The Newsletter of the International Network of Renewable Energy Project Support Offices

REPSource

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Winrock International receives support for the REPSO network from the U.S. Agency for International Development

The Value of WIND

Photo by Peter Williams

Irrigation on Sumba Island

Using two buckets slung on a flat bamboo shoulder pole, each morning the women and children of Sumba Island's Sabu tribe begin hauling water.

During the eight-month dry season, one day on Sumba is a replica of the last: the Eastern trade winds blow incessantly across the coastal savannas, drying the vegetation and turning the distant hills a bright yellow. For Ina Radjah and her son Jonah, days are spent between the spring near her home and her family's 7,000 square foot onion patch about 40 feet away.

Walking carefully in the shallow furrows between the rows, they systematically soak the top six inches of soil in the onion field. Nonetheless, at the end of the day, a shovel scooped eight inches below the surface of the onion plot reveals that tomorrow the watering will have to be repeated. This is because, combined with the climate, this shallow watering practice keeps the root zone of the onions so close to the surface that one day of wind and sun without water will send the family's crop into a permanent wilt.

A family cultivating a 7,000 square foot onion crop spends an average of 16 hours a day carrying water for irrigation—roughly 1,040 hours of watering to bring the crop to harvest. If sold at the average market price, the value of the crop in August 1996 would be Rp 1,300,000, or about US$ 550,

(See Wind, page 8)

An Investment in Riches

by Lolo Panggabean,RENI Coordinator

Indonesia is rich in renewable resources: great solar insulation; 246.6 billion tons per year of known reserves of solid biomass; a regular average wind velocity in eastern Indonesia of 3-4.5 m/s; potential for all sizes of geothermal energy production; and an estimated 75 GW of hydro potential. To turn these renewable energy resources into steam or electric power, investments will be needed.

Our country has a recent history of very successful investment in infrastructure. Investment in manufacturing and the industrial sectors has helped to fuel the country's annual growth rate to 7%—one of the highest growth rates in the world, and the driver behind much of the 15% annual growth demand for power.

The government response has been to invest in infrastructure and improvements to the national grid. Despite this support, the state-owned electricity company Perusahaan Listrik Negara (PLN) has not yet been able to meet the country's needs.

Given all this unmet demand, why haven't renewables taken off? The government *has* invested in renewables: funds are allocated to renewable energy projects in 10 major sectors of REPELITA, Indonesia's National Development Plan.

The government has also invested in the industry's infrastructure by developing policy measures, for example the small power producers agreement, popularly known as PSKSK, that is designed to promote the use of

(See Commentary, page 12)

Interview

Yani Witjaksono, Preside

Yani Witjaksono, President of Yayasan Bina Usaha Lingkungan, or Environmental Business Foundation (YBUL), Indonesian sponsor of the Renewable Energy Network Indonesia (RENI), and Lolo Panggabean, RENI Coordinator, talk with Winrock staff Andrea Collins and Peter Williams about renewables in Indonesia.

A: How does renewable energy relate to development needs in Indonesia?

L: When it can take an active role, renewable energy is an important part of the diversification of domestic energy sources. It is part of the national policy on energy, and now it is institutionalized through the presence of the new small power producers agreement, popularly known as PSKSK.

P: How is RENI working to expand renewable energy markets?

Y: RENI has already demonstrated significant success in establishing a base from which to encourage the development and implementation of significant numbers of renewable energy projects. These projects will greatly increase the number of MW generated by renewable energy in Indonesia and provide a solid set of model projects which illustrate the enormous potential for renewable energy development in the world's fourth most populous country.

Yani Witjaksono

L: RENI works through dissemination of information to potential developers for home use systems, to large energy companies, and to the palm oil and sugar mills.

RENI also works closely with related government agencies, with potential users of renewable energy technology, as well as those that have influence over implementation policy, like the Ministry of Mines and Energy (MM&E), the Indonesian Agency for the Assessment and Application of Technology (BPPT), the National Planning and Coordinating Agency (BAPPENAS), the Department of Transmigration, and the like.

From now on, RENI will also work closely with the Association of Renewable Energy Companies of Indonesia (APETINDO), which will keep close contact with PLN and the PSKSK project. We will work with APETINDO to do a constraints analysis of the environment for renewables. We need to look at things like regulations, market barriers, etc. We need the help of APETINDO representing the private sector.

P: What kind of barriers does RENI encounter in the promotion of renewable energy?

L: I think the whole idea is a matter of convincing, especially convincing the owners of the renewable energy resources. We need to make sure the owners understand that they can make profit. In a smooth way.

I also think one of the barriers is the lack of concrete data on true avoided costs for electricity generation. If these costs can be charted, the results should show that renewables are often the most economical choice for electricity generation.

Financial sources like banks or mutual funds will only invest their money where they can be sure it will produce benefits. But if they see that this kind of work is profitable, they will invest.

Y: The lack of investment capital for renewable energy projects is a barrier. This is especially true for cogen projects: some mills that we have approached need investment capital. But that's not easy to find.

This problem is not restricted to the renewables business: if you talk to other types of companies in Indonesia they also face investment capital problems.

Also, success with renewable energy projects is something you cannot see happen in one year or three years. It needs hand holding, convincing, and coordination of many factors, including capital.

Environmental businesses deserve special treatment.

A: The government is privatizing the power sector. In your opinion, what will be the most significant events that come from privatization?

nt of YBUL, and Lolo Panggabean, RENI Coordinator

L: Each private company will have to strive for profit. This will effect efficiency, and electricity will probably have to be sold at true cost.

Privatization will force everyone to act more professionally, I think. We need that in the electricity business, from the point of view of, and use of, natural resources, and from the point of view of actually avoiding losses in distribution.

Y: The private sector will play a very important role in the future, but their projects will need good management. When private sector companies come to me for help, my first question after the project proves to be economically feasible is *Who is going to manage the program on a daily basis?*

L: I should add one point to my remarks on privatization. This is important. From now on, PLN's concentration will be units of electricity sold. In the past PLN has been concentrating on many different things, like technology development and demonstrations, and human resources development. These things will be left more to the private sector in the future, and PLN will concentrate on the business of electricity.

P: Will privatization make it more difficult to provide service in rural areas?

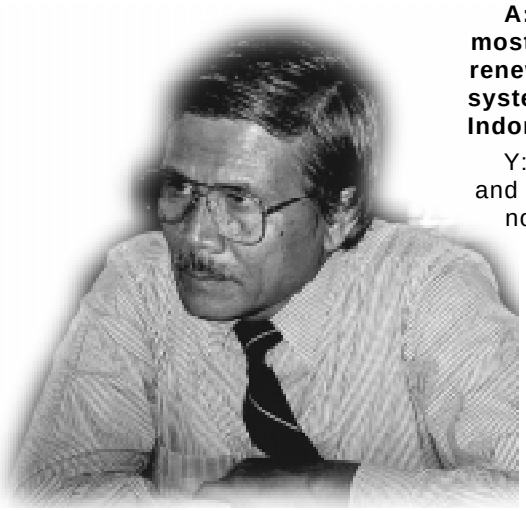
L: PLN is still responsible for the provision of electricity in the whole country.

Renewable energy is an important part of the diversification of domestic energy sources

A: How is the privatization of energy services being received in Indonesia?

Y: Generally people are happy with it. But then, based on my involvement with other programs and surveys, I would say that not all sectors of the government are happy with it. Often they feel that their coordination with NGOs, private sector, and government is already smooth.

But in Medan, for example, regional government is very enthusiastic about private sector involvement because the regional government is aware that they don't have the capability to provide enough infrastructure and services, resources to fund the projects, or professional help to manage the projects.



Lolo Panggabean

A: What are the most popular renewable energy systems in Indonesia?

Y: Geothermal and hydro right now.

A: Is that because the resources are so vast?

L: That's one thing, plus these resources are available at one site, compact, relatively easy to handle, and clean.

P: Are hydro and geothermal competitive with traditional fossil fuel production of electricity?

L: The economics has been proven to be competitive.

P: What do you see as the role of Indonesia in renewable energy development in other countries in Asia?

L: We cannot do much for Asian countries that are more developed than Indonesia. But there are newly emerging nations now—Myanmar, Cambodia, Laos, Brunei, and Vietnam—that we can help.

Indonesia has historically been used for human resources development in the field of energy. PERTAMINA (the state oil and gas company) has done this in oil and gas. BPPT has done this for regional training of staff from Thailand and Malaysia in solar energy. You have many demonstration projects in Indonesia, and these places can be used as training sites. Right now there are biomass cogeneration demonstration projects where we can do training. Wi

Indonesia to Expand Solar Energy Use and Local Industry

The Government of Indonesia (GOI), with support from the World Bank and the Global Environmental Facility (GEF), is implementing a project to expand the use of solar energy to provide lighting and other electricity services to approximately 200,000 homes. This project builds on existing experience in Indonesia on the part of the government, and the local and foreign private sector, which to date have provided solar home systems to approximately 20,000 households. In addition to increasing the quality of rural life, these lighting systems have enabled children to strengthen their education by studying at night, and allow for extended hours for productive rural activities, increasing income.

This project will be the largest such solar electrification initiative to date, from the point of view of households served. It relies wholly on the private sector solar companies for implementation in a commercially sustainable manner, incorporates standards and terms and conditions that require solar home system dealers to offer quality products and after-sales service, and allows the Indonesian government to play a key role in setting product standards and certification. The project also provides credit through commercial banks to solar distributors, who will on-lend to households, and a GEF grant that will effectively cost-share the down payment with rural households. Through this combination of credit and grants, it is expected that rural households will be able to buy solar home systems on an affordable installment plan basis. The basic design of this project, with its focus on strengthening the local solar private sector, should also strengthen the ability of these companies to meet rural energy needs in agriculture and commercial enterprises.

The estimated total project cost is US$ 118 million, 38% of which will be covered by the World Bank loan ($20 million) and GEF grant ($24.3 million). The remaining costs will be covered by the GOI (1%), commercial banks (4%), and by sub-borrowers such as SHS dealers and the end users in rural households (57%).

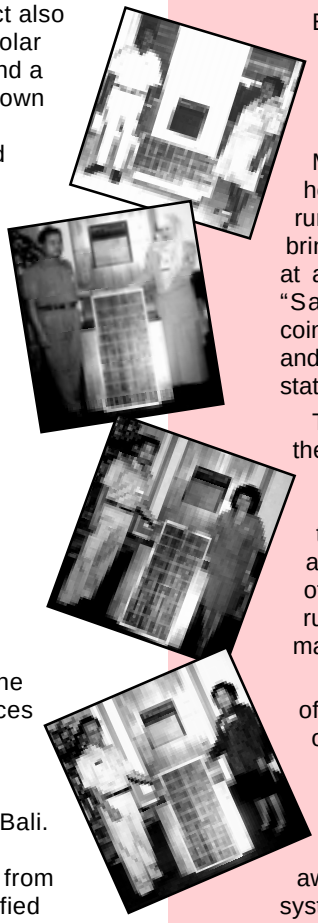
Project Details

The World Bank will loan funds to support the installation of 200,000 SHS units in the provinces of Lampung, West Java, and South Sulawesi. Financing will be channeled through four participating local banks: Pt. Bank Negara Indonesia, Bank Niaga, Exim Bank, and Bank Bali. The loans and grants will be disbursed by participating banks after the government team from BPPT that commissioned the projects has verified installation of the units.

The loan scheme to the distributors is based on standard Indonesian commercial credit terms: an interest rate of 24% payback in 48 months, and a minimum 100% collateralization. These terms are not easy for solar distributors to fulfill. According to some solar distributors, without the GEF contribution this scheme is not attractive. The financing scheme, as currently envisioned, also leaves distributors as the holders of the bank loans; this may lead to distributors approaching debt limits beyond which commercial banks will not lend.

Creation of a secondary market for SHS loans, whereby the distributors sell “performing” SHS loans, may be one manner of handling this possible constraint. WI

SHS Awarded to Teachers



Because they work and live in such isolated areas, Indonesia’s rural teachers face many difficulties, including inadequate physical infrastructure, communications, and transportation. Since 1991 the Indonesian Ministry of Education and Culture has honored elementary school teachers from rural areas of Indonesia’s 27 provinces by bringing them to Jakarta for formal recognition at an official event popularly known as the “Satyalencana Pendidikan.” This event coincides with Indonesia’s Independence Day, and the teachers are also invited to the country’s state functions to celebrate the holiday.

This year, in addition to formal recognition, the Ministry added to the teachers’ honors an award of a solar home system. This award is intended not only to motivate and support teachers but also to increase awareness and education about appropriate applications of solar (renewable) technology in Indonesia’s rural areas where kerosene is usually the main source for power.

Recognizing the benefits and appropriateness of the solar home system award, the Ministry of Education and Culture will annually present two school teachers and masters in each province with a system as part of their annual recognition of outstanding rural teachers. Teachers who receive these awards are expected to teach about solar systems as well as stimulate demand for more systems in their areas. WI

Developments in Indonesia Favor Renewable Projects

In mid-1996 the GOI drafted legislation to allow private companies to enter Indonesia's electricity transmission and distribution market, and issued international tenders for electricity projects.

The government has included in it's next two five-year plans the expectation of a total of 27,500 MW of new electricity. The private sector is expected to build 21,000 MW of this new capacity.

Although most new power capacity will be added to the Java-Bali grid, the government also wants to encourage private investment in the power sector on Indonesia's other islands. Subsidies on diesel fuel are slowly being removed to reduce domestic oil consumption.

The MM&E has basic responsibility for energy matters, and PLN is its primary agent in the electricity sector.

Small Power Producers Selling to PLN

PLN plans to buy electricity from small private power producers via Pembangkit Skala Kecil Swasta dan Korporasi (PSKSK), the government's newly formulated small power purchase agreement. A hallmark of the PSKSK is that the government is encouraging developers to use fuels besides oil.

Under PSKSK, small power producers are allowed to generate and sell electricity to PLN in amounts of up to 30 MW to the Java/Bali grid, and up to 15 MW for other systems.

The tariff is prioritized by type of energy input:

Category One: Energy generated by wind, solar, or mini-hydro.

Category Two: Energy generated by agricultural or industrial waste garbage or municipal waste, and energy cogenerated by agricultural or industrial waste.

Category Three: Energy co-generated with natural gas, coal, or oil.

Category Four: Energy generated by natural gas, coal, or oil.

Participation in PSKSK

Small power producers can participate in the production and distribution of electricity in three ways:

- Owning the electric plant, with PLN supplying power to households;
- Generating electricity for sales to companies in a particular industrial sector;
- Self-generation.

Large Renewable Projects

Large hydro and geothermal projects can be proposed via the large private power producer scheme. In this scheme the electric power produced may be sold to PLN, other permit holders, or the general public.

Solicited as well as unsolicited private power projects will be considered preferentially using the build-own-operate (BOO) contract mechanism.

Participation is prioritized in two categories:

One: Solicited Projects, in which the private producers implement projects planned by the government. The electric power produced must be sold to PLN.

Two: Unsolicited Projects, in which the private producers propose projects to the government. These are considered under three conditions:

- the ability of PLN to supply electricity in the area of proposed projects;
- the plans of PLN for developing the infrastructures needed for supplying electricity in the area of the proposed projects;
- the effect of the proposed projects on the electric power system and the possibility of interconnection.

Equipment Imports

Renewable energy equipment and components are imported as general trading commodities, hence import duties and taxes are applied consisting of import duty (5%), import value added tax (10% of 105%), income tax (2.5% of 115%) and sales value added tax (10% of 117.5%) payable at the customs office at the port. This means, effectively, 30.2% of the invoice value.

Interested companies and individuals are advised to contact the RENI office listed on page 11, or Mr. Romadhon at P.T. Perusahaan Listrik Negara (P.T. PLN-Persero) telephone and fax number 62-21 739-2674.

APETINDO is Formed

In December 1996, representatives of Indonesia's renewable energy technology private sector formalized the Asosiasi Perusahaan Energi Terbarukan Indonesia, or Association of Renewable Energy Companies of Indonesia (APETINDO).

The chairmen of the biomass, solar and informal hydro renewable energy technology associations make up APETINDO's Board of Directors.

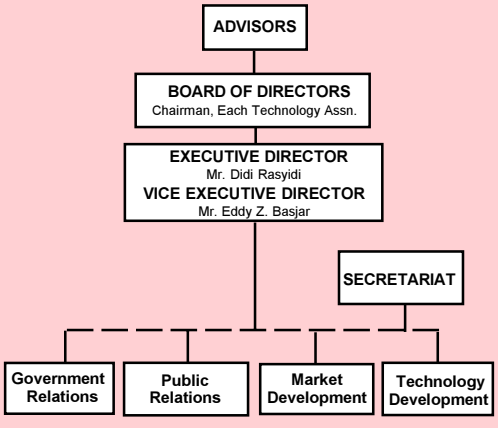
The organization's newly-elected executive directors are Mr. Didi Rasyidi of Linsing Rens Corp., and Mr. Eddy Z. Basjar of Powertel Engineering.

USAID-Jakarta and YBUL both facilitated development of the group.

Formation of the all-private business association illustrates the critical mass of domestic, private sector, and commercial business persons interested in the commercialization of renewable energy in Indonesia.

Said Didi Rasyidi, about the new association: *It is the hope that this organization, by representing many companies both large and small, will provide a stronger voice for all renewables in Indonesia. Thus the government will be more apt to listen to a voice of unified private sector interests.*

Organization Chart



Focus: Electrification and Renew

The current rate of electrification is 39.68%. PLN reports that 58% of the villages and 74% of rural households do not have access estimated 110 million Indonesians do not have access to the electric grid.

Solar: Indonesia has great solar insulation (4.5 kWh/m^2/d to over 5 kWh/m^2/d). There have been some 25,000 solar home systems distributed and installed throughout the country already. The estimated installed capacity is 3 MWp. Increased government support for village electrification could optimistically increase this market to 6 MWp annually. PV technologies are already being used for lighting, water pumping, refrigeration and communications.

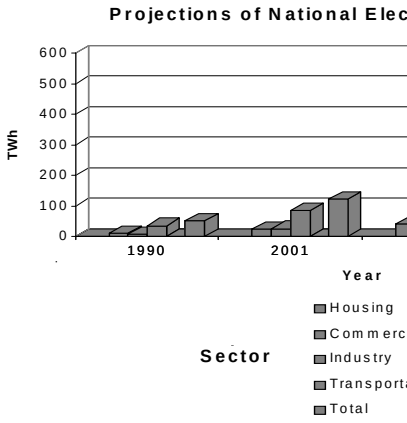
Biomass: The sugar, palm oil, and wood products industries have an estimated 1,700 MW of potential capacity. Although many of these facilities produce power for their own use, few sell power to the grid or other users.

Wind: Average wind velocities as high as 7.3 m/s have been recorded with regular averages of 3-4.5 m/s common to the region. Detailed, accurate data currently shows a strong wind resource in the eastern part of Indonesia. LAPAN has installed a diesel-hybrid wind system off the island of Bali which has been successfully operating for several years.

Geothermal: The potential is estimated to be 16 GW. About 310 MW have been developed. Distribution is as follows: Java, 7.8 GW; Sumatra, 4.9 GW; Sulawesi, 1.5 GW; Flores, 0.35 GW; Bali, 0.325 GW; other islands, 1.2 GW.

Between now and the year 2000, nine projects generating over 40 MW apiece are planned. Mini-geo (<10 MW) installations could be developed for off-grid rural applications, primarily in eastern Indonesia and micro-geo binary cycles (100 kW to 1,000 kW) in about 15 locations.

Hydro: There are roughly 75 GW o with the following distribution: Java Sumatra, 15.6 GW; Kalimantan, 21 islands, 33.6 GW. The total installe the country at about 3.2 GW. Java's have been developed to about 50% Thirty-nine projects are planned thr year 2005/6, totaling 4,656 MW. Th opportunity for developing microhyd thousands of sites.



vable Energy Profile of Indonesia

s to any form of electric service. The average PLN consumer waits 167 days to three years for grid connection, but an

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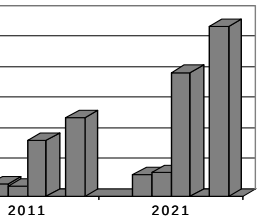


ial & General Service

ation

Yayasan Bina Usaha Linkungan (YBUL)

YBUL is a Jakarta-based Indonesian NGO. It's primary objective is to stimulate the development of environmental business in Indonesia. YBUL is particularly concerned with promoting opportunities in renewable electricity generation in rural and remote areas not on the national grid, and has been active in providing grass-roots training to local NGOs and village cooperatives that have direct access to rural communities.

The Establishment of RENI

In early 1996 YBUL began management of the Renewable Energy Network Indonesia (RENI). YBUL's president, Yani Witjaksono, considers management of RENI one of YBUL's significant achievements.

RENI activities include management of a fund that sponsors reimbursable grants of up to 50% of the cost of feasibility or prefeasibility studies to renewable energy project developers; maintenance of a resource center for renewable energy; and facilitation of the creation of APETINDO, an association of private Indonesian renewable energy companies.

YBUL Staff: *Top Row, l. to r.: Ms. Nina Natalina, Ms. Yani Witjaksono, Dr. Lolo Panggabean, Mr. Harjono Purwandono Hardjono. Botton Row, l. to r.: Ms. Sari Delyani, Ms. Umi Chasannah, Ms. S. Juliani.*

Other YBUL Activities

YBUL identifies potential environmental businesses and introduces these companies to potential sources of finance. YBUL also encourages local financial institutions to be confident in loaning funds to environmental businesses, and has developed a US$ 2 million loan scheme from each of two local banks.

In addition, the NGO provides on-going consultancy services and technical assistance to environmental entrepreneurs, and conducts an annual workshop on business management training with Indonesia's leading business school.

Ongoing YBUL projects include work with: USAID and other multi-lateral development agencies; the Environmental Enterprise Assistance Fund; U.S. Export Council for Renewable Energy (US/ECRE); the World Bank; the UNDP's GEF/GSP program; the Japan International Cooperation Agency; and the International Institute for Energy Conservation.

Board and Staff

YBUL's board members serve on a voluntary basis. Its advisory board includes Indonesians from business, banking, law, environmental business, public relations, and representatives from the International Finance Corporation (IFC) and the World Wildlife Fund.

Since 1993 YBUL's staff has increased from one to eight. Staff training and skills include knowledge and experience in policy analysis, financial management, feasibility studies, technical analysis, and training in energy and environmental projects—all drawn from their backgrounds in private sector banking, energy and energy technology research, energy development and environmental and biodiversity project management.

Wind *(continued from page 1)*

roughly fifty cents per hour for hauling the water, planting, weeding, and harvesting the crop. Even so, onion farming is a valuable enterprise and has succeeded in raising the standard of living for farmers in onion growing areas of Sumba over the last 10 years.

In September 1996, Winrock staff, with support from USAID, and working in collaboration with local NGO Anda Mananggu, began discussions with the farm families in Walakiri. Work at Walakiri is part of the Windpower for Islands and Nongovernmental Development (WIND) project, sponsored by USAID and Winrock International.

The long-term goal of the project is to use renewable (especially wind) energy technology to strengthen the local economy. The objective in the Walakiri area, home of the Sabu tribe, is to supply water to the onion fields for individual farms using wind energy and a micro-irrigation system.

Participation in the small irrigation project was presented to the farmers as a business proposition. A small utility, managed by Anda Mananggu, was proposed to monitor water metering and to collect payments. Income would be used to maintain the wind pumping system and expand the service in the future.

It is estimated that the hours of labor needed to water 7,000 square feet of onions will be reduced from approximately 1,040 to approximately 100 hours. The cost of the water will be Rp 68,250, or about US$ 25. When the farmers calculated the time savings and the potential for expansion, momentum began to grow and an agreement for developing the water system was put in place.

Now Ina and her family are anticipating expanding their farm and having extra time to invest in activities like fishing, weaving, and for 14-year old Jonah, perhaps going back to school.

The irrigation system at Walakiri is one of several dozen wind energy systems planned by Winrock for eastern Indonesia. Systems are also planned for fruit, indigo (an important input for the local traditional weaving industries) and vegetable crops. In addition to irrigation, the project will also use wind to provide power for other income-generating activities including popsicle production, storing and shipping fresh fish, operating a small hatching unit for broiler chick production, and grinding corn.

Photo by Peter Williams

WIND project technical staff in Soe, Timor

Photo by Peter Williams

Wind tower in Saketeo, Timor

Winrock provides classroom and on-site technical training to staff from collaborating NGOs in operation, maintenance, and repair of existing wind systems. Along with the increased income generated by owners of expanded enterprises, villagers will have new opportunities for gainful self-employment as a result of the area's increased ability to do business.

Each mini-utility should be able to maintain the wind systems that sustain it well into the next century, providing a model for future establishment of wind energy based utilities for areas too remote to be connected to large, centralized grids.

Technology Readiness: Mapping the Wind

A reliable wind map is the first step in finding sites with good sources of wind energy. Following is a conversation with Dennis Elliott and Mark Schmidt, meteorologists with the National Renewable Energy Laboratory (NREL) in the U.S, who developed the method being used in the WIND project for predicting and mapping the availability of wind energy for small- and medium-sized, consistent sources of wind power.

D: We started simulating databases back in '93, when we worked at Bechtel. We actually started this in earnest when we had our very first set of international projects at NREL.

With our maps, organizations can identify areas that have a high probability to have a good wind resource. We utilize existing data to predict existing wind resource patterns and wind distribution.

Basically, we take knowledge gleaned from comprehensive databases, apply meteorologic analysis techniques to the information and, using GIS models, make regional wind maps to help prospect for areas where wind

Mapping (continued from page 8)

energy applications may be feasible. We can do it just about anywhere in the world now.

M: The short term goal of our current project in Indonesia is identification of good wind resource areas for possible wind project applications, specifically in the region of East Nusa Tenggara.

INNOVATION

M: When we began working in developing countries, we found that generally, data are limited, which makes the job a lot different from working in the U.S. and regions of the world where a lot more information and data already exist.

When we first started in Indonesia, we had limited data that were very difficult to quantify. No one had used the data available to NREL to come up with wind maps, and we'd never used the geographic information systems (GIS) to make our maps. (GIS is software for doing advanced mapping of all types).

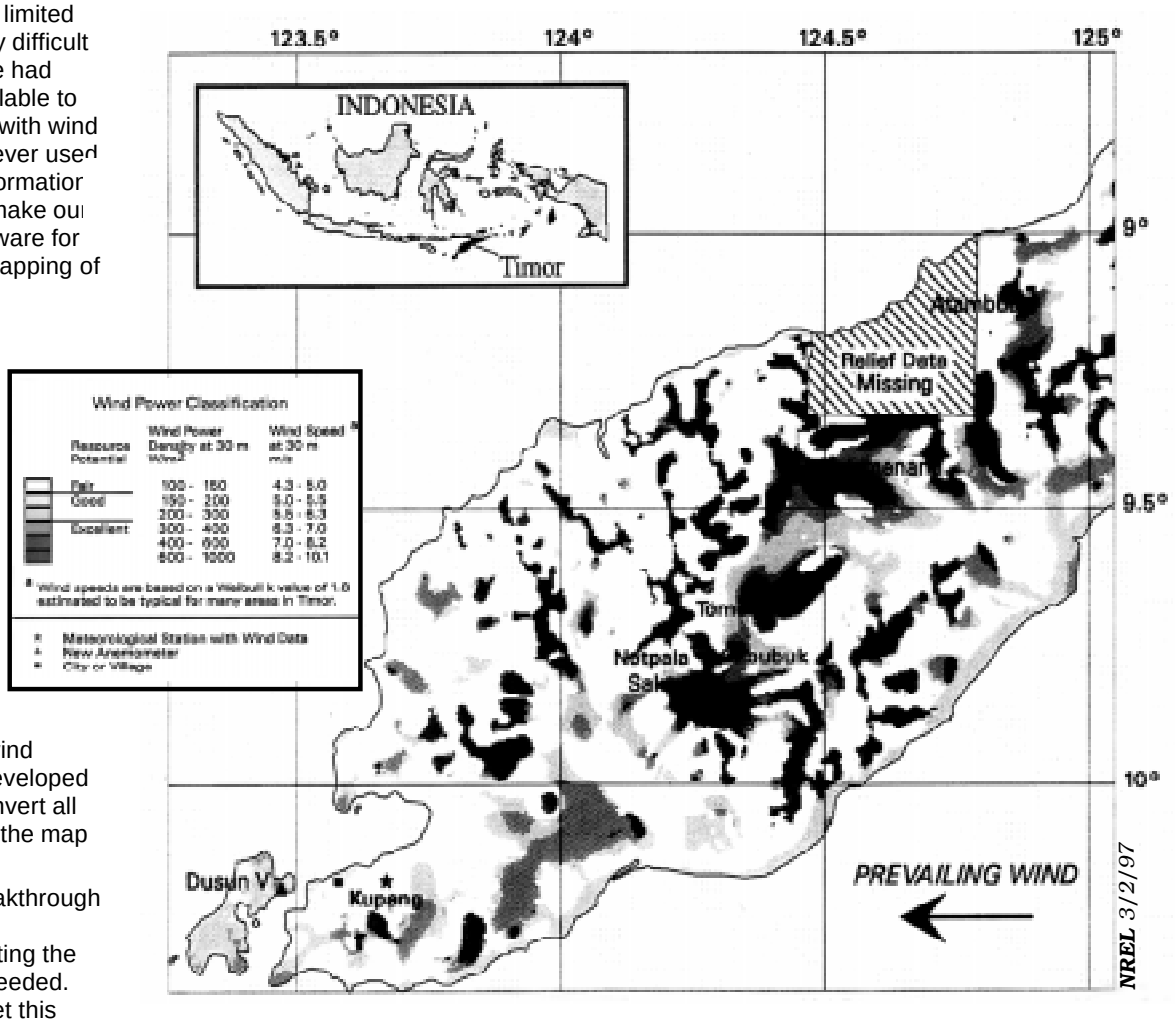
So we had to tailor both the data sets and the software. Over time, we have developed comprehensive, newly-available meteorological and topographic data sets, which we use as basic building blocks to make our GIS wind maps. We have developed the software to convert all that information to the map itself.

D: The first breakthrough we experienced in Indonesia was getting the satellite data we needed. We managed to get this satellite data set from NASA in this past year, and it was a heck of a job to write code and process all that data, but once we did we found some extremely complex patterns. So we were able to understand the wind resource patterns in Indonesia much better. The new satellite data added a quantum leap in our knowledge of Indonesia.

METHOD

M: Now, when we want to do a given country, we extract from world-wide sources everything for that region of the world. We may have as many as six to 10 different types of data sources that we're pulling together. We don't ignore any data. If we don't have wind data, which is often the case, we go in and look at satellite-derived temperature data, and other data, like air pressure data, we can try to use to infer wind resource patterns.

It takes us a year of just running software to decode and process all the raw data and pick out the parts of it that are useful to our maps. It's a huge effort to understand all the data and get everything ready to go.



West Timor Wind Resource Areas

VALUE ADDED

M: Before, in Indonesia, people were really maybe only 10–20% successful in predicting areas with good wind resources. Our mapping techniques can make them 70–80% accurate, or even higher, and identify the good areas.

(See Technology, Page 11)

What's New in REPSO?

Central America...

The REPSO is housed in the non-profit organization called Fundación Solar, in Guatemala. In March, Winrock forester Ken MacDicken traveled to Guatemala to train Fundación Solar staff, and the staff of cooperating institutions Plan International, Defensores de la Naturaleza, and local universities, in monitoring carbon changes in forestry projects. Participants learned about the Joint Implementation (JI) process, data analysis and interpretation, and performed monitoring and evaluation of a test field site.

The Fundación Solar is co-managing several biosphere reserve projects that have the potential to become JI projects. JI projects are designed to offset greenhouse gas emissions in order to lessen the total amount of greenhouse gases globally.

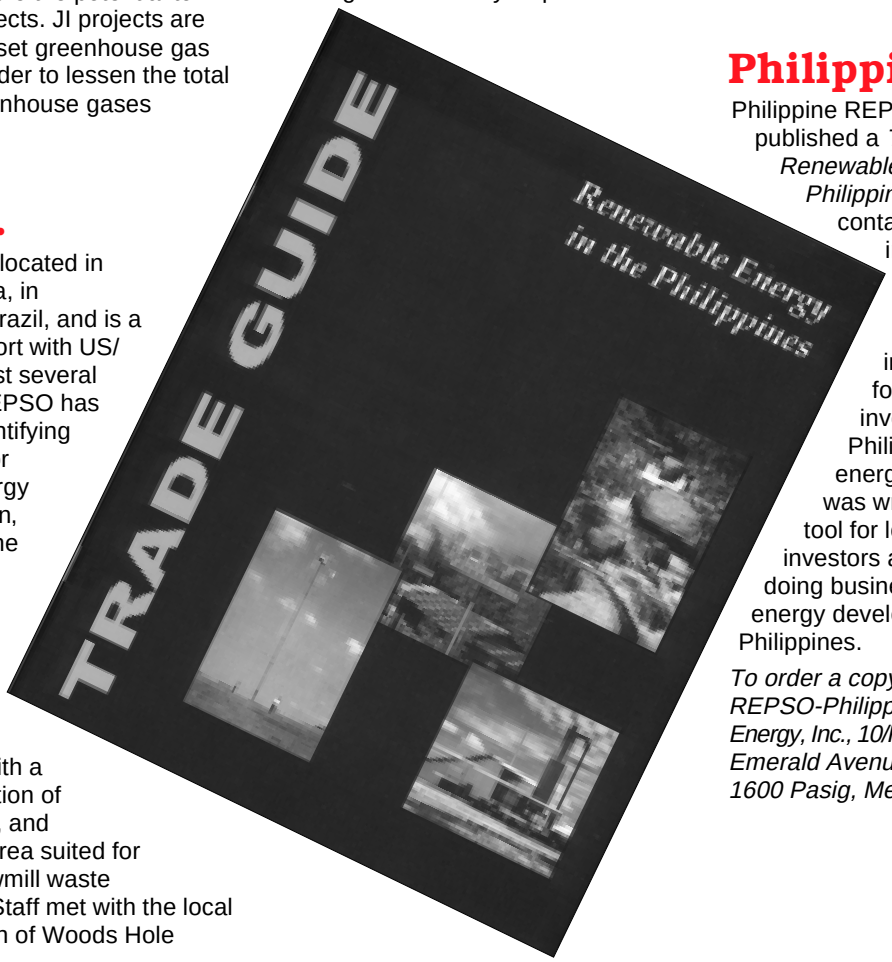
Brazil...

The REPSO is located in Salvador, Bahia, in Northeastern Brazil, and is a cooperative effort with US/ECRE. In its first several months, the REPSO has focused on identifying opportunities for renewable energy commercialization, particularly in the Northeast. Recently, the REPSO organized a field visit to Paragominas, an area in the state of Pará with a high concentration of sawmill activity, and potentially an area suited for large-scale sawmill waste cogeneration. Staff met with the local research station of Woods Hole regarding the actual working conditions and challenges facing the region, with owners of two mills, and with the president of the mill owners' association SINDESERPA. It may be possible to develop commercial bioenergy projects in Paragominas depending on the local state utility's willingness to enter into power purchase agreements.

India...

Swati Power Engineering Ltd., New Delhi, a small hydropower company promoted by a non-resident Indian, recently negotiated a power purchase agreement (PPA) with Uttar Pradesh State Electricity Board for Swati's 11 MW Bhilangana Small Hydropower Project. Mr. A. K. Goel, Program Manager, REPSO, played a key role in advising the company on technical and commercial aspects of the agreement, and in pursuing and concluding the agreement with the state government.

The project, located in the Himalayan mountains close to the environmentally controversial Tehri Dam, is not expected to displace any people, submerge any land, or lead to deforestation, the bane of most large hydro power projects. It will promote environmentally benign development for the local population. The project, now under financial closing, is expected to produce power and feed it to the grid by the end of 1999.



Philippines...

Philippine REPSO has recently published a *Trade Guide on Renewable Energy in the Philippines*. The trade guide contains relevant information on Philippine laws, rules, and regulations on foreign investment, and focuses on the investment potential in Philippine renewable energy development. It was written as a reference tool for local and foreign investors and project developers doing business in renewable energy development in the Philippines.

To order a copy, please write to REPSO-Philippines at Preferred Energy, Inc., 10/F, Strata 100 Building, Emerald Avenue, Ortigas Center, 1600 Pasig, Metro Manila, Philippines.

Technology *(continued from page 9)*

Accurate mapping can help get wind energy projects funded by the various international investors and government organizations that might be interested in utilizing wind energy for power, but who might otherwise not consider it.

M: Our maps alleviate some of the doubts about the distribution of wind resources which allows investors to concentrate on potential areas for wind projects—they can see right on the map where to prospect for good sites.

THEY DON'T MAP JUST SPEED

D: Notice our maps are wind power maps, not wind speed maps.

M: The reason why is that many types of factors influence the power of the wind—the speed of the wind, the density of the air, and the geography of an area, just to name a few. It's a non-linear relationship, so very little change in any of the variables can mean big changes in wind power.

D: For example, wind power notches up a whole power class when you change your main wind speed by half a meter per second. The biggest factor in figuring the power of wind is the air density, and the big difference in air densities is elevation. So even though air density decreases as you go up, winds increase typically at a much greater rate than the effects of the air density.

So your best sites on east Timor or Sumba are typically on some of the elevated ridges and plateaus, as Jeff Gucker has found in subsequent measuring. They're better than the coastal sites. And our maps predict that.

Our maps also predicts how terrain influences the wind flow. Because of wind acceleration, or deceleration, you get what we call large scale blocking effects. The winds downwind of a big island like Timor are effected maybe hundreds of kilometers away from the influence of the island on the climates in the whole region.

Generally our maps of Indonesia have predicted some really high wind source potential, like in the elevated regions of west Timor, and the data Winrock is collecting is verifying that. Wi

is a private, nonprofit organization that works with people to build a better world—increasing agricultural productivity and rural employment while protecting the environment. Winrock's staff of more than 200 implements projects in 40 countries. Activities are funded by grants, contracts, and contributions from public and private sources. Winrock is headquartered on Petit Jean Mountain near Morrilton, Arkansas, and has offices in Arlington, Virginia, and around the world.

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Commentary *(continued from page 1)*

new and renewable energy resources and more efficient use of energy resources.

Using renewables to produce energy for the people of Indonesia is a concept that makes sense and is promoted by everyone from the central government and the chamber of commerce to yayasans like Yayasan Bina Usaha Lingkungan (YBUL), Dian Desa, and Mandiri, with its microhydro, and PT Yala Tel with its geothermal, to international institutions such as Winrock International and the World Bank.

It is time for the government and the public to invest in *coordinating* Indonesia's renewable energy efforts. This issue of REPSOurce illustrates just some of the work being done in renewables in Indonesia today. Coordination among the various groups mentioned above would present a more realistic picture of the sizable amount of renewable energy activity that is actually going on in Indonesia. It is not important who manages this effort; what is important is that it be done.

Such visibility could lead to overcoming current obstacles to the accelerated use of renewable technologies: lack of capital investment; transmission and distribution problems; mismatched situations between source location and demand sites; high front-end costs of equipment; funding; relatively high cost of equipment compared to buying power of the people; lack of lending institutions, and other barriers slowing our country's ability to take advantage of this vast resource.

Investment in such a coordinated effort would be something the government, Indonesian entrepreneurs, and end-users could take to the bank. In the words of my colleague Pak Hardjono, it could result in *leverage to produce enough energy for domestic use that will meet the needs of the people and lead to improved resource productivity, and provision of energy for industrial and infrastructure development*—goals of the National Development Plan.

REPSOurce

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