitable plots of land and is negotiating long-term power supply contracts with local power companies. The goal is to develop these projects using the same sound and robust approach that the company has applied so effectively in Europe for many years.

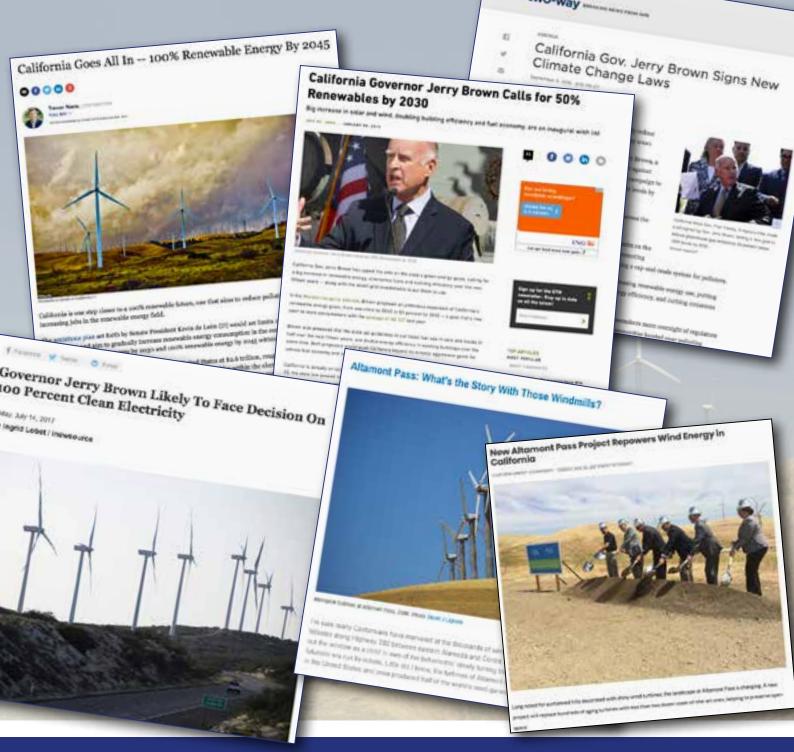


Jerry Brown: "We know it's a problem. We know it's huge. We know we can't stop it. We have to wake up Europe, and wake up America, and wake up the whole world to realize that we have a common destiny and what's at stake.





Peter Bottemanne





Arjen C.F. Ploeg

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Windpark Springe Bennigsen



Ortsgemeinde Kappel Windpark Kappel



Ortsgemeinde Bell Windpark Krastel



County South Tipperary (Irland) Windpark Curraheen



Ortsgemeinde Rieden



Stadt Springe Windpark Springe Bennigsen



Ortsgemeinde Nachtsheim Windpark Nachtsheim



Ortsgemeinde Brimingen



Stadt Mayen Windpark Kürrenberg



Windpark Bous



Windpark Dahlem



Windpark Nachtsheim





Windpark Altamont



Windpark Schwalbach



Windpark Kuhbett



Gemeinde Detmold Windpark Nienhagen



Windpark Weibern Rieden











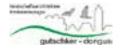






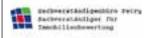


















































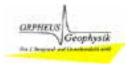


























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