



Plenty of Energy from Sligo's Fresh Air!

The majestic 2.5 MW turbines of Airtricity's Kingsmountain wind farm nestled in Sligo's Ox mountains provided the focus of the study tour for the Energy from Fresh Air 2003 wind energy conference.

The wind farm is currently the largest in the Republic, its ten turbines transmitting 25 megawatts of clean, green energy into Ireland's power system. The cold and inhospitable weather encountered at the wind farm did nothing to dampen the enthusiasm of over 120 delegates. See full review of the conference inside...



Susan Ihde, BWE

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New Wind Farm Planning Guidelines Released for Consultation

The Department of the Environment, Heritage and Local Government (DoEHLG) decided to review the 1996 guidelines to reflect current Government policy in relation to wind energy.

It is intended that the revised guidelines will be positive towards the development of wind energy and provide a tool to planning authorities to assist in the processing of applications for wind energy projects.

The guidelines are intended to ensure a consistency of approach throughout the country in the identification of suitable sites and the treatment of wind farm planning applications.

The guidelines will primarily be a reference point for local authority planners when assessing wind farm applications. In this respect, siting and design guidelines for different sizes of wind farms have been developed.

It is intended that both planners and developers will benefit from the guidance showing how wind farms can be appropriately accommodated in different landscape types.

It is important that all planning authority's development plans incorporate a statement of the authority's policies and objectives in relation to wind energy related development as well as matters it

will take into account in assessing planning applications for specific wind energy proposals.

The development plan must achieve a reasonable balance between responding to overall Government Policy on renewable energy, sustainable and spatial development, as well as climate change, and enabling the wind energy resources of the planning authority's area to be harnessed in a sustainable manner. The guidelines will assist Planning Authorities in achieving this aim.

The revised Wind Farm Planning Guidelines will be available at www.enviro.ni



Stop! We can't take all this Wind!

The recent call by the Irish Grid Operator for a moratorium on new grid connections for wind projects sounded like an echo from the past to their Danish counterparts. Denmark, of similar size and population to Ireland but with over 3000MW of wind energy projects now installed had asked the same questions of their grid system.... 20 years ago!

Danish Energy Policies

For many years, Denmark has had an environmental and energy policy with ambitious goals. This has resulted in subsidised support for the construction and operation of both small-scale wind power projects and small-scale CHP plants.



In 1996 the Danish government published targets for the reduction of carbon dioxide (CO₂) emissions by 20% in 2005 compared with 1988 levels, and of halving CO₂ emissions by 2030 - with one third of the power produced sustainably, and the remaining production highly efficient.

Small-scale production has priority access to the network in Denmark, and distribution companies are obliged to connect it. The producers pay the connection costs just to the nearest 10 kV connection point, even if grid reinforcement or the addition

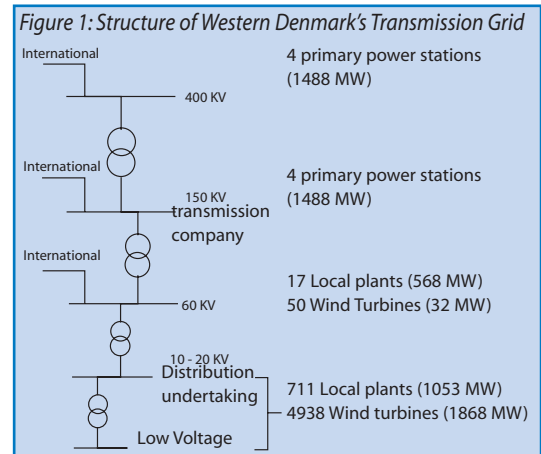
of another connection point is needed, with the distribution company paying the rest.

By 2001 this energy policy had resulted in approximately 50% of electricity production in Western Denmark having priority access of this kind. Wind power projects and small scale CHP are no longer regarded as 'secondary' production units.

The present situation is very different from what had been expected back in the early 1990s. The power capacity of local CHP plants grew swiftly throughout the 1990s to 1467 MW in 2001, driven by the need for heating. The situation for wind power is more complex. During the early 1990s, the pace of development was quite relaxed and the total installed capacity for Denmark as a whole reached 1500 MW in 1995. However, after that point the increase in wind development was faster than anticipated; there was enormous growth in 2000, with a total of 1932 MW of onshore wind power in Western Denmark by the end of that year.

Most of the distributed generation within the region is privately owned, and its construction determined by subsidy rules and political agreements – the grid operator has no influence on the amount installed, and does not know in advance how much new capacity will be installed, or where. As a result of the rules in force, onshore wind power is expected to stabilise at around 2500 MW in Western Denmark alone.

Denmark is part of the Nordic electricity market and of spot market trade on the Nord Pool. Its day-to-day operations involve balancing the power system, taking into consideration that:



- the amount of wind power generated is unpredictable, a function of the amount of wind present
- congestion must be managed in a transparent way
- security of supply must be ensured
- the market must function well, based on correct pricing.

Balancing the Danish Power System

With the large amount of non-dispatchable power production in the distribution system, Western Denmark's power system can become unbalanced, as production does not follow the load. Situations can arise when there is a shortage of production - for instance when there is a high load but no wind. On the other hand, situations often occur where there is excess production, due to off-peak load and windy conditions, and when CHP production is high because of heat demand. Such situations tend to occur during weekends and holidays. The system has then created a surplus, or overflow. Operating and balancing the system require detailed planning on the previous day, before the spot market closes, and in

2020 (MW)	Consumption (MW)				Wind power (MW)		Local/ Industrial CHP
	Winter		Summer		Scenario 1	Scenario 2	
	Max	Min	Max	Min			
Norway	26,000	22,700	17,100	13,800	1,000	4,000	250
Finland	16,500	10,600	10,900	7,400	500	2,000	3,200
Sweden	32,000	23,000	15,000	9,800	4,000	8,000	3,000*
Denmark	7,500	3,000	6,000	2,500	5,400	7,000	2,550
Total	82,000	59,300	49,000	33,500	10,900	21,000	9,000

Table 1. Potentials for wind power in the Nordel area

* Only part of this power is non-dispatchable, as some local CHP units in Sweden can produce heat independently of electricity production

the following hours, until the moment of operation - the period when imbalances are handled in the regulating market. Even when a balanced system is expected, things can turn out differently, and the imbalance is often in the order of 800-1000 MW.

The wind itself plays a special role in the power balance, which is why accurate wind forecasts are important.

Figure 2 shows examples from three operating situations, where:

- where the wind is rising later than forecast, giving a shortage of 800 MW
- where the wind is rising earlier than forecast, giving a surplus
- where the wind is rising as forecast.

Power Overflow

Excess power arising from bound production can be exported, provided that capacity is available on the interconnections to Norway, Sweden and, possibly, Germany. However, if the oversupply becomes larger than available capacity, then there is the potential for a critical power overflow. During a critical overflow there is a risk of disturbances, and of a system breakdown.

As the overflow situation may well become critical during the next few years balancing the system by means of internal Danish measures will be needed.

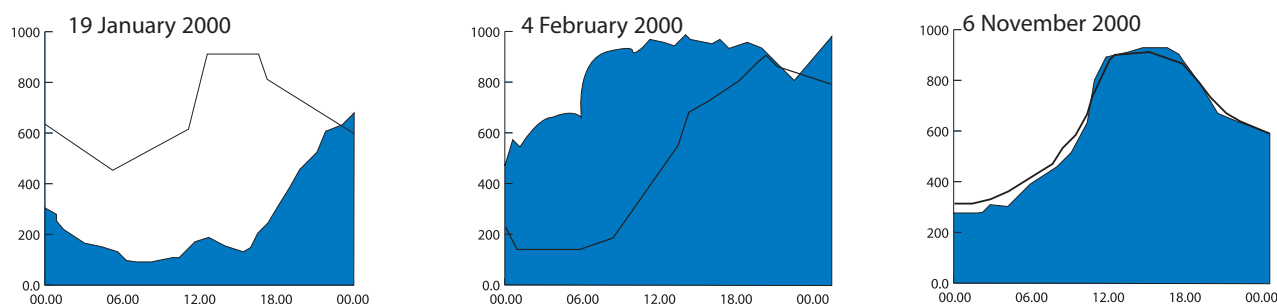


Figure 2: Examples of the wind rising later, earlier and as forecast

An analysis made in conjunction with the Danish Energy Agency mentions the following measures:

- constraining local CHP plants
- constraining wind turbines
- introducing flexible loads
- installing heat pumps.

Growth of Wind Power

Technical developments during the 1990s mean that turbines have grown to 3 MW or larger, and more growth is expected, both in terms of turbine size and wind farm development. Two scenarios (see Table 1) have been prepared for the Nordel area (the Nordic electricity market comprising Norway, Finland, Sweden and Denmark). With present national goals everything

seems to indicate that by 2020 Nordel will comprise at least 10,000 MW of wind turbines. In the light of this, Scenario 1 is by no means an extreme scenario. Scenario 2, however, assumes that wind power expansion is speeded up, compared with present goals.

The Present Situation

In the early 1990s, there were only marginal costs for implementing wind power and local CHP plants. At the same time, the presence of distributed plant postponed the need to upgrade the transmission network due to the placement of production within the same networks as the load - distributed generation showed benefits. Now, with high wind energy capacity connected to the system, the time has come to move to the next stage of grid reinforcement as the lower voltage networks have become 'filled'.

One of the consequences of Danish policy has been the need to operate a complex power system. The installed capacity of local CHP plants and wind farms already exceed the capacity of central power plants in western Denmark. Coping with so much wind on the transmission system is technically challenging, but also achievable.

At present, balancing a power system like the Danish one is managed by connection to areas with other types of production. A recent study by industry experts Garrad Hassan states that approximately 3,300 MWs of wind capacity can be connected before there are no locations left on the transmission system without the requirement of system reinforcement. As the Irish grid network becomes more complex and integrates to the UK grid system, the electricity network in Denmark can be an example of how appropriate network management and proactive political will can fulfil the enormous potential of wind energy in Ireland.

Adapted from Cogeneration and On-site Power Production Integrating CHP and Wind Power – How Western Denmark is leading the way. Courtesy of James & James Volume 3 Issue 6 Nov-Dec 2002. All rights reserved.

A New Grid Code for Wind

A multi-disciplinary consultation group comprising representation from SEI, ESBNG, the CER, the IWEA, wind generator manufacturers, ESB Networks and other industry participants have been in the process of developing a new Wind Grid Code.

In the last 12 months ESBNG has visited other Transmission System Operators in Europe to learn about their experiences on this matter and have also met with a number of wind turbine manufacturers to discuss their expectations of the capabilities of wind turbines going forward.

The group has now produced a separate Operating Code (within the Grid Code) to highlight the areas of the Grid Code that apply to wind only.

The Consultation Group meets once a month, with the first meeting held in October 2003. In essence the following are topics which must be considered by the Consultation Group:

- Fault Ride Through
- Frequency
- Voltage
- Signals, Communications, Dispatch & Control
- Minimum Size.

The final version has been presented to the Grid Code Review Panel and issued to the CER for approval and consultation.

Plenty of Energy from Sligo's Fresh Air!

Pat Forkan, Director of Planning at Sligo County Council, opened EFWA 2003, welcoming delegates by sharing his experiences of how well the Kingsmountain project had been received in the county. Indeed further projects have been permitted in Sligo and a number of others are currently being considered by his office. Since its construction in early 2003 the wind farm has become a landmark in the county with country walks using the wind farm as a staging post on weekend excursions. Mr Forkan welcomes the addition of appropriately and sensitively designed wind farms into the Sligo landscape.

John Lynch, Bord na Mona's Project Manager for Ireland's first wind farm at Bellacorrick, Co. Mayo imparted a rare view from a working wind farm with his presentation "Bellacorrick Wind Farm: Ten Years of Operating Experience". John's presentation captivated the audience with a unique insight into the real-life day to day operations at his wind farm site. Certainly, like any other industry, the establishment of the Bellacorrick site wasn't without its challenges but after ten years, John looks back on the project as "a wholly satisfactory experience".

The British Wind Energy Association's Alison Hill contributed to Energy from Fresh Air with her presentation "Urban Wind Farms". Wind energy is now being deployed to power a spectrum of electricity requirements from the smallest urban lighting systems to the entire needs of some of the more energy-intensive industries across Europe. In a focus on the premises of car manufacturing giant Ford, Alison examined the benefits that Ford will achieve by employing three wind turbines at their Dagenham site which lies within 10 km of London's bustling city centre. The project will supply 100% of the electricity requirements for Ford's Clean Room Assembly Hall for expanded production of diesel engines.



Alison Hill, BWEA

Power to the People!

Community Ownership of Wind Farms can work in Ireland too!

Community owned wind farms can be as successful here as they have been across Europe according to the results of a recent study by the Western Development Commission (WDC).

Following an approach by Bri Nua, a community group located on the Inishowen Peninsula, and Mayo Community Wind Energy Group, the WDC formed The Renewable Energy Partnership (REP) in 2002. The REP is a strategic initiative whose function is to investigate the potential for 'Community Ownership of Wind Farm Projects' in Ireland. A total of €73,000 in funding was received from LEADER, Sustainable Energy Ireland and the WDC, to undertake the work.

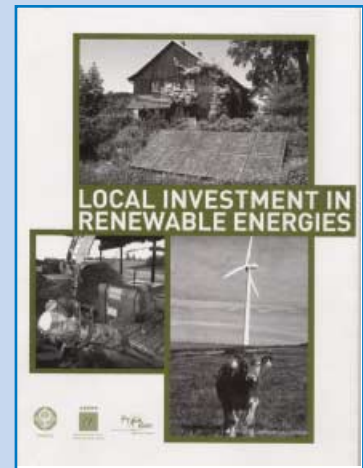
The report was undertaken by CSA Group Ltd. in conjunction with the Renewable Energy Partnership. The results of the 'Community Ownership of Wind Farm Projects' Study will be published in June 2004 and a CD-ROM containing the model for investment will be distributed throughout the public, private and voluntary sectors.

PREDAC, the European Action Group for

Renewable Energy have published a user-friendly factsheet highlighting the benefits of local investment in renewable energies. The factsheet explains the four golden rules for successful development:

- Appropriate support mechanism
- Incentives for local investment
- Correct information to the community
- Efficient support to initiators

To download a copy of the factsheet, visit www.cler.org/predac/wp1/



Deirdre Lewis from CSA delivered a presentation on Community Ownership of Wind Farms (see box above), and explained how such projects have been employed abroad. Community based projects are a key element of the Government's 1999 Green Paper on Sustainable Energy.

Day two began with a focus on the environmental benefits of wind energy. Susan Ihde, representing the German Wind Energy Association, illustrated how the most successful wind industry in the world manages to continue its rapid growth without encountering some of the challenges met here. Susan identified the many other activities that pose significantly greater threats to birdlife than wind farms before revealing the results of many years of investigative studies in Germany which prove that the impact of wind farms on birds is very low indeed. Susan then outlined the process which German wind farm developers follow to ensure minimal impact on local birds near their project sites.

Despite the frequent reaction of first-time visitors to wind farms expressing surprise at how quiet the wind farm is, noise still has not completely shaken off the legacy left by the very early years of the wind industry. 'Noise and wind turbines' presented by Andrew Bullmore from Hoare-Lea Acoustics described how the new UK guidelines for planning wind farms have addressed the issue and have prescribed acceptable limits for noise from wind farms. The issue is likely to be addressed completely in the newly revised Wind Farm Planning guidelines being published by the Department of Environment, Heritage and Local Government.

REIO were delighted to again welcome Minister Dermot Ahern T.D., to introduce the new tools for Planners, Policy makers and Developers that SEI have developed over the past year. Minister Ahern explained the need for Ireland to meet its policy targets and reduce our over-dependence on fossil fuel imports. He went on to review the AER process to date

and introduce details of the consultation document on future renewable energy policy. The minister re-affirmed his commitment to the future growth of renewable energy in Ireland and revealed his great satisfaction with the results of Ireland's first independent survey of Attitudes towards Wind Energy and Wind Farms in Ireland and Sustainable Energy Ireland's Wind Atlas for Ireland, providing the perfect introduction for the three following presentations.

The Wind Atlas for Ireland is one such tool that now enables local authority planners and policy makers to identify areas with adequate wind resources so that they can be considered for future wind farm development in County Development plans. Pat McCullen from ESBI evidenced the enormous data compiled

and evaluated to come up with accurate wind maps for each county in Ireland at 50, 75 and 100 metre heights above ground level. These heights reflect current and anticipated wind technology trends. For more on the Wind Atlas for Ireland see the report on page 6.

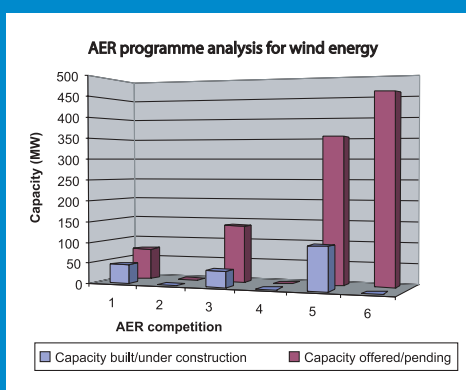


James McCarthy-Morrogh from Lansdowne

Minister Dermot Ahern T.D., Paul Kellett REIO and David Taylor SEI reviewing the Wind Atlas

An Alternative for Alternatives

Minister announces consultation on future renewables policy.



The Department of Communications, Marine and Natural Resources has commenced consultation aiming to assess how Ireland will set and meet targets for the wider deployment of green electricity.

Launching "Options for Future Renewable Energy Policy, Targets and Programmes" Minister

Dermot Ahern T.D. said that he was "... publishing this consultation document to stimulate debate and encourage all interested parties to make submissions to ensure that their views, knowledge and experience can be taken into consideration in developing future renewable energy policy in Ireland. My priority is to maintain momentum in the market segment generating electricity from renewable energy technologies. This document, therefore, concentrates on four essential issues:

- Future targets;
- Future support mechanisms;
- Barriers to renewable energy deployment; and
- Administrative issues raised in the RES-E Directive.

Bringing these essential issues into sharp focus, keeping in mind the need to seek least cost measures, will ensure the momentum is maintained."

For further information visit the Department's website www.dcmnr.ie



Sunset or sunrise?

Market Research reflected upon results of SEI's survey of Attitudes towards Wind Energy and Wind Farms in Ireland and illustrated results through a presentation that would have left no one in doubt about the broad support that wind energy enjoys in Ireland. Not only do more than eight out of ten people view wind energy positively per se, but that there is also broad support for the construction of more wind farms here, with two thirds of Irish adults favouring the development of a wind farm in their local area. Wind farms are viewed favourably when compared with other utility structures in our landscape. Nearly three quarters of those surveyed suggesting that they would be happy to see the government provide incentives to build more wind farms. See page 6 for a full report on the Survey.

The public attitudes survey was an innovative series of overlapping questionnaires which not only investigated how wind energy was perceived by the Irish population but also identified what value we place on our varied landscapes.

Tomás O'Leary from MosArt, responsible for the photomontages used in the survey, presented how the public consider some landscape types to be more scenically beautiful than others. He went on to show how people felt wind farms of different scales, turbine sizes and configurations effected the scenic beauty of the different landscape types and revealed that in general, the Irish public have a preference for larger turbines in smaller numbers on each landscape. Cumulative effect was also explored with people preferring several smaller developments in the same landscape as opposed to single large scale developments. Attitudes towards Wind Energy and Wind Farms in Ireland will help to inform planners and policy makers about how the Irish public view wind projects and assist developers in the sensitive design of future projects across the country.

A free proceedings CD-ROM is available from our offices.



Photomontage used by Tomás O'Leary to illustrate ten wind turbines in a fertile farmland landscape at EFA 2003.

What is the Wind Speed over Your House?

Sustainable Energy Ireland has now developed the Wind Atlas for Ireland to map Ireland's wind resource. The atlas was completed in 2003 and launched at SEI's Energy from Fresh Air conference.

It will contribute to a new approach for the development of wind energy projects in Ireland. The maps, displaying wind resources at three heights above ground level, integrate wind resource data, urban regions and the electricity transmission and distribution networks for the entire country. The Wind Atlas for Ireland will be a valuable tool in planning and evaluating of area wind resources for local authority planners, policy makers and prospective wind farm developers.

The Atlas has been distributed to all local authorities and is available digitally in CD-ROM format. To order a copy, log on to the Renewable Energy Information Office online bookshop at www.sei.ie/reio/reiobookshop.html.

Key elements of the Wind Atlas are available to view at www.sei.ie/windmaps. The Wind Atlas shows wind speeds at 50M, 75M and 100M above ground level. The different heights represent the hub-heights of current and future wind turbine technology.

Ireland's high reliance on imported fossil fuel and the current preference for gas-fired plant for most of our new generation capacity leaves our electricity system more exposed to cost and security of supply risks than many of our competitors.



Screenshot illustrating windspeeds over REIO offices in Bandon

The exploitation of wind energy can reduce our dependence on imported fossil fuels and in doing so contribute significantly to greenhouse gas emission reduction.

The Wind Atlas for Ireland, along with the *Attitudes towards Wind Farms in Ireland* public survey and the revised Wind Farm Planning Guidelines will provide the framework for the identification of 'strategic', 'preferred', 'open to consideration' and 'no-go' areas for wind energy development by local authorities as recommended by the Renewable Energy Strategy Group in 2000.

Irish Public Give Wind Energy the Thumbs Up

Sustainable Energy Ireland has completed an innovative series of independent surveys to identify what the Irish public's attitude to wind farms is and how future energy policy as well as planning and design guidance might be directed. Results of the surveys are presented in detail in SEI's publication entitled *Attitudes Towards The Development of Wind Farms in Ireland (2003)*.

Three interrelated surveys were carried out as part of the study, dealing with the Irish population as a whole; with communities living close to an existing wind farm; and with communities where a wind farm has recently received full planning permission.

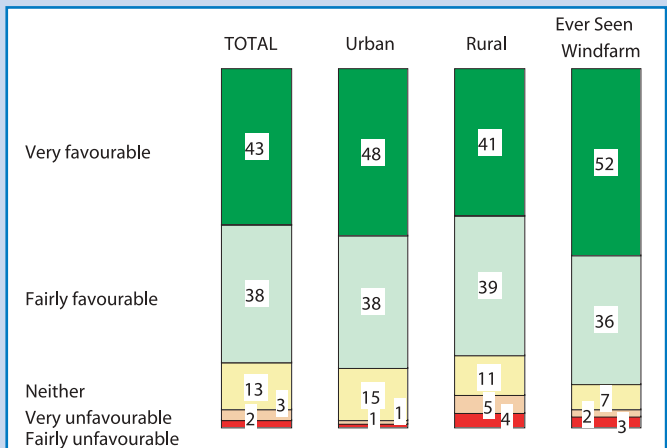
An independent steering group developed three overlapping questionnaires for use in the face-to-face interviews. Landscape consultants from MosArt and Lansdowne Market Research were responsible for administering the surveys and analysing the results. Key findings from the survey include:

- Three quarters of the general Irish population would be willing to support government incentives to build wind farms with eight out of ten believing wind energy to be a good thing.
- Two thirds of Irish adults are favourable to having a wind farm built in their locality with little evidence of the not-in-my-backyard effect. Of the 10% of people who would not like a wind farm built locally, key concerns expressed include adverse impact upon

landscape as well as noise and a lack of faith in wind energy.

- Wind farms are more acceptable than other utility structures such as mobile phone masts, steel electricity towers or power stations but less acceptable than wooden electricity poles.
- Coastal, mountain moorland and fertile farmland landscapes were rated as highly scenic, with flat midland bogs and industrial / urban landscapes judged to be considerably less scenic by respondents when shown high quality photomontages depicting each landscape type.

Overall Attitude to Construction of More Windfarms in Ireland



To view the full survey log on to: www.sei.ie/uploads/documents/upload/publications/Attitudes_towards_wind_.pdf

Wind Turbines in 50 Questions and Answers

Where does wind energy come from?
How do modern wind turbines work?
How do I develop a wind farm on my land?

Wind Turbines in 50 Questions and Answers outlines where the impetus for wind energy derives, the technology, economics and environmental impacts of wind energy and describes the future of wind energy in Ireland from where we currently stand.

Wind Turbines in 50 Question and Answers is available to order online at the REIO online bookshop; www.sei.ie/reio/reiobookshop.html or contact the office directly at 023 42193.



REIO takes off with top European Award

SEI's Renewable Energy Information Office has been honoured with the European Commission's highly coveted Campaign for Take-Off Award for the 'Best National Renewable Energy Partnership' in 2003. The prestigious award was presented at a special ceremony in Berlin.



REIO's Paul Kellett receiving award from Günther Hanreich

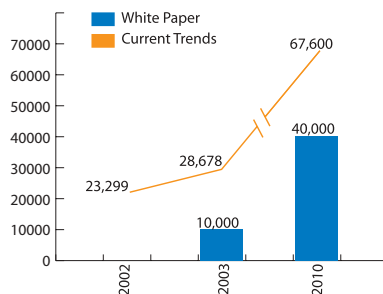
The Campaign for Take-Off awards were created to acknowledge the efforts and commitments made at a local, regional and national level as well as to highlight these efforts as showcases for the general public in Europe and beyond.

Presenting the 'Best National Renewable Energy Partnership' award to Sustainable Energy Ireland (SEI), Mr. Günther Hanreich - Director, DG Energy and Transport said that the awards jury recognised SEI's outstanding work in creating a varied and high-interest programme to promote the development of renewable energy in Ireland.

The 2004 Wind Power Barometer

With a 25.1% increase in 2003, wind power capacity reached a new installation record worldwide. The first figures available announce an additional capacity of 7,948 MW for the year 2003, bringing total world wind power capacity up to 39,294 MW.

EurObserv'ER presents the current development of this sector in its Barometer published in issue 159 of Systèmes Solaires magazine.



Download the Wind Barometer at <http://www.managenergy.net/products/R203.htm>



Participants and exhibitors from across Ireland are due to take part in the Energy Show 2004 which takes place in the RDS Industries hall on the 12th and 13th of May next.

The event, which is organised by Sustainable Energy Ireland, is now firmly established as a major national showcase for energy in Ireland and is the perfect forum for suppliers and customers of sustainable energy technologies and services to meet, share views and transact business. The Show will follow the highly successful format of previous years, with a 2 day trade exhibition coupled with a comprehensive and varied workshop programme covering all aspects of energy efficiency and renewable energy relevant to Irish business.

According to David Taylor, CEO of SEI, "The show is a must for anyone with responsibility for, or an interest in energy related matters, including the planning and development of energy projects in Ireland.

We are very much looking forward to welcoming participants and exhibitors from all sectors of the energy market and beyond to the RDS in May.

I would encourage any individual or company with an interest in the area to attend and participate in the numerous workshops planned over the two days."

Moving towards a lower carbon economy is the central theme of this year's Show. This effectively means reducing our overall energy demand through energy efficiency measures and meeting a greater proportion of that demand from renewable, non-fossil fuel based resources. The Minister for Finance has announced his intention to introduce a carbon tax later this year. In this context, it is important for those with a responsibility for energy use in business are informed of their options for reducing their consumption without impacting on their competitiveness.

For further information on the Energy

Show 2004, including details of how to exhibit, or register for the workshop, log on to www.sei.ie or e-mail energyshow@sei.ie

Given the recent discussions relating to the extended grid integration of wind farms into the Irish electricity network, we are delighted to bring industry expert John Olav Tande from SINTEF Energy Research & SEI partner in the IEA to discuss how this can be successfully achieved with his paper 'Grid integration of wind farms'.

MosArt's Tomás O'Leary will present the 'New National Guidelines for Planning & Design of Wind Farms in the Irish Landscape' to discuss how wind farms can be effectively and sensitively designed to harmonize with the local environment

'The Environmental & Economic Benefits of a Strong Wind Industry' will be discussed by Dr. Joachim Kutscher from Forschungszentrum Juelich GmbH. Germany, with over 14000MW of wind energy installed, has benefited greatly from its thriving wind industry and can show Ireland how a successful wind industry can not only lower our emission levels but also lead to wealth and prosperity for all.

Wind Atlas for Ireland

Accurate wind mapping for the entire country is now available. The Atlas is presented both in hard copy and as GIS data files depicting mean wind speed and power at heights of 50m, 75m, and 100m above ground level, typical of current and future hub heights for wind turbines. Available on SEI's website and in CD format from the REIO office.



Energy Visions 2030

Hardback, 237 pages, over 140 full-colour images, diagrams and tables.

Energy Visions 2030 for Finland gives an overview of Finland's present energy sector and investigates the future from the technological and techno-economic perspective.

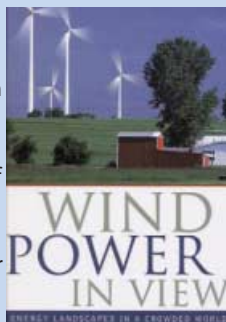
Three different scenarios - the baseline scenario, the strong energy saving scenario and the ambitious technological development scenario - and conclusions based on the scenarios are also presented.



Wind Power in View

Hardback, 234 pages, over 90 full-colour images, diagrams and tables.

Wind Power in View: Energy Landscapes in a Crowded World is an authoritative international collaboration examining the aesthetics of wind energy and the place of wind turbines on the landscape. The thought-provoking images and text includes full citations to encourage further research by academics, planners, and policy makers. Wind Power in View takes a balanced look at what people see when wind turbines appear in their midst.



Wind Energy 2003

Paperback, 173 pages, over 60 wind turbine specifications.

The most comprehensive technical catalogue for modern commercial wind turbines available first reviews the wind industry worldwide. The catalogue offers technical specifications for wind turbines are grouped according to rated power capacity, between 0.5kW and greater than 1.5 MW. Specifications include dimensions and technology types employed by each turbine. Power curve data, sound power level information and electrical characteristics are available for the most frequently used commercial turbines.



Building Sustainable Energy Systems

Hardback, 552 pages, over 100 images, diagrams and tables.

This book is a forum of ideas and views. It provides a platform for information exchange and debate. With this book the Swedish National Energy Agency aims to share some of the experiences they have accumulated in Sweden over the past three decades. They have invited various Swedish experts to contribute their insights. They review the development of Swedish energy systems and policies, the programmes implemented and the challenges they are facing nationally and globally.



Solar Homes Catch the Sun

8 page, A5 booklet with full-colour images and diagrams

Discover how you can apply solar architecture principles to:

- keep your heating bills to a minimum
- enjoy the comfort of a warm, cosy house
- create a healthy and ecological living environment for you and your family

Download from www.sei.ie/reio.htm



All the above publications are available from our office (see below) or by visiting our online bookshop at www.sei.ie/reio/reiobookshop.html

The Renewable Energy Information Office

Planning Update is published by the Renewable Energy Information Office

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