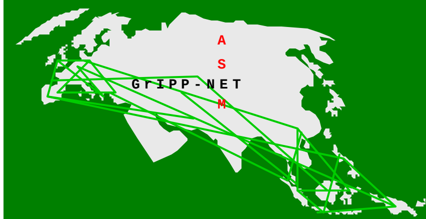

GrIPP-Net News

A Quarterly Newsletter of the ASEM Green Independent Power Producers Network
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Editorial

In the past few years, the rapid expansion of wind energy use in Europe, especially in Germany, has surpassed all projections. The ten-fold increase in turbine power during this period is an indication of the degree to which this technology has advanced.

In view of the important role of wind energy among renewable energies, this Newsletter will focus on wind energy. This Newsletter gives an overview of the wind energy market in Europe and in Southeast Asia.

On the next three pages the situation of the European wind energy market is demonstrated. The general framework conditions of wind energy and the wind resources in Europe are shown. Furthermore, the status and advances in wind technology in Europe are pointed out. In addition, different policy instruments for wind energy in Europe and the economic project characteristics such as financing schemes, legal forms and economic data are presented. Finally, success factors of wind energy projects in Europe are summarized and the prospects for the European wind power is given.

In the succeeding two or so pages, an overview about wind energy in Southeast Asia is presented. Results of recent wind resource studies undertaken in selected countries of Southeast Asia are discussed. The results show the potential areas for wind power development. In addition, the status of the development of the technology in the region is also summarized. Some of the main barriers to the commercialization of wind power in Southeast Asia are identified and elaborated. Finally, the potential of wind for power generation in the region is briefly discussed.

In the next issues of this Newsletter, other renewable energy technologies—biomass and small hydro power—will be featured.

Meanwhile, we extend a very warm welcome to all our speakers and participants to the **ASEM Green IPP Network First Regional Workshop** with the theme of "Renewable energy sources in SEA—current stage, market conditions, and outlook." With this Workshop, we hope to facilitate the promotion of clean, environment-friendly and renewable energy technologies for power generation as well as foster closer cooperation among European and Southeast Asian countries in this endeavor.

The *GrIPP Net Newsletter*, the official publication of the Green IPP Network, is published quarterly to communicate network activites and to support the dissemination of relevant information and network results. It is provided free to network members and interested stakeholders, and can be downloaded from this site: www.ASEM-GreenIPPnetwork.net.
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Upcoming Event

ASEM Green IPP Network First Regional Workshop
"Renewable energy sources in SEA—current stage, market conditions, and outlook"
24-25 October 2002; Sofitel Hotel, Bangkok, Thailand

DAY 1

Opening Session (8:00 - 9:00)

- Welcome/Opening remarks: *IIP (Germany), the European Commission (Thailand), FIHRD (Thailand)*
- Launching of project website and newsletter: *CEERD -FIHRD (Thailand)*

Keynote Presentations (9:00 - 10:00)

- Latest developments in renewable energy policy and programs in the context of the 2001 Bali Declaration: *ESCAP*
- Implications of power sector restructuring on Green IPPs: *UNEP*

Panel Session 1: Focus on Biomass (10:30 - 15:30)

- Presentation on European policy instruments: *ECN (Netherlands)*
- Presentation on market conditions, barriers and outlook for biomass in Southeast Asia (SEA) **:** *AIT Cogen (Thailand)*
- SPPs and Encon Fund of Thailand: *NEPO (Thailand)*
- Case study on project structures and financing: *EGCO (Thailand)*
- Case study on policy instruments: Small Renewable Power (SREP) Programme of Malaysia: *PTM (Malaysia)*
- Country presentations: *MIME (Cambodia), IRES (Indonesia)*

Panel Session 2: Focus on Wind (15:30 - 17:30)

- Project structures of wind energy projects in Europe: *IIP*
- Presentation on market conditions, barriers and outlook for wind in SEA: *PNOC (Philippines)*
- Country presentations: *UPSL (Philippines), DEDP (Thailand)*

DAY 2

Panel Session 3: Focus on Hydropower (8:30 - 10:30)

- Presentation on European technology (and resources): *Risoe (Denmark)*
- Presentation on market conditions, barriers and outlook for small and mini-hydro in SEA: *IHC (China)*
- Country presentations: *DEDP (Thailand), Institute of Vietnam, HEDCOR (Philippines)*

Open Forum (Parallel Sessions, 11:00 - 12:00)

- Session 1: Project structures and financing approaches
- Session 2: Policy instruments and regulation
- Session 3: Renewable energy technology and resources

Closing session (12:00 - 12:30)

- Summary and preliminary conclusions
- Workshop adjournment

Inside

Wind Power in Europe

by **D. Möst; N. Enzensberger; W. Fichtner; O. Rentz**
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Introduction

Wind energy development started in Europe in the early 90s. In the space of fifteen years, it has evolved from an industry producing small and simple machines into a technology which can compete with the well established forms of power generation. In particular, wind power development in Spain, Denmark and Germany experienced double-digit growth rates every year. The plant suppliers in these countries have profited from this strong development on their market and are now well positioned among the leading plant suppliers.

To understand this development, the framework conditions for renewable energies in Europe have to be viewed:

Existing overcapacities in most newly liberalised power markets in Europe—as they became apparent during the last years—reduce new investment possibilities for renewable energy technologies to a niche market as the additional generation capacity of newly installed renewable energy projects has no added value for the overall supply system. Thus, there is no direct need for additional and costly energy projects which are given by renewable energies projects.

Climate protection strongly influences the European energy policy and therefore the political support for clean energy generation technologies in Europe is highly intense.

There is also a *strong public interest* in environmental issues whereby the support for renewable energy projects is high. But the public interest for clean technologies declines from North to South. In northern countries such as Denmark and Germany local citizens are willing to support renewable energy projects in their environment.

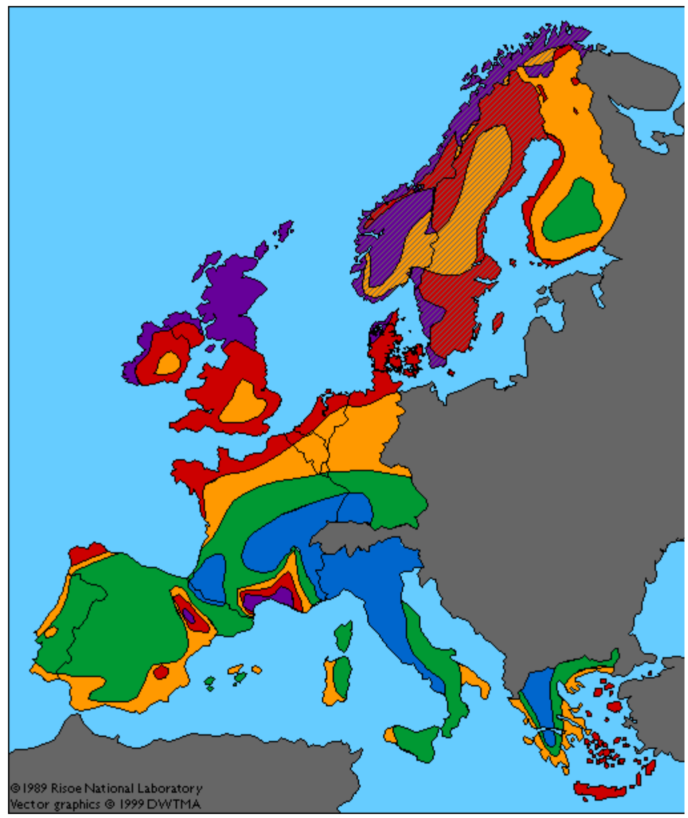
Dropping electricity prices lead to an increasingly stronger cost disadvantage of renewable energy projects in comparison to conventional power plants. This development enhances the dependency of renewable energy projects on supporting policy instruments.

Figure 1.1: Picture of wind power plant and technician (Source: Bundesverband Windenergie)

Wind resources in Europe

Figure 1.2 shows the wind map of Europe, where the wind resources in a height of 50 metres above ground level is pictured. The purple zones are the areas with the strongest winds, while the wind is the weakest in the blue zones. The dividing lines between different zones are not so sharp, as they appear on the map. As shown in the wind map, the wind resources of the United Kingdom and the Scandinavian countries are greater than in the other European countries. France has the largest wind energy potential in Europe after the UK. The windiest regions are along the Mediterranean (>7.5 metres per second m/s) and the English Channel (6.5-7.5 m/). Despite this enormous potential, however, only a very few wind turbines have been installed to date.

An average wind speed of about 4.5 m/s at a height of fifteen meters above ground level is recognized as feasible for the exploitation of wind energy today.



Wind Resources at 50m Above Ground Level [m/s]

Colour	Sheltered terrain	At a sea coast	Hills and ridges
	> 6.0	> 8.5	> 11.5
	5.0 - 6.0	7.0 - 8.5	10.0 - 11.5
	4.5 - 5.0	6.0 - 7.0	8.5 - 10.0
	3.5 - 4.5	5.0 - 6.0	7.0 - 8.5
	< 3.5	< 5.0	<7.0

Figure 1.2: Wind Map of Europe (Source: Risoe National Laboratory)

Status and advances in Wind Technology in Europe

During 2001 another 4,500 MW of wind power capacity was added to the European electricity grids, bringing the total installed wind power capacity in Europe to more than 17,000 MW, an increase of more than 35%. The 17,000 MW will produce about 40 TWh of electricity annually which equals the electricity

Table 1.1. Status of wind energy in Europe in 2001

Country	New Installations 2001 (MW)	Total installation end 2001 (MW)
Germany	2627	8734
Spain	1050	3550
Denmark	115	2456
Italy	276	700
United Kingdom	107	525
Netherlands	45	420
Greece	84	358
Sweden	60	290
Portugal	57	125
Ireland	10	125
France	15	96
Austria	17	94
Belgium	11	31
Others	26	200
EU Total	**4500**	**17704**

consumption of 10 million average European households. Germany is once again at the top of the new installations list in 2001 and brings the total installed wind power capacity in Germany to 8,734 MW. This represents 3.3% of national electricity demand. In Table 1.1 the new installations as well as the total installation at the end of 2001 of Europe are shown.

As earlier mentioned, wind energy development has started in the early 90s in Europe. At the top of the total installed capacity list, Germany is an example for pointing out the wind energy development. In Germany this development was fostered by two fixed feed-in tariff-schemes and the strong boom of wind energy resulted in a steady and exponential growth. The wind capacity development over the years for Germany is shown in Figure 1.3.

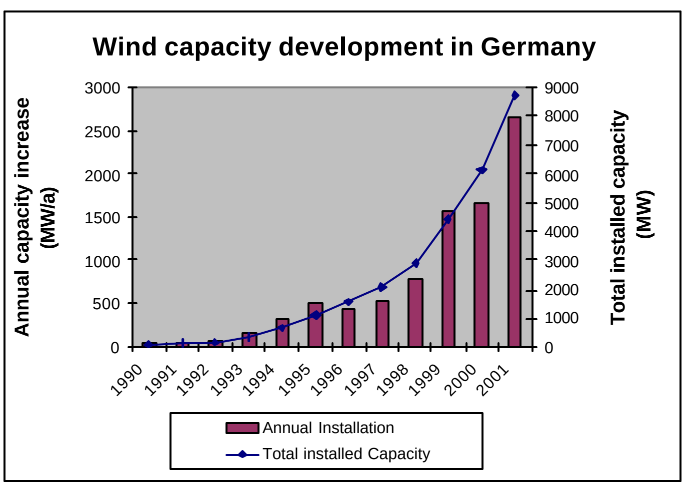


Figure 1.3: Wind capacity development in Germany

The technical characteristics of wind projects in Europe have slightly changed over the past years. The most obvious change is the continuous increase of the installed turbine size. The average size of all turbines that have been installed in the year 2001 in Germany has reached almost 1300 kW which means a doubling within four years. Also the supply side adapts to these changes. The number of wind turbine types offered within each size class illustrates similar findings.

The technical characteristics of the newly installed turbines have also changed over the years. While in the early 90s still a few 2- or 4-blade turbines have been installed, the 3-blade structure has reached full market penetration since then, similar to the luff-side rotor position. Pitch-regulated turbines have reached a market share of 68% (2000), the same as asynchronous generators.

Table 1.2: Development of technical turbine characteristics over time in Germany (Source: ISET Kassel, Wind Energy Report Germany 1999/2000)

	1988	1990	1992	1994	1996	1998	2000
Number of newly installed plants that have been evaluated							
	134	245	386	809	809	983	1208
Blade number							
2 blades	40%	11%	9%	7%	2%	0%	0%
3 blades	58%	88%	90%	93%	98%	100%	100%
4 blades	2%	1%	1%	0%	0%	0%	0%
Rotor position							
lee	7%	8%	4%	1%	0%	0%	0%
luv	93%	92%	96%	99%	100%	100%	100%
Power regulation							
stall	51%	51%	62%	57%	54%	38%	32%
pitch	49%	49%	38%	43%	46%	62%	68%
Generator type							
asynchron	63%	74%	70%	75%	68%	61%	68%
synchron	37%	26%	30%	25%	32%	39%	32%

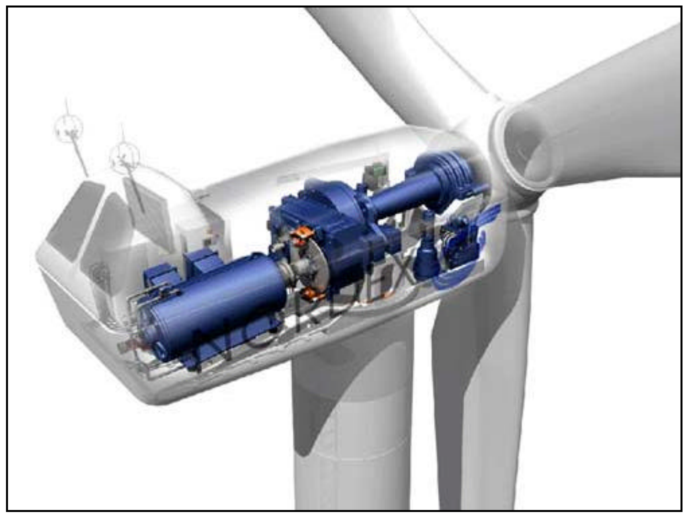


Figure 1.4: Drawing of Nordex turbine(Source: Bundesverband Windenergie)

Policy instruments for wind energy in Europe

At a time when Governments in Europe process of liberalizing their electricity markets, wind power's increasing competitiveness should lead to higher demand for wind turbines. Without political support, however, wind power remains at a competitive disadvantage, because new wind power stations have to compete with old nuclear and fossil fuel power stations that produce electricity at marginal costs. Political action is needed to overcome these disadvantages. There are different types of instruments to support renewable energies:

Fixed tariff systems: Tariff systems based on a fixed price paid per kWh produced have been enormously successful at fostering wind energy and are enshrined in law in Germany, Spain and Denmark. In Germany, legislation fixes the price of electricity from renewable energy in relation to the generation costs of renewable technologies. In the Spanish system the wholesale price of electricity from renewable energy follows the market price for electricity after an environmental bonus is added per kWh. As production costs decline, for instance as a result of improved technology and economies of scale, lower wind speed sites become profitable, expanding wind power further. The most important advantage of fixed price systems for renewable energy is that they facilitate planning of new renewable energy plants for the investors in renewable energy. The challenge in a fixed price system is fixing the "right" price.

Renewable portfolio standards (RPS): Under an RPS, such as the one operating in the UK, power companies or electricity customers are obliged to buy a number of green certificates in proportion to their total electricity consumption. The certificates are bought from the producers of renewable energy—the wind turbine owners—who will receive certificates in proportion to their electricity delivery, for example one certificate per delivered kWh. The system implies that part of the payment to the wind turbine owners is made in a special currency, the green certificates. The price of the certificates is set in a market where buyers' demand and sellers' supply determine the price. So the operator of a wind energy plant, for instance, receives payments for the delivered electricity and for the green certificate.

Competitive bidding, tendering or auctions: Governments define a fixed amount of funds and tenders for projects which can be technology neutral or specific. It accepts projects tendered up to the level of the available funds Under auction or tendering systems, power purchase agreements are entered into for an agreed period, typically 15 years. In this system there is a politically decided quantity which the power companies or the customers must purchase. This is achieved by letting the suppliers of electricity from renewable energy sources compete for the power purchase agreements. Experience has shown that the aggressive competition created for lowest price leaves only small margins that will deter investors and force developers to use only a limited set of highest wind resource sites.

As mentioned above the fixed feed-in tariffs are used in the three countries (Germany, Spain and Denmark), which are at the top of the list of total installed capacity in 2001. Because the financing schemes in Europe are not the same in all countries and Germany represents the largest part of the European wind sector, the focus will be on economic project characteristics of wind energy projects in Germany.

Economic project characteristics of wind energy projects in Germany

Most wind turbines installed in Germany form part of larger wind parks. These wind parks use to apply quite homogenous project structures, i.e. the legal form of a private limited liability company and a limited partnership (*GmbH & Co. KG*) and a financing scheme based on *closed-end funds structures*. The special feature of the GmbH & Co KG structure is that the role of the full partner within the limited partnership (*KG*) is taken over by the private limited liability company (*GmbH*) which itself has limited liability. The basic motivation for applying this legal form is twofold. First and as seen above, the GmbH & Co. KG structure offers similar characteristics as a corporation regarding liability issues. Second, it offers tax effects a normal corporate structure cannot benefit from. Given that the principal owners of the company are partners of a private, i.e. unincorporated company, the company's revenues are treated as incomes of the equity investors and taxed under the income tax scheme instead of corporate tax schemes. Equity capital is basically provided by external limited partners, usually small private investors, that participate in a wind project under a*closed fund scheme*.

In most (over 95%) of the wind parks, external limited partners (i.e., the private investors) are legally represented by a trustee, only very few wind parks permit a direct partnership of external limited partners as equity investors. The trustee is therefore another typical characteristic of the German public wind funds. The intention of this involvement is to reduce administration costs and to ensure managerial efficiency.

Equity capital for German wind parks is typically derived from participations that are offered in the finance market as financial products similar to closed-end ship or property funds. The market volume of such wind funds has reached 1.350 million Euro in 2001 (total investment sum) with a total equity capital of around 400 million Euro (average equity share: 30%).

In most funds, a *minimum participation height* is fixed. Typical heights for this minimum participation are 5,000, 10,000 or 25,000 Euro. Projected rates of return typically range between 7 and 9% excluding tax advantages.

Loan capital for these wind park projects is nearly exclusively derived from two sources: the European Recovery Program: Environment and Energy Saving Program and the DtA-Environment Program. Interest rates range between 5,25% (DtA) and 5,75% (ERP). The equity share typically ranges between 27-33% (50%-percentile).

Economic data of wind energy projects in Germany

Projected operation costs typically range between 2.0–2.6 cent/kWh, management costs between 0.29–0.42 cent/kWh and maintenance costs between 0.05–0.1 cent/kWh. Electricity generation costs (project duration: 20 years, discount rate: 5%) then range between 7.7–8.3 cent/kWh.

As the market has grown, wind power has shown a dramatic fall in cost. The production cost of a kilowatt-hour of wind power is one fifth of what it was 20 years ago. The cost of wind power generation falls as the average wind speed rises, and as recent analysis shows, at an average site with a speed of 8 metres per second, and a cost per installed kilowatt of 700 Euro, wind can be cost competitive with gas (see Figure 1.5).

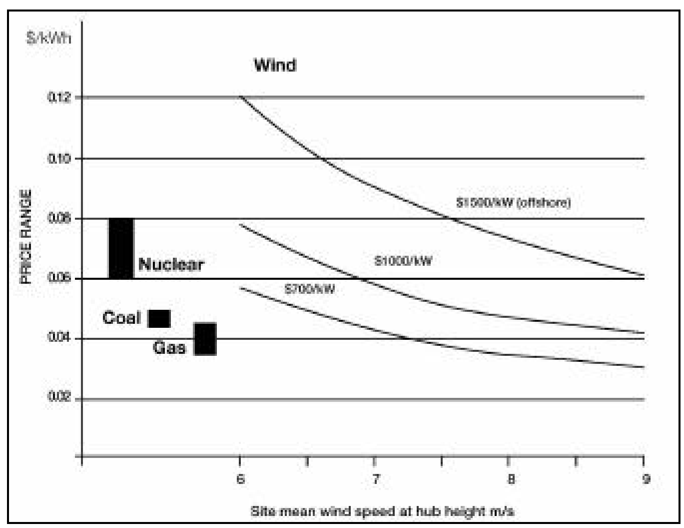


Figure 1.5: Prices for different generating technologies (Source: Wind Force 12, EWEA)

Success factors for wind energy projects

There are different success factors for wind energy projects in Europe. An important factor is to verify the abundance of wind at the planned site. Good wind sites are a prerequisite for high project revenues, which determine project profitability. Another important point is public opposition to wind power. This could be especially significant when the country's population density is high, which in turn could result to a higher risk of public refusal. For this case an important success factor is the participation of local citizens.

... Continued in page 7

Wind Power in Southeast Asia

- by ***M. I. Cabrera and T. Lefevre***
Centre for Energy Environment Resources Development, Bangkok, Thailand

Introduction

In Southeast Asia (SEA), the development of wind for power generation has been very slow due to technical and financial considerations. With the technological advances made in Europe and the USA, for instance, coupled with the expressed policies of SEA governments to accelerate the development of indigenous energy resources for energy security as well as sustainable development, interest has further increased on wind power development particularly in countries with promising wind regimes. A number of large- and small-scale wind power projects are in the pipeline, and in the long-term, wind is expected to contribute to the region's electrification program, particularly in the rural areas.

Wind resources in Southeast Asia

Selected areas in the region have good wind energy potential. Based on a World Bank-AAEP study, there are good to excellent wind resource areas for large-scale wind generation that can be found in the mountains of central and southern Vietnam, central Laos, and central and western Thailand, as well as a few other locations (Figure 2.1). Furthermore, coastal areas of southern and south-central Vietnam show exceptional promise for wind energy both because of strong winds and their proximity to population centers. On a land area basis, around 28,000 sq km of Vietnam (8.6% of the total land area) experience good to excellent winds, while the corresponding figures for Cambodia, Laos, and Thailand are 345 sq km (0.2%), 6776 sq. km (2.9%), and 761 sq km (0.2%), respectively (Table 2.1).

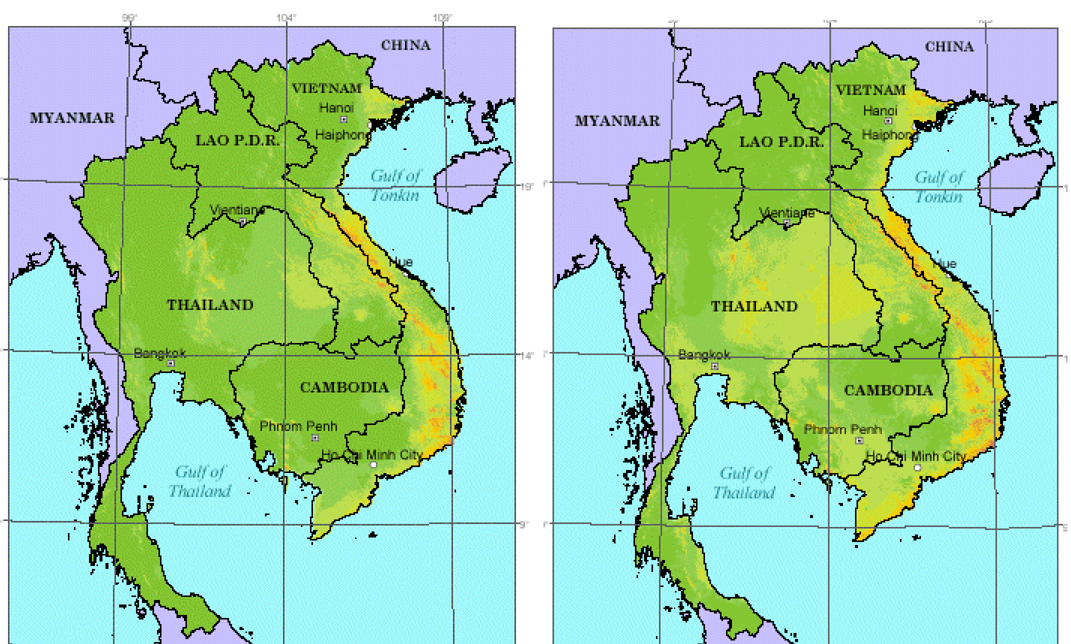
Opportunities for village wind power are considerably more widespread because small wind turbines are able to operate satisfactorily at lower wind speeds. Areas of good to excellent wind resource for village power are predicted in east-central Thailand, western and southern Cambodia, the northern and coastal southern Malay Peninsula, south-central Laos, and a large proportion of central and southern Vietnam as well as coastal areas of northern Vietnam. The study estimates that about a quarter of the rural population of the four southeast Asian countries live in areas showing good to excellent promise for small-scale wind energy.

A similar study has been done in the Philippines by the National Renewable Energy Laboratory of the US Department of Energy. Based on the wind resource analysis and mapping study, the wind resource in the Philippines is best in the north and northeast and lower in the south and southwest of the archipelago. The wind mapping results show many areas of good-to-excellent wind resource for utility-scale applications or excellent wind resource for village power applications, particularly in the northern and central regions of the Philippines. Over 10,000 sq km of windy land areas have been estimated to exist with good-to-excellent wind resource potential. Using conservative assumptions of about 7 MW per sq km, this windy land could support over 70,000 MW of potential installed capacity. Considering only these areas of good-to-excellent wind resource, there are 47 provinces in the Philippines with at least 500 MW of wind potential and 25 provinces with at least 1,000 MW of wind potential. However, additional studies are required to more accurately assess the wind electric potential, considering factors such as the existing transmission grid and accessibility.

Status of wind power in Southeast Asia

At present, wind power use in the region is limited to stand-alone electricity production in rural and remote areas. In Central Java, Indonesia, 49 kW have been installed while Yogyakarta has 42 kW. Around 27 wind generators have been installed in the country, with capacities varying from 0.1 kW to 15 kW. Two systems were developed as hybrid pilot projects. So far, no grid-connected medium or large-scale applications have been realized in Indonesia.

Some of the wind turbines in the Philippines include a 10-kW stand-alone system in the Northern Philippines serving 25 households. Another 25-kW stand-alone system in Batangas Province has six different loads with different priorities depending



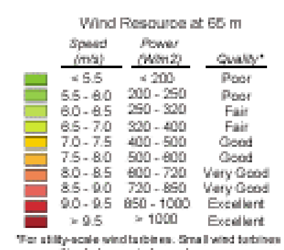


Figure 2.1. Wind resource in Southeast Asia at 65 m (left) and 30 m. Legend is shown at right. Source: TrueWind Solutions, LLC

Table 2.1. Wind Energy Potential of Southeast Asia

Country	Characteristic	Poor (< 6 m/s)	Fair (6-7 m/s)	Good (7-8 m/s)	Very Good (8-9 m/s)	Excellent (> 9 m/s)
Cambodia*	Land Area (sq. km)	175468	6155	315	30	0
	% of Total Land Area	96.40%	3.40%	0.20%	0.00%	0.00%
	MW Potential	NA	24620	1260	120	0
Laos*	Land Area (sq. km)	184511	38787	6070	671	35
	% of Total Land Area	80.20%	16.90%	2.60%	0.30%	0.00%
	MW Potential	NA	155148	24280	2684	140
Thailand*	Land Area (sq. km)	477157	37337	748	13	0
	% of Total Land Area	92.60%	7.20%	0.20%	0.00%	0.00%
	MW Potential	NA	149348	2992	52	0
Vietnam*	Land Area (sq. km)	197342	100361	25679	2187	113
	% of Total Land Area	60.60%	30.80%	7.90%	0.70%	0.00%
	MW Potential	NA	401444	102716	8748	452
		(5.6-6.4 m/s)	**(6.4-7 m/s)**	**(7-8 m/s)**	**(8-8.8 m/s)**	**(8.8-10.1 m/s)**
Philippines**	Land Area (sq. km)	14002	5541	2841	2258	415
	% of Total Land Area	4.70%	1.86%	0.95%	0.76%	0.14%
	MW Potential	97000	38400	19700	15600	2900

*Note: * For large wind turbines only. Potential MW assumes an average wind turbine density of 4 MW per square kilometer and no exclusions for parks, urban, or inaccessible areas. Wind speeds are for 65 m height in the predominant land cover with no obstructions.*
*** Wind speeds are for 30 m height.*

on the amount of power produced and is without a battery storage. A 3-kW stand-alone system was put up by a local telecommunication company (PT&T) as a power supply for its relay station in tandem with a diesel generator. There are only two known suppliers of small wind electric systems (a few hundred watts). For larger units direct contact with foreign manufacturers is being done by interested users.

Meanwhile, the Electricity Generating Authority of Thailand (EGAT) installed six small horizontal axis wind turbine generators (WTG) for experimentation in Phuket Island. An 18.5-kW WTG is directly connected to the local grid while the three smaller ones were modified for charging 240V battery along with a WTG-PV hybrid system. A 150-kW capacity has been installed at Phuket, and is grid connected.

In Vietnam, around ten thousand 200-W battery charging wind turbines have been installed for household use, mainly in the central and southern regions. In addition a number of 150-W battery charging wind turbines have been installed at households in coastal areas of Quang Ninh and Hai Phong.

Figure 2.2. One of the systems installed by Winrock in Indonesia

At present, the Philippines is the most active in the region in wind power development, with two major projects in the pipeline. The Philippine National Oil Co. (PNOC) is developing a wind farm in the villages of Saoit and Pagali in nearby Burgos town. The project consists of building a 40-MW capacity wind farm facilities and laying down 42-km transmission lines to link them up with the main transmission lines in northern Luzon Island (Ilocos Norte Province). The wind power facilities component involves detailed design, procurement and installation of equipment and materials, civil works and electrical work. The transmission lines and substations component involves procurement and installation of equipment and materials, civil works and electrical work. In addition, consulting services will review detailed design and the monitoring and supervision of project implementation. PNOC's partners in this project is the Energy Development Corporation (EDC).

Early next year, the Metro Manila-based Northwind Power Development Corp. (NWPDC) will start setting up a wind power plant at the windswept town of Bangui, Ilocos Norte. The wind farm will begin its commercial operation by 2004. The Bangui Bay wind farm will use 30 units, 60-metre high Vestas wind turbines, and arranged in a single row stretching on about a 3-km shoreline facing the South China Sea. The wind at Bangui coast is blowing at a speed of 7 m/s. The wind plant will synchronize operations with the National Power Corp. (NPC) grid to complement NPC's power supply to the local electric utility. On July 19, the NWPDC sealed the 25.5-MW wind power project-sale agreement with the Ilocos Norte Electric Cooperative (INEC). The plant can produce up to 60-MW power if the remaining two phases are completed. The NWPDC will operate and maintain the wind power plant and deliver at least 52,560-MWhr (equivalent to 7 MW) to INEC every year for 20 years. The additional wind energy is about a third of the province's total power requirement of 26 MW. Based on the energy sales agreement, INEC will buy power from the NWPDC at 7% lower than the prevailing NPC rates. The power cooperative, however, will continue buying its remaining energy demand from NPC.

Barriers to the development and commercialization of wind power in Southeast Asia

The major reasons why the commercialization of wind power in SEA has not accelerated compared to other regions include: lack of wind data in specific sites, high initial costs, lack of access to financing, low public awareness, lack of working unit, no local manufacturers and distributors, no clear financial and fiscal incentives and generally a low level of technology awareness.

Wind resource data are needed for the reliable estimation of the development of wind power in a country. Such data are needed to enable governments, multilateral development banks, private developers, and others to determine the priority that should be given to wind energy and to identify windy areas that might be suitable for development. The lack of useful data is especially critical in Southeast Asia, which has not yet experienced widespread wind development. Southeast Asia has not been the subject of extensive wind resource studies in the past, but some studies have been conducted for the Philippines, the coastal areas of Thailand, Cambodia, and Vietnam. Wind data collection takes time and money to accomplish. Although wind resources atlases have been produced for Cambodia, Laos, Thailand, Vietnam and the Philippines that can be used for identifying potential wind development areas, there is a lack of high-quality surface data to compare with the maps. As such, there is still a need to conduct measurement programs meeting rigorous wind-industry standards in order to verify the results and confirm the wind resource at promising locations.

The installed demonstration projects were also very expensive. But with modern wind systems becoming cheaper, there is again a resurgence of interest among government and private investors in the region.

There is also a low level of awareness among the public about the usefulness of the technology due in part to the lack of working units. And if there are, some are not working due to technical problems giving the technology a bad image. These problems include faulty designs, inappropriate system components, poor spare part supply, etc. Furthermore, there is insufficient expertise and technical know-how to design, operate and maintain such systems.

SEA governments also give more priority to the development of conventional energy sources, thus there is limited funding and incentives for renewable energy development.

Some SEA countries have policies that support the development of renewable energies like wind power. Indonesia's Ministry of Energy and Mineral Resources said that small power generators using renewable resources soon will be guaranteed a buyer in the state utility. The decree will force state utility Perusahaan Listrik Negara (PLN) to buy whatever electricity is on sale from plants of 1 MW or less using geothermal, hydro, biomass, wind and solar sources to generate power. Meanwhile, the Philippines has a long-term program for the development of renewables including wind power. An executive order was enacted providing for the participation of private sector in the exploration, development, utilization and commercialization of ocean, solar and wind (OSW) energy resources for power generation. Although Thailand supports the development of renewable energy, particularly for small power generation, there is no specific financing scheme to develop wind energy.

Prospects of wind power in Southeast Asia

The wind energy resource studies done in Cambodia, Laos, Thailand, Vietnam and the Philippines show significant opportunities for both large-scale wind energy installations and small-scale village power. Many of these opportunities were previously unsuspected.

Wind power generation can contribute to the region's electrification programs particularly in the rural areas, where access to electricity is still low. Villages located in very good or excellent wind areas can benefit from wind power systems. These areas can be found in Vietnam and the Philippines. About a third of the rural population of Vietnam and a sixth of that of Laos live in areas with a good wind resource for small wind turbines, whereas only 5% and 9% of the rural populations of Cambodia and Thailand do. These estimates do not consider the possibility that windier areas may be found outside of towns but still within a distance that could make them suitable for village power generation. Given the data now available, with the help of investors, lenders, and developers, governments in these countries can now focus on developing wind for power generation.

Sources: Wind Energy Resource Atlas of Southeast Asia, Prepared for The World Bank, Asia Alternative Energy Program by the TrueWind Solutions, LLC, New York, USA, (September 2001) available online at http://www.worldbank.org/astae/werasa/index.htm; Wind Energy Resource Atlas of the Philippines, D. Elliott, M. Schwartz, R. George, S. Haymes, D. Heimiller, G. Scott, National Renewable Energy Laboratory, USA, February 2001; Philippine Daily Inquirer (31 July 2002)

Wind power in Europe .... *Continued from page 4*

Other success factors are a short process of authorization and a regimentation of the grid connection.

In Germany the main success factors have been the feed-in tariff which offers attractive remuneration and satisfactory planning security. The second success factor can be seen in the upcoming and the widespread application of the closed-end funds scheme that created the possibility to involve local residents directly into this new market thus significantly reducing public objections.

In Spain, Europe's second largest country of total installed wind capacity, the success in the development of wind energy can be attributed to the high wind potential, the stable legislation framework to electricity generation, and the development of administrative procedures at regional level to wind farms authorization.

Prospects of wind power in Europe

In Europe, there is an exploitable potential for onshore wind power of more than 600 TWh/year. In countries like France and the United Kingdom, where the total installed capacity of wind energy is "low", the potential for wind energy is very high. In Germany, the wind energy market is widely developed and the construction of onshore power plants gets more and more difficult, because site selection of good onshore wind sites complicates successful project development. One possibility for the further expansion of wind energy in Germany, however, is the so-called repowering, or the replacement of smaller and older turbines with larger, modern models.

But there is an enormous additional wind resource to be found in the seas around the coastline of Europe. Several European countries, led by Denmark, are already seeing the first large scale offshore wind farms built in their territorial waters. The European wind turbine manufacturing industry is also focussing its current R&D effort on producing new designs specially adapted for the emerging offshore market. This is expected to seriously take off in northern Europe from 2003 onwards. In Europe an important factor will be the opening up of the offshore wind market.

Sources: European Wind Energy Association (EWEA), 2001, WIND FORCE 12: A Blueprint to Achieve 12% of the wold's Electricitiy from Wind Power by 2020, www.ewea.org; Institut für Solare Energieversorgungstechnik (ISET), 2001, Wind Energy Report Germany 2001, Kassel; N. Enzensberger, M. Wietschel, O. Rentz, 2001, Policy Instruments fostering wind energy projects – a multi perspective evaluation approach, Energy Policy, Elsevier

Calendar of Events

CEPSI 2002 (14th Conference of the Electric Power Supply Industry)
05 - 08 November 2002; Sea Hawk Hotel and Resort, Fukuoka, Japan
URL: http://www.aesieap.com

2002 APEC Exhibition on New & Renewable Energy Technology
07 - 09 November 2002; Seoul, South Korea
URL: http://apeckoex.kier.re.kr/

Offshore Wind Energy - The Technical Challenge
19 November 2002; 1 Birdcage Walk Westminster, London
URL: http://www.imeche.org.uk/conferencesandevents/imeche.asp?page=eventhome.asp&ProductId=58

Hydropower Developments: New Projects, Rehabilitation and Power Recovery
21 November 2002; 1 Birdcage Walk Westminster, London
URL: http://www.imeche.org.uk/conferencesandevents/imeche.asp?page=eventhome.asp&ProductId=42

Powercon 2002: The Second Annual Asian Power Executives Summit
26 - 27 November 2002; Conrad, Hong Kong
URL: http://www.iqpc.com.sg/AS-546

Oil, Gas and Power Development in the Mekong Region
26 - 27 November 2002; Phnom Penh, Cambodia
URL: http://www.cmtevents.com/

Pollutec 2002: 18th international Exhibition of Environmental equipment, Technology and Services for Industry & Local Authorities
26 - 29 November 2002; Lyon, France
URL: http://www.pollutec.com/index_en.htm

Third Meeting of the Global Forum on Sustainable Energy
27 - 29 November 2002; Graz, Austria
Contact: Irene Freudenschuss-Reichl: freudenschuss-reichl@un.org

Bioenergy 2002: Sustainable Energy for Society, the Economy and the Environment
02 - 03 December 2002; Manly Pacific Parkroyal, 55 North Steyne, Manly, Sydney, Australia
URL: http://www.solaraccess.com/industry/event.jsp?eventid=362

2002 Guangzhou International Green Energy Products, Equipments and Application Technologies Expo
16 - 18 December 2002; China Export Commodities Fair, Guangzhou, Guangzhou, China
URL: http://www.newenergy.org.cn/english/event/event.asp?id=279

Power-Gen India & Central Asia
14 - 16 January 2003; Pragati Maidan, New Delhi, India
URL: http://www.power-genindia.com

The Second Regional Conference on Energy Technology Towards a Clean Environment (RCETCE)
12-14 February 2003, Phuket, Thailand
URL: http://www.serd.ait.ac.th/teenet/rcetce.htm

CLEAN 2003 - India International Clean Energy Expo 2003
20 - 23 February 2003; Bangalore, India
URL: http://www.cleanenergyexpo.com/

COGEN Europe Annual Conference 2003 "Cogeneration - the Path towards Growth" | 03 - 04 April 2003; Brussels
URL: http://www.cogen.org/events/Annual_Conference_2003.htm

In the News

EUROPE: EU Drafts Law on Combined Heat/Power Generation

The European Commission said it had drawn up a proposal for a law to promote the combined generation of heat and power, cogeneration, which it says saves energy and combats climate change.

The Commission said in a statement that the directive would encourage EU states to promote cogeneration through a systematic identification and progressive realisation of the national potential for high-efficiency cogeneration.

EU states would have to report on the progress achieved towards meeting this potential and measures taken.

To remove barriers to cogeneration, EU states would have to guarantee that power from cogeneration would be transmitted through the national grid without discrimination.

It would also facilitate access to the grid for electricity produced from cogeneration units using renewable energy sources and from units with a capacity of less than one megawatt.

It would also ensure that guarantees of origin of electricity from cogeneration could be issued on request.

Source: Reuters via Planet Ark, 25 July 2002

INDONESIA: PT Indonesia Power to Build 40-MW Geothermal Plant in Central Java

PT Indonesia Power said it plans to build a new 40-MW geothermal power plant in Kamojang, Central Java.

A company executive Herman Darnel Ibrahim said the subsidiary of the state-owned electricity company PLN is looking for financiers for the US$80-million project.

Geothermal will be a major source of energy to generate power in the future, Herman said.

He said construction of the new plant will take two to three years after fund is available.

He said the project will be built in cooperation with the state-owned oil and gas company.

Source: ANTARA via *Asia Pulse, 19 September 2002*

MALAYSIA: 20 Small Renewable Energy Plants to Sell Electricity to Tenaga

The Energy Commission has allowed 20 small power generation plant operators to sell electricity produced from renewable energy resources to Tenaga Nasional Bhd, Energy, Communications and Multimedia Minister Leo Moggie said. He said the operators are now working out the commercial arrangements to sell the electricity through Tenaga's distribution grid system. The commission received 37 applications with a combined capacity of 150 MW under its small renewable energy power programme (SREP), which was launched last year. This move is in line with the government's plans to use renewable energy to produce 5% of the country's power generating capacity by 2005. Of the 20 operators, two companies—Bumibiopower Sdn Bhd and Jana Landfill Sdn Bhd—have already signed agreements with Tenaga. Tenaga has also agreed in principle to buy electricity generated by Felda using bio-mass technology. As part of its downstream activities, Felda will construct four 20-MW power stations that will use oil palm husks as fuel.

Source: Bernama, 02 October 2002; AFX-ASIA via PR Newswire, 30 July 2002