NORDIC FOLKECENTER FOR RENEWABLE ENERGY
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WHAT WE ARE

Welcome to the world of renewable energy and energy savings!
Experience modern energy technology and its history.
Enjoy alternative architecture and beautiful fjord landscape.

ABOUT FOLKECENTER

NORDIC FOLKECENTER
FOR RENEWABLE ENERGY

is an independent, non-profit institution, managed by a board of 11 members representing the trades, local authorities, energy organisations, sciences as well as concerned citizens. Folkecenter forms part of international networks including partners all over the world.

Folkecenter provides research, development of technology, training and information for the manufacture, industrial innovation and implementation of renewable energy technologies and energy savings in Denmark and throughout the world. Folkecenter intends to achieve measurable increases in utilization of renewable energy technologies and thereby significant reductions in environmental pollution.

FOLKECENTER WORKS ON FOUR MAJOR FRONTS:

1/ Development and implementation of renewable energy systems: small-scale wind power and PV testing, innovation and design; CO2 neutral transportation; solar architecture.

2/ As sparring partner to manufacturers, local consumer groups, and initiators within renewable energy.

3/ Disseminating information on renewable energy in Denmark and elsewhere to professionals, trainees, concerned citizen groups and political decision makers focusing on decentralized energy solutions.

4/ The Village for Green Research, where Folkecenter is situated, demonstrates practical examples of integration of several renewable energy solutions, passive housing, water recycling systems etc. as an experimental and functional example of a future ecological society.

NORDIC FOLKECENTER for RENEWABLE ENERGY

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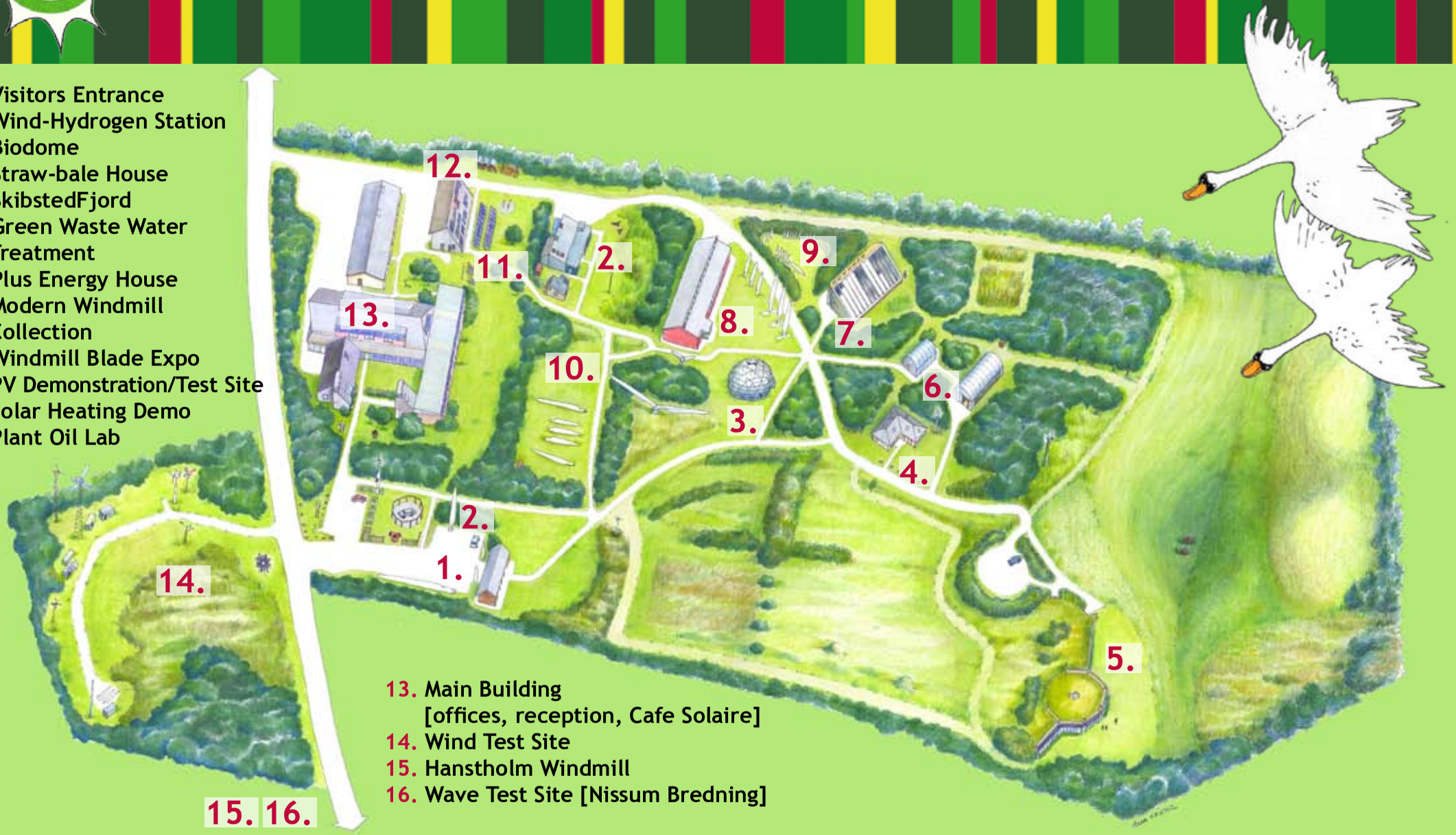


13. Main Building [offices, reception, Cafe Solaire]
14. Wind Test Site
15. Hanstholm Windmill
16. Wave Test Site [Nissum Bredning]

VISITORS ENTRANCE

Folkecenter is situated in Sdr. Ydby, a small village in the Thy peninsular, overlooking the scenic landscapes around the Limfjord in the North Western Jutland of Denmark. Windmills are seen in every direction you look. Since 1975 the region of Thy has been practicing pioneering renewable energy technologies. Folkecenter's 4000m^2 of buildings includes offices, workshops, exhibitions, training centre, etc. Folkecenter owns 8 hectares of land with rolling hills, close to historical sites from the Bronze Age and the Viking period.

The visitors entrance building was designed by Preben Maegaard and Morgens Riis, and has a unique wooden structure - wooden blades from 22kW Kongsted windmills from 1979 were used for the roof construction.

In the visitors entrance there is ticket sale counter and lavatories for visitors.

WIND-HYDROGEN PLANT

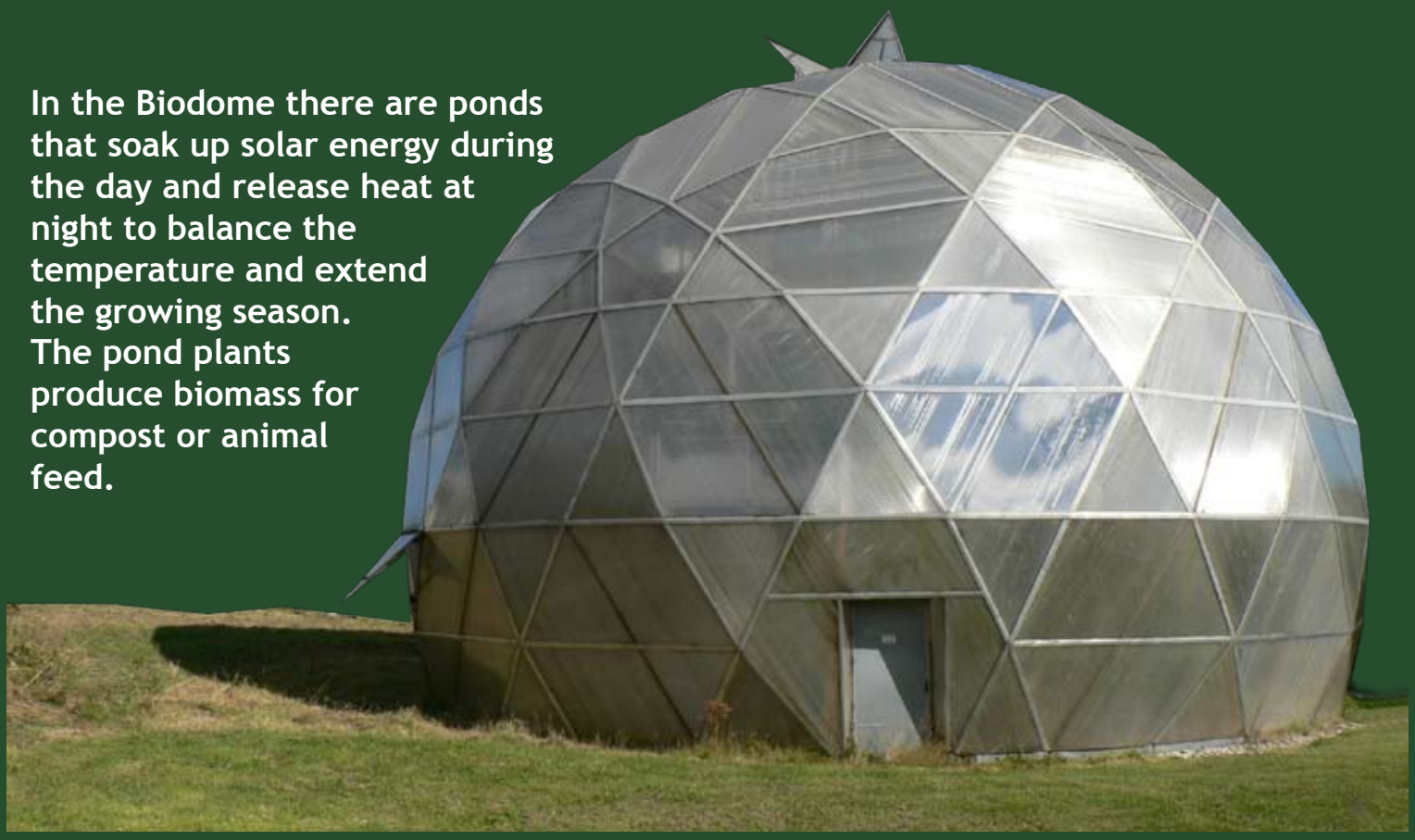
As the first and only place in Denmark, Folkecenter has the whole wind-hydrogen-car chain with electrolysis plant at 20 kW, storage of hydrogen and filling station for tanking of cars with hydrogen built in 1995.

Hydrogen filling station was installed at Folkecenter in 2007. Special filling system was designed according to EU standards. Hydrogen is stored in the 350 bar pressure storage tank.

BIODOME

The BIODOME is a unique greenhouse. In the shape of a sphere, it contains three floors. The diameter at the base is 14m. Structural frame is made of aluminium and is covered with triple wall polycarbonate glazing. The Biodome takes full advantage of all positions of the sun, maximizing solar gains. It uses an integrated approach to water and nutrient reuse, heating and aquaculture.

In the Biodome there are ponds that soak up solar energy during the day and release heat at night to balance the temperature and extend the growing season. The pond plants produce biomass for compost or animal feed.



STRAWBALE HOUSE

The experimental construction of the strawbale house is based on wooden structure filled with 842 wheat strawbales. The building has two floors and is insulated for normal standards. Inside walls are plastered with clay and painted with joghurt. Outside walls are plastered with lime mortar. Floor foundation is made of seashells.

The house has its own supply of electricity from a 2,2 kW Proven windmill. The strawbale house is not connected to the public grid.

SKIBSTEDFJORD

SKIBSTEDFJORD is a 750m² training centre and assembly house, which features experimental low energy underground architecture. It is integrated in the hill-side and the roof is covered with 1,5m layer of earth.

SkibstedFjord is an example of the integration of photovoltaic panels in the building. The solar cells are integrated in the window panes in the facade of Skibstedfjord, demonstrating the possibilities of the use of cells as an architectural element with visual effects. In the underground house there are two different PV arrays (monocrystalline polycrystalline PV cells). These are the first glass-integrated PV cells which were produced in Denmark (April, 1998).

Many educational, social and cultural events take place at the SkibstedFjord: conferences, seminars, concerts etc. There is a library (with collection from New Experimental College), study rooms, cafeteria and octagonal assembly hall.

GREEN WASTE WATER TREATMENT

Since 1988 Folkecenter has been conducting experiments with different kinds of green waste water cleaning.
In our philosophy waste water is a resource.
Green waste water contains nutrients that are very useful in relation to the production of new biomass like plants, fish and mussels.

The „Water for Life“ plant is used for cleaning waste water in a natural way. Waste water is aerated and treated by means of algae, micro organisms, snails, fish and green plants. After this, nearly all pollutants are eliminated, and the water flows to the sludge tank. Micro organisms eliminate organic residue from the wastewater. In the root zone plant, the final cleaning takes place; the cycle is closed - clean water returns to nature.

“Water for Life” system at Folkecenter

Model of a biological filter

PLUS ENERGY HOUSE

Plus Energy House was built in 1992. The house was both solar collector and greenhouse. Plus Energy House demonstrated a wealth of innovative ideas and combined mobile insulation, recovery of heat lost by evaporation from plants, and a dike pond laboratory which produced fish and vegetables using nutrition from biogas digested animal manure.

By 2012 the building was renovated to host an exhibition of models of wave energy machines and other renewable energy equipment. Wave energy models are authentic test examples from the period 1996 to 2002 when a big variety of wave energy initiatives from inventors, institutes and companies could be found in Denmark.
The collection of wave energy machine model is the largest in Denmark.

MODERN WINDMILL HISTORY
Collection

Modern Windmill History Museum building contains an exhibition of historical types of windmill nacelles and components as well as prototypes from the 1970s.

Kongsted 22kW nacelle

Nacelle of the Gedser wind turbine

Blacksmith's 22kW nacelle

WINDMILL BLADE EXPO

The Windmill Blade Expo is Denmark's largest collection of windmill blades. Blades up to 31 meters long show the development of modern windmill design. Blades can be seen in different places at the Folkecenter.

Collection of early blades

Blades of Økær, KJ, Olsen and Svaneborg

11m long MAT and 19m long LM blades

Blades used as information displays

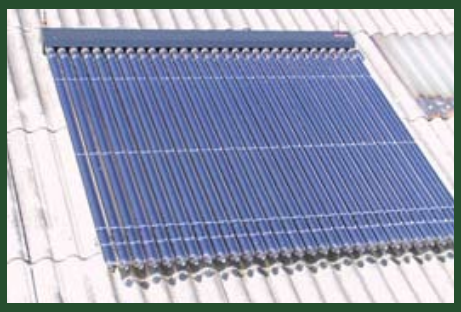
Original blade from the Tvind windmill (1978-92)

PHOTOVOLTAICS
Demonstration/Test Site

The photovoltaic industry is a quickly evolving enterprise. There are many variables when considering purchase of a PV system. Folkecenter PV Test Site is designed to demonstrate some of the leading manufacturers in solar industry. The test site allows for the physical comparison of 40 photovoltaic panels from international manufacturers as well as output data comparison in real-life light conditions.

Folkecenter PV Test Site provides information to compare important variables of each product, like performance, efficiency, technology, construction, physical dimensions, etc.
Real-time output and production history can be found on Folkecenter website.

SOLAR HEATING DEMO



Outdoor solar heating demo for heat supply with 12 different solar heating plants. Each of these can cover a family's hot water consumption in summer. The oldest plants are from 1984, other are completely new. There are many examples of solar energy, solar panels, solar heating, vacuum-type and roof-integrated modules on the solar barn at Folkecenter.

PLANT OIL LAB

Folkecenter has done research, and has developed solutions for production of plant oil since 1994.
Our focus is decentralized production of PPO, pure plant oil for transportation purposes.

An oil press at Folkecenter produces 2-4 litres of oil per hour, depending on the quality of the seeds. Besides oil the press also produces rape cake, which is suitable for animal fodder.

MAIN BUILDING


Café Solaire

The main building of Folkecenter has reception with the exhibition of various information materials; offices; meeting rooms; library; trainee centre and public Café Solaire.


Offices

Reception


Library

The corridor has a glass façade with integrated thin-film solar modules. Since 2002, on the first floor of the main building there is solar shading with integrated solar cells. The modules produce 750Wp of energy and filter the sunlight in the summertime, when the sun is high on the sky, but allows more of the sunlight into the building in the wintertime, and in the evening, when the sun is low.

On the south side of the main building there are 41 polycrystalline modules of solar cells (55 W each) connected to the grid from 1995.

WIND TEST SITE

At the Folkecenter Test Site, 10-15 small-scale windmills are constantly being tested, measured or demonstrated for national and international clients. The windmills deliver more electricity than required for Folkecenter's own power needs. The Test Site has platforms and foundations for testing of electricity producing windmills of 1 kW up to 30 kW and mechanical wind pumps.
The Test Site is equipped with data loggers, wind measurement masts, towers for installation of wind turbines and water wells where the performance of small windmills for electricity and water pumping can be measured.

HANSTHOLM WINDMILL

In 1989-1992 Folkecenter designed and constructed a 525kW windmill.

The windmill is a prototype of typical Danish design, it belongs to the DANmark series, the result of more than ten years of continuous innovation and development, resulting in a series of advanced and reliable wind turbines ranging from 20 to 525 kW.
Hanstholm wind turbine was set up in 1992. Since then it has been running without any problems. Annual power production is at 1.4 million kWh, which is enough for the electricity demand of 350 households.

A total of 160 windmills were produced by various manufacturers.

As part of the information service at the Folkecenter it is possible to get inside the windmill.

Windmills at Roshagevej are a part of the coastal protection.

WAVE TEST SITE

Folkecenter owns and operates Wave Energy Test Station, located by Nissum Bredning, in the western Limfjord, not far from the Folkecenter. The facility has been in operation since November 2000. It offers inventors, developers and manufacturers pre-commercial testing of scale models and wave energy prototypes.

Testing in real conditions in a marine environment, with drifting objects, waves, ocean currents and other realistic operating conditions, have demonstrated its importance toward commercialization of wave machines.

HISTORY of FOLKECENTER

Denmark suffered more than any other country from the oil crisis in 1974 and 1979. Imported oil was used for all energy purposes: electricity, heating, transport etc. Both for the population and the politicians it was evident that diversification was the answer to create independence from oil and other fossil fuels. Strong opposition to nuclear power soon developed and renewabale energy solutions flourished. It was the early beginning of an energy revolution with the aim of substituting all fossil fuels and atomic energy by renewables. Especially in Thy, the domicile of the Folkecenter, many local initiatives were taken to design and develop new technologies using wind, solar and biomass in the search for new forms of energy.

A local group of activists conducted numerous projects within wind and solar energy. However, the grassroots initiatives required more and more expertise. Based on very good results of local development initiatives, action was taken at the political level to create an institute for development, testing and information of various types of renewable energy with many small and dynamic commercial entreprises as its primary target group. They had the capacity to manufacture and commercialise renewable energy; they were positive towards new ideas and approaches but needed technical support, facilities for testing and partnerships. This they should soon find at the Folkecenter. In 1983 special law by the Danish Parliament created the financial basis of governmental funding and support. In principle it is still available with some significant changes made in 2002. 400 people from all levels of the Danish society support activities of Folkecenter; a board of 11 persons has the leadership of the centre; since 1983 Preben Maegaard has been the director of Folkecenter and its driving force.

PREBEN & JANE

People of Folkecenter for Renewable Energy

PREBEN MAEGAARD, Founder & director of Folkecenter for Renewable Energy

Born 1935, is a Danish renewable energy pioneer, author and expert. Since the oil crisis in 1974 he has worked locally, nationally and internationally at the organizational, political and technological levels for the transition from fossil fuels to renewable energy.

In 1974 Preben Maegaard established NIVE (Nordisk Initiativ Vedvarende Energie). In 1983 he founded and has been director of the Nordic Folkecenter for Renewable Energy. In this capacity he has been responsible for the technological innovation of windmills, including design, construction and implementation of sizes from 20 to 525 kW, farm biogas digesters as well as integrated energy systems including hydrogen and biofuels for transport. For over three decades, Preben Maegaard has been conference director, organizer, speaker and/or participant of numerous national and international seminars, workshops and conferences, chairman of the World Wind Energy Conferences (WWEC2003 in Cape Town, WWEC2004 in Beijing and WWEC2005 in Melbourne), as well as author and/or co-author of numerous reports, books, articles and periodicals in Danish, English, German and Japanese within the field of renewable energy and sustainable development and has received a number of awards. Under his leadership Folkecenter has provided transfer of renewable energy technology to many countries, and set up numerous pilot projects worldwide.

JANE KRUSE Head of Information & Training Programs at the Folkecenter

Since 1976 worked with grass-roots for sustainable development as opposed to nuclear power and traditional fossil energy.

Founding member of Folkecenter and secretary of the board for 11 years. Editor, author and photographer of many Folkecenter publications. Since 1990 has been coordinator of European and international renewable energy information tours. Works closely with many NGOs. Jae Kruse is project leader on issues concerning developing countries and training courses. Since 1999 has been project manager at the Folkecenter: Establishment of test facility for wave power machines; Testing of wave power machines; Testing of small windmills from 400 W to 25 kW.

1992-1996 had been Member of the Committee for small household windmills advising the Danish Energy Agency. Since 1994, Member of the Danish Ministry of the Interior's Rural District Group, promoting initiatives and activities involving rural populations and advising the Home Secretary.

Board member of: Committee for Green Technology (DEA); Centre for Rural Area Development (Aalborg University).

Project leader for: Local community in the countryside being self-sufficient in energy in the area of Sydthy; "Water for Life"; Full-scale strawbale house; Sustainable solutions for Bosnia and Herzegovina, focus on water; Solar electricity for three villages in Mali, West Africa; Solar cells integrated in buildings; Aktiv Vidensformidling, ELFOR/ Dansk EnergiNet Project; Climate Solutions Thy & Mors, Development Forum. Worked as advisor to Folkecenter Uganda.

AAGE ROSENDAL NIELSEN

The SkibstedFjord building at the Folkecenter has among other things the library from NEC (New Experimental College) and the sofa that John Lennon used to sit on during his stay in Thy in 1970. NEC was the pillar of the Nordenfjord World University, a different kind of school project that took place in Thy from 1969 and the following 25 years. Also the forerunner for the Folkecenter, Asgaard, was a part of the educational community and one of the few left of the original 20 schools. The background was the philosophy behind the Danish folk high school that N.F.S.Grundtvig invented and the free school that Kristian Kold invented - this is a school system where it is not the exams that matter, but the community and historic, poetic conversations.

"Nordenfjord World University" was founded by Aage Rosendal Nielsen, local spiritual leader, born and raised in Thy.

Aage had a vision about peace - a full co-existence between different nationalities on earth. Many interesting people came to visit Thy in those years. Among others John Lennon and Yoko Ono who were interested in the school project. They visited Thy and became personal friends with Rosendal. Aage died in 2003, 81 years old, but many of his visions, thoughts and ideas are still alive.