

A fossil-free future? The Danes just do it!

By Walt Patterson

Acclaimed author, energy thinker and nuclear critic (and nuclear physicist) Walt Patterson visited north-western Denmark to discover what a fossil-free future might look like in practice. Although Walt is a veteran proponent of renewable energy - and has long argued that we should radically redesign our energy systems - he was still impressed by the routine, matter-of-fact manner in which the Danes show how accessible a sustainable energy future really is.

Standing with difficulty on a Danish beach, braced against a force 8 North Sea gale driving spray and sand into your face, you are sure of one thing. Wind is raw energy, there for the taking for those who know how. The Danes know how. Towering above you are three 165-metre high 3MW wind turbines, their wings turning majestically in the gale. They belong to the townsfolk of Hvide Sande, helping to power the town and its harbour. The turbines are not, of course, alone. They are part of the local system that delivers both electricity and heat to their owners and operators. All over this northwestern corner of Denmark are such local systems.



**The 34-year-old windmill in Tvind (c)
Waymarking.com**

The visitors struggling back up the beach in the gale were taking part in a weekend workshop at the Nordic Folkecenter for Renewable Energy, near the town of Hurup in the Danish municipality of Thy. The theme of the workshop was "100% Renewable Energy in European Regions". The visit to Hvide Sande was on a tour intended to demonstrate that the objective was not only feasible but already happening. To be sure, the tour party traveled by bus, burning conventional diesel fuel. But the local supply of electricity and heat in northwestern Denmark, in Thy and its neighbours, comes almost entirely from local renewables. Moreover, to the Danes involved, this is no big deal. As far as they are concerned it is matter-of-fact and routine.

Oil shock

After the 'oil shock' of 1973-74, which hit Denmark hard, local activists began developing projects to use wind, solar and other energy alternatives. As the level of expertise required became demanding, the local initiatives came together to set up the [Nordic Folkecenter for Renewable Energy](#). In 1983 the Danish Parliament voted financial support; the Center now has some 400 Danish supporters. It has a main building with an extensive library and audiovisual facilities; an impressive collection of historic wind technology; a biodome with fast-growing biomass for research; testing stations for wind turbines, photovoltaic panels and solar thermal collectors;

buildings demonstrating innovative materials and construction techniques; other laboratories and workstations; and, set into the side of a hill, a striking octagonal underground meeting-hall with adjoining cafeteria. As its name suggests, it is a centre for every aspect of renewable energy - technology testing and demonstration, system integration, education, policy analysis and commentary, and outreach - especially outreach to those who need to see how renewable energy works in reality and in practice.

The workshop at the Folkecenter in October this year was just such outreach. It was arranged by the [World Future Council](#), an international non-governmental organization founded by Jacob Uexkull, the philanthropist-activist behind the Right Livelihood Awards, sometimes called the Alternative Nobel Prizes. The workshop brought together 31 participants from 15 European countries and Canada, all variously involved in expanding the use of renewable energy, especially at a local level.

The workshop presentations, now available online, and the lively discussions that followed, mostly took wind, solar, biomass and other renewable energy technologies as a given. They were more concerned with the social and political dimensions of choices, decisions, planning and management. **Cooperative ownership and management has long proved particularly persuasive, as participants from many countries confirmed** to expand the contribution of renewables and to deliver the benefits while overcoming obstacles. A recurring theme was the importance of active local participation, to gain acceptance and support for new ways to produce and deliver electricity and heat, and to use them more effectively. Cooperative ownership and management has long proved particularly persuasive, as participants from many countries confirmed.

Engineer-evangelist

The director and presiding genius of the Folkecenter is Preben Maegaard, a spry and irrepressible 78-year-old, an internationally renowned engineer-evangelist for wind power. His history of wind technology will be published in 2013. He and his partner Jane Kruse gave workshop participants a vivid commentary on the evolution of renewables in northwestern Denmark, both at the Center and on the wide-ranging bus tours included in the workshop programme.

First stop on the first tour was Thy-Mors Energie, the local electricity company in the municipalities of Thy and Mors. The technical director, Peter Melgaard, gave the visitors a witty and convincing presentation of how to run a system including, at last count, 348 wind turbines. Part of the company is the regulated monopoly operator of the electricity network; the other part is the commercial arm, buying and selling electricity within its own system and also trading with the rest of Denmark and even beyond. As well as the wind turbines the system includes combined heat-and-power (CHP) stations, likewise locally owned and operated, burning straw, waste, biogas and a modest amount of natural gas, sometimes also incorporating electric boilers to use surplus wind energy.

The CHP stations operate not only to balance the electricity system but also to supply district heating to homes and other buildings all over the municipalities. Although breezily unconcerned by the variable input from the wind turbines, Melgaard did concede that the rapid addition of solar photovoltaics on houses in residential areas was outdistancing the ability of the network to adjust, and might in due course cause operating problems.

The tour party visited the CHP station in Thisted, an immaculate facility which also uses geothermal heat and is commissioning a concentrating solar array to preheat water for the system. The mayor of Thisted then welcomed them to a reception, at which she underlined the pride of the town and region in its innovative approach to heat and electricity, delighted to show their achievements to foreign visitors.

Manure slurry

A very different but complementary facility lies 8 kilometers south of the town of Lemvig. The Lemvig biogas plant, yet again locally owned and operated, has a fleet of tanker trucks that gather manure slurry from farms in a 50km radius around the plant. A truck collects a tankful of slurry and delivers it to the plant, which processes the manure in three enormous digesters, each taller than a five-storey building. The digesters produce biogas, which is piped to the CHP plant in Lemvig that generates electricity and provides district heating. The digested manure, now high-quality agricultural fertilizer, free of weed seeds and pernicious bacteria and much less pungent, is then returned to the farms in the same tanker that collected the slurry.

As well as the magnificent Hvide Sande turbines, the tour party also visited perhaps the most famous wind turbine in Denmark, indeed at one time famous all over the world, the 2MW turbine built in 1978 at the Tvind school. While Germany was building the Grosse Wind-Anlage Growian, and NASA with Boeing and GE the Mod series, and the UK the Orkney group of turbines - all embarrassing and expensive failures - volunteers in Denmark built the Tvind machine, in part to demonstrate an alternative to the nuclear option then being keenly debated in Denmark. Its influence on the subsequent course of Danish energy is indisputable. Some 34 years later the Tvind turbine is still operating. The tour party picnicked under its distinctive red-and-white rotating wings.

Language matters

The point is worth stressing: in Danish, wind turbines have 'wings', not 'blades'. Language matters. Unlike, for example, the UK, Denmark has not allowed the promoters of fossil fuel and nuclear energy to inflict alarming and disparaging language on the electricity generation whose competition they fear. In Denmark wind turbines are not "ugly blotches" on an otherwise pristine landscape. **blotches" on an otherwise pristine landscape** Unlike the monstrous intrusions of fossil-fueled and nuclear power stations, not to mention their endless march of transmission towers, Denmark's ubiquitous wind turbines are a graceful and elegant complement to their surroundings - the surroundings, of course, equally manmade, the result of human activity for millennia, as the Danes well recognize.

Danish professor Bent Sorensen, in his masterly tour-de-force *A History Of Energy*, published earlier this year (Earthscan 2012), describes in fascinating detail how north-western Denmark, for instance, has been shaped and reshaped by the Danes themselves - sometimes disastrously, as in the forest clearances four hundred years ago, latterly with much more care and imagination. Sorensen's exhaustive and engrossing analysis of Danish energy management, both historical and current, recognizes major achievements, such as the wind power programme. But it also raises questions of policy that remain intensely controversial, such as Denmark's continuing reliance on coal and its trend toward foreign ownership of energy facilities.

Denmark's energy picture is not, therefore, entirely rosy. Major issues remain on the agenda, hotly contested. Nevertheless, participants in the Folkecenter weekend came away feeling that northwestern Denmark, at least, has its sustainable energy future well in hand.

About the author

Walt Patterson, a member of the editorial board of *European Energy Review*, is an associate fellow of Chatham House, in London. A famous critic of nuclear power back in the 1970s and 1980s, he has written - and spoken - about energy for over 40 years. His website archive [Walt Patterson On Energy](#), averages more than 500 hits per day. His most recent book is *Keeping The Lights On:*

Towards Sustainable Electricity. His next, now under way, will be called *The Trouble with Fire: What We Do, How We Do It, How We Can Do Better*.

Some of the presentations held at the conference at the Nordic Folkecenter for Renewable Energy in October, which Walt Patterson attended, are well worth a read. They can be found [here](#).

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