

RENEWABLE ENERGY
2010

Telling Our Story: Renewable Energy





Message from the Executive Vice President and CEO

Renewable Energy and the Fight against Climate Change

Countries cannot develop without widespread access to reliable and affordable electricity. In the face of rising concern over global climate change, the challenge is how to source this energy sustainably.

Many of IFC's client countries suffer substantial power shortages. The limited electricity they have often comes at an inflated cost. To meet basic human needs and enable economic growth, countries must increase their power generation capacity. Investing in renewable energy helps meet supply imbalances, while also addressing the challenges of global climate change, not only for individual consumers, but also for the businesses that create jobs, especially micro, small, and medium enterprises. Simply put, it helps the private sector succeed.

Massive investment is needed in renewable energy in the coming decades to provide for the needs of the emerging economies. With many governments facing fiscal constraints, public funding alone will not suffice and the private sector will have to provide most of the necessary investment. It comes as no surprise, therefore, that more emerging market countries are seeking to scale up private sector renewable energy investment and are looking to IFC for help.

In this environment of possibilities, IFC is stepping in to make a difference where we are needed most, mobilizing our full range of investment and advisory services to foster and catalyze a change in the scale of private sector involvement in renewable energy in emerging markets. Driven by our concern over global climate change, we are pulling together the necessary private

Cover: An industry force in its own country after just three years in operation, China WindPower Group is now working with IFC to take its expertise into new markets (see p. 14).

capital, technology, and management skills to help to finance countries' transformation to a low-carbon development path. Our work spans the renewable energy spectrum, from direct project-level investment to support for equipment manufacturing and investing in funds. We are:

- Supporting the reduction in cost of renewable energy technologies by investing across the manufacturing supply chains of wind and solar equipment
- Ranking as a leading investor in financing new generating capacity of solar, wind, biomass, geothermal, and hydro power
- Advising governments on creating the right regulatory environment to encourage private sector investment in renewable energy development
- Developing innovative market transformation initiatives that incubate new commercial products and accelerate their use, such as the IFC/World Bank Lighting Africa program that helps manufacturers develop clean, inexpensive lighting products using LED and other technologies to replace costlier kerosene lamps and candles in Africa
- Supporting local industrial companies as they initiate their involvement with renewable energy
- Increasing local market investment in renewable energy by making funds available to banks, equity fund managers, and other intermediaries

IFC's direct investment in renewable energy increased from \$440 million between fiscal years 2005-07 to \$2.0 billion between fiscal years 2008-10. We are committed to continue increasing our investments in the sector. Our projects have helped to power whole villages and light up schools and clinics, thus improving lives while helping offset greenhouse gas emissions.

This collection of stories gives a glimpse of the impact of our commitment to increasing renewable energy deployment around the world. As the world seeks to mitigate global climate change, IFC is there to promote renewable energy development, giving people access to the modern energy services they need to live, to thrive, and to succeed.



Lars H. Thunell
Executive Vice President and CEO

Access to Energy: *An Urgent Need*

Access to modern energy services is a fundamental building block of development.

Yet World Bank data show that 1.5 billion people—more than 20 percent of the global population—live without access to electricity, and far more live with expensive, unreliable power supplies. Up to 3 billion more people rely on burning wood and other solid fuels for heating and cooking.

Reliable energy supply is vital in improving living conditions (refrigeration, lighting, cooking, and communications), enabling essential services such as health and education, and unlocking economic growth through private sector activity in commerce and manufacturing. Without electricity, gas, and other modern energy supplies, people rely on burning kerosene, coal, wood, and other fuels for lighting, heating, and cooking. These polluting fuels cause health problems through burns and lung damage, and cause local environmental damage and contribute to climate change.

Increased use of renewable energy is in poor countries' direct interest. It can provide clean, cheap, and reliable access to electricity.

It also provides these emerging economies with the opportunity to address their long-term future by selecting a less carbon-intensive path to growth. A range of renewable energy technologies exists to take advantage of the various natural resources that may exist in any given location: solar, biomass, geothermal, hydro, and wind power can each be harnessed in a cost-effective and sustainable way when the right conditions exist and the right approach is taken.

This is where IFC comes in.





Satellite image of the earth at night, showing the lights of countless cities, towns, and villages. The dark areas of much of Asia, Latin America, and Africa show the need for increased access to energy in the developing world.

IFC'S APPROACH TO RENEWABLES

Focusing on the 'Firsts,' Bringing New Technologies to Scale

The developing world needs far more investment in renewable energy.

Whether from a business or a development perspective, increased investment is a 'win-win.' There are major opportunities in using renewables to reach previously unserved markets—especially the poor—while also meeting the climate challenge. To make a major difference, billions more must be invested each year in the proven technologies that generate power from self-replenishing sources. Most of this money must come from the private sector. The transition to a cleaner energy path is one of the great business opportunities of our times—and one that needs IFC support for early success stories, solid “winners” that will set models for others.



Natural steam being released from a geothermal power plant in Turkey, where IFC is helping the industry expand as an alternative to fossil fuels (p. 22).

But our own financing will never be enough by itself. In renewable energy, we thus focus on the “firsts”—landmark transactions that remove previous barriers, opening the way for follow-on investment from purely private sources. These include:

- **Biomass:** Financing the expansion of a local company that uses agricultural wastes to electrify impoverished rural areas (pp. 4-5).
- **Solar:** Helping a dynamic woman entrepreneur from Thailand expand the industry in her country (pp. 8-9).
- **Wind:** Financing Latin America's largest wind farm to date, and taking a Chinese wind firm to the next level, able to compete internationally (pp. 12-15).
- **Hydro:** Financing large and small run-of-river plants that use clean, abundant water as a source of power (pp. 16-19).
- **Geothermal:** Breakthrough projects in the Philippines and Turkey, two high-potential countries that are actively developing their promising resources (pp. 20-23).
- **Supply Chains:** Helping emerging market firms bring down the cost of key solar industry components so the industry can spread faster (pp. 26-29).

Since 2005, IFC has financed more than \$2.4 billion in renewable energy projects. Mobilizing cofinancing from new sources such as the \$6.3 billion, World Bank–managed Climate Investment Funds is an increasingly important part of our work.

In the last two years more than half of all power sector investments made by IFC have been in renewable energy projects. IFC has financed more than 2.75 gigawatts of hydro projects and nearly 900 megawatts of wind projects in this time.

A growing number of investments have also been made that support grid-tied and off-grid solar photovoltaic power plants, geothermal power plants, biomass-fired power plants, and manufacturing supply chains.

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Honduras: A rural school gets electrical power (see p. 33).

FROM NIGHT TO LIGHT

Dispelling Darkness in Bihar

Tamkuha, literally meaning ‘fog of darkness,’ is an economically disadvantaged village in India’s poorest state, Bihar. But it is no longer symbolic of its name.

Today, its small roads are well lit after sundown and bustling with activity.

“Common crime and kidnappings are things of the past,” beams a local ayurvedic doctor, V. P. Singh Yadav. “Now I can treat small emergencies late at night.”

Able to open his clinic at midnight if needed, Yadav now earns more than \$300 a month. Three years ago he made less than a tenth of that. He credits a local power station set up by Husk Power Systems with transforming his remote community bordering Uttar Pradesh, another poor state in north India.

Founded in 2008, Husk uses biomass gasification technology to convert local farmers’ rice husk wastes into electrical power. It operates simple, low-cost



Base of the Pyramid: Husk Power's low-cost biomass plants in India.

mini-power plants that provide affordable power to villages like Tamkuha that are off the national grid. With a capacity of 30 kilowatts, each mini-plant can illuminate 500 households. Charging less than \$2 a month, they allow a family to light up two rooms and recharge a mobile phone.

The company’s more than 40 plants in Bihar deliver electricity as a ‘pay-for-use’ service, connecting each household or business directly to a Husk power station. IFC’s \$1 million equity investment in Husk Power Systems and related \$250,000 loan will support the company’s expansion to another 100 villages.

Husk entrepreneurs Gyanesh Pandey, Ratnesh Yadav, Manoj Sinha, and Charles Ransler believe their low-cost, environmentally friendly approach can be scaled up to power rural India. To help the company meet its goal of lighting up a thousand villages in the next three years, IFC plans further funding and advisory services.

Agricultural waste like rice husk can be an effective power source for low-income users. This innovative, off-grid solution makes sense in India, which faces the daunting challenge of connecting more than 100,000 villages to the grid—many of them unreachable through conventional means.



Villagers in Bihar now have improved lighting conditions, thanks to IFC client Husk Power's small-scale power generation plants. Husk's "pilot projects were profitable in six months, so its model is sustainable," *The Economist* wrote.

SOLAR SOLUTIONS

A Public-Private Partnership in Rural Africa

Life without electricity plagues rural Africa. Solar power can be part of the solution.

Morocco's national utility Office National de l'Electricité (ONE) has raised the rural electrification rate from 18 percent to 95 percent since 1995. Small-scale solar kits were an important part of its approach, bringing power to more than 3,600 villages.

This makes ONE a perfect IFC partner in Senegal, whose government is working with the World Bank Group on new public-private partnerships to achieve 50 percent rural electrification by 2012.

In one rugged northern area near the Mauritanian border, IFC and ONE are co-investors in a new private utility called Comasel St. Louis, which has a long-term concession from the government. Among its goals: using solar technology to bring more than 5,000 local villagers their first electrical power over the next two years.



Africa: Effective in other countries, small-scale solar systems are now being introduced in rural Senegal.

The area is poor and dry, using unpaved roads for transport and simple wells for water.

But its residents want a reliable source of power and lighting, and are willing to pay for it. Comasel St. Louis' solar systems will meet those needs for as little as \$8.39 a month, costs that are far below those of the kerosene lamps and dry cell batteries currently being used. They will also serve 213 schools and 118 health centers.

Initial subsidies from the International Development Association (IDA) and the Global Environment Facility, provided under an innovative Output Based Aid approach where funding is released only as targets are met, and Islamic Development Bank loans will help defray installation costs in the early phases. Villagers will then begin to pay, ramping up commercial viability via a four-tier pricing structure based on consumer demand. The three lowest-level users will pay flat monthly rates, while small businesses and other large users will pay on a variable basis.

Demand for a low-cost, "base of the pyramid" solution to Africa's rural electrification needs is high. But given the expectations of modest returns, private risk capital is in short supply. To establish the viability of a new business model, IFC is investing alongside a proven partner from the developing world, setting an example for others to follow.



Lacking electricity, villagers in rural Senegal have a hard time connecting to the modern economy. A new IFC/Moroccan-owned utility will soon sell inexpensive power to more than 5,000 of them, using small-scale solar systems.

UTILITY-SCALE POWER

Solar Makes Sense

Women entrepreneurs are the hidden force behind many great companies—including Thailand's early leader in solar power.

There the local first mover is called simply Solar Power Co. (SPC). It is the brainchild of its CEO Wandee Khunchornyakong, a tireless solar proponent who has spearheaded the industry in her country for nearly 30 years—taking SPC to the point that it now is selling power to national utilities for the first time.

Early in her career, long before solar's commercial viability had been established, Ms. Khunchornyakong built her knowledge working on donor-financed projects. Then she founded Thailand's leading solar cell production company, Solartron, taking it public in Bangkok in 2005. Next she launched SPC, which soon became the first Thai firm licensed to build grid-connected solar photovoltaic (PV) power plants.

By 2008 she had government approval to build 34 of them, each generating 6.1 megawatts from the same top-quality Kyocera modules used in Spain, home of the world's largest solar PV installations. Under SPC's business model, each plant would sell power to government utilities under long-term

contracts and be project-financed as standalone entities involving the parent firm and other outside investors. But the financing still needed to be raised.



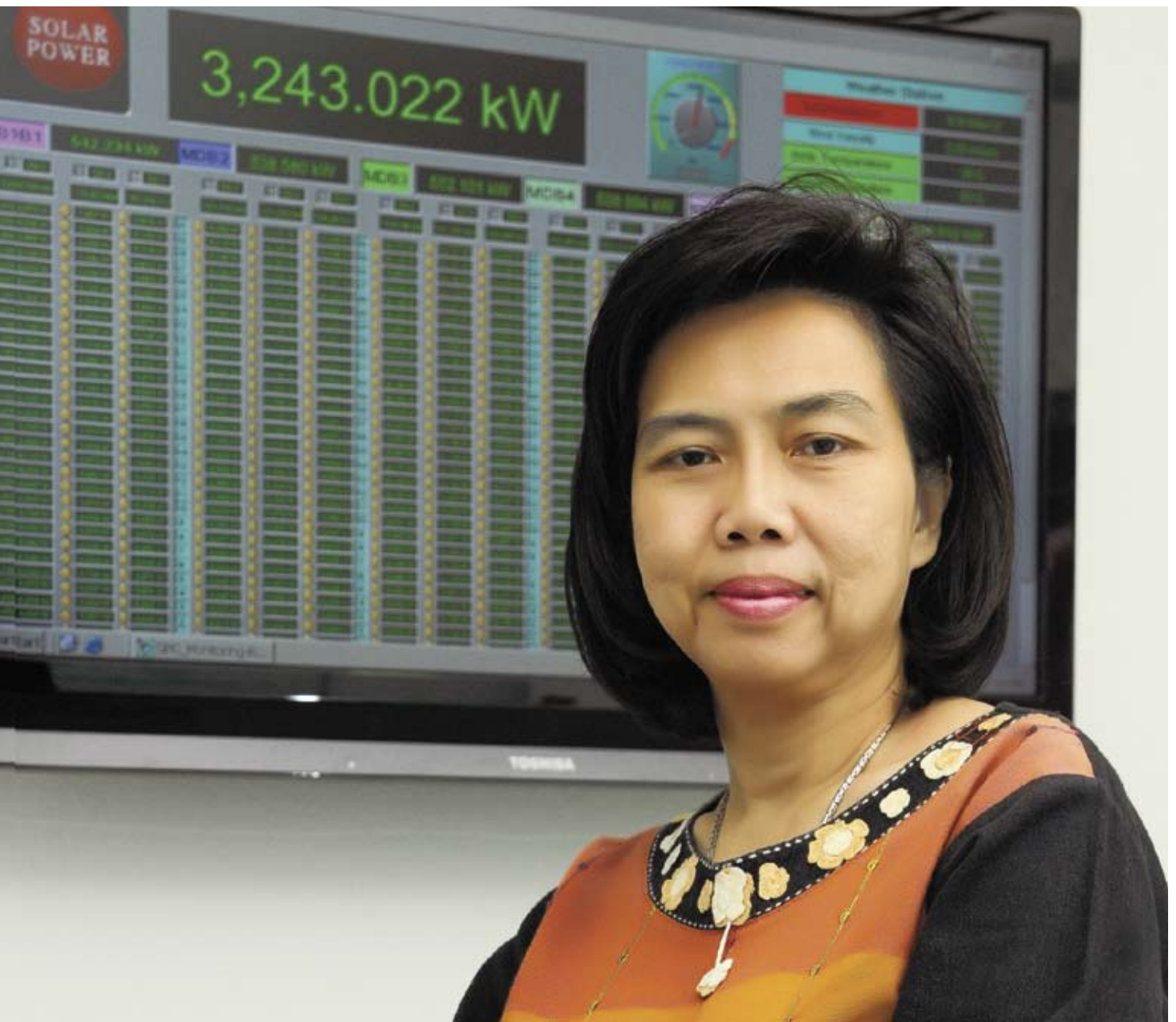
Thailand's Korat 1 solar power station, owned by new IFC client Solar Power Co.

When SPC began developing its first plant in 2009, few in the Thai business community saw the commercial potential of grid-connected solar power. Seeking a trusted partner who would carry weight with local investors, it contacted IFC.

After thorough analysis, we endorsed the firm's financial and engineering models, then made a \$1.7 million equity

investment in its first project, Korat I, and promised the same amount for SPC itself and some of its other planned projects. This helped SPC attract a \$12 million local currency financing package for its solar plants from Bangkok's Kasikornbank, *EuroMoney* magazine's 2010 Best Bank in Thailand.

The \$22 million Korat I project opened in April 2010, becoming the largest utility-based solar project not just in Thailand, but in all of Southeast Asia. With IFC and KBank on board, SPC is now attracting other investors and plans to have all 34 of its plants operating by 2012.



Wandee Khunchornyakong, the trailblazing entrepreneur behind Thailand's first commercial solar power plants. IFC is helping her finance an initial 34 installations over the next two years.

THE SAHARAN SUN

A Powerful Source

Morocco: upcoming home of one the world's biggest solar public-private partnerships.

The site is a rocky plateau above the southern city of Ouarzazate, on the edge of the Sahara and often called “the door of the desert.” Striking scenery makes it a Hollywood favorite: *Star Wars*, *Lawrence of Arabia*, and *Gladiator* were all filmed there.

A scorching sun hangs overhead, boosting summer temperatures to 40° C (104° F) or more. Making it the basis of a feasible power project is now the task of IFC and our partners, as we advise the Moroccan government on the initial phase of an ambitious 2,000 megawatt plan for solar energy.

National solar agency MASEN named IFC its financial adviser in developing the first power plant to be built in Ouarzazate. The goal is to have 500 megawatts

installed by 2015 at a cost of approximately \$3.5 billion. Private investors will be asked to submit proposals for the initial phase of at least 150 megawatts by early 2011, with a public bid award expected in the second half of that year.

However defined, it will be one of the largest solar plants ever built, selling power in the domestic market first, and later perhaps to Europe as well. Such projects are now growing in number: in June 2010, Abu Dhabi authorities named Spain's Abengoa Solar and French oil company Total their partners in a new, approximately \$700 million, 100 megawatt solar plant called Shams-1, due to open in 2012. The consortium will build, own, and operate the power plant using concentrated solar power (CSP) technology, collecting sunlight in 768 parabolic troughs.

The Morocco project will also use CSP systems. But large-scale commercial financing is far less available in emerging economies than in oil-rich Gulf locales. So our task is not just to structure the project. IFC and the World Bank will help mobilize concessional financing from development institutions so the Ouarzazate project can sell affordable power to its final consumers without major government subsidies, while also providing private developers a viable business proposition. A tough challenge, but a good one for IFC.



Sunshine: An important part of Morocco's power mix.



Concentrated solar power, used at newly commissioned projects like this one in Egypt, is the technology of choice for an upcoming mega-project in Morocco. IFC is advising the government on ways to attract private investors.

EURUS

Latin America's Biggest Wind Farm

By most standards, Oaxaca is one of Mexico's poorest states. But when it comes to wind, it is the richest.

Southeastern Oaxaca is a world-class wind power site. Few other places have winds that blow so long and strong. One of its towns is even called La Ventosa ("the windy place"). To help attract the private capital needed to develop this remarkable potential, IFC has just financed the \$600 million, 250 megawatt Eurus plant—Latin America's biggest wind power plant to date, and, outside of hydropower, the largest renewable project so far in the Americas.

Named for the Greek god of the East Wind, Eurus houses 167 turbines on one rural community's land. Privately owned by Spain's ACCIONA Energia, it sells its power to one of Mexico's largest, most socially responsible firms, cement leader Cemex. It is good for business as well as the environment: Cemex now pays much less for clean power than for the fuel oil-based variety it had previously been using that causes greenhouse gas emissions.

Eurus also benefits the local farmers from whom it leases land, providing them with additional income, employment opportunities, and community development support.

It is a precedent-setting project. But its financing almost collapsed amid the global financial downturn that caused banks to cut back on new lending. A

\$375 million package of commercial financing was expected when construction began. But by early 2009 it had proved impossible to obtain. When the sponsors turned to IFC, the entire amount was raised, keeping the project on schedule and commercially viable.

IFC lent \$71 million itself, and co-arranged another \$242 million from eight partner institutions with the Inter-American Development Bank. Another \$30 million came from the Clean Technology Fund, a World Bank-managed, multidonor vehicle for landmark climate change projects that is part of the \$6.3 billion Climate Investment Funds initiative.

Before Eurus, Mexico had just 88 megawatts of wind power projects nationwide. In Oaxaca alone there is the potential for 5,000 megawatts more—and a new blueprint for getting deals done.

Eurus: One of the first IFC-financed projects supported by the Climate Investment Funds, a \$6.3 billion multidonor initiative housed at the World Bank.



The privately owned Eurus project powers Mexico with a free, never-ending resource: the wind.

CHINA WINDPOWER

An Emerging Player

China is now the world's largest wind market. IFC is helping build one of its industry pioneers, China WindPower Group.

Listed in Hong Kong just three years ago, China WindPower (CWP) is a fast-growing, entrepreneurial firm committed to developing top-quality clean energy in the country that has the world's highest carbon emissions. Using a vertically integrated business model, it makes wind turbine towers, then designs, constructs, and maintains the wind farms for itself and other developers.

Opportunities abound: China has doubled its wind power capacity every year for the last four years and shows no sign of stopping, committed to getting 15 percent of its power from renewable sources by 2020. Having developed 12 mid-size Chinese wind farms in

partnership with large state-owned enterprises, CWP sought IFC's assistance to reach the next level.

We are financing its first wholly owned project: the 201 megawatt Xiehe plant in northwestern Gansu province, one of China's poorest regions. Located deep in the Gobi desert, it is part of a mammoth project to develop 3.8 gigawatts of that region's wind power potential in the first phase, and ultimately up to 10 gigawatts. IFC is providing a \$45 million loan for the project, and mobilizing up to \$107 million more from leading foreign commercial banks. By itself, Xiehe is expected to offset more than 421,000 tons of carbon emissions annually over the next 20 years—the equivalent of taking more than 85,000 cars off U.S. roads every year.

The collaboration between CWP and IFC extends much further. We have also taken a \$10 million equity stake to help CWP at the corporate level as it is exploring opportunities outside China for the first time, starting in India and Africa. As more and more developing countries move to utilize their wind power potential, CWP can play a major role, helping them go green.



China WindPower: A growing force in the renewable energy industry.



Chinese technicians are busy monitoring the performance of wind turbines. Vast wind resources are a major new source of electricity in China, supporting economic growth while offsetting greenhouse gas emissions.

LARGE-SCALE HYDRO

A SNAP Decision

Success in one key privatization helped the Philippines turn the corner.

In 2007 its growing economy sorely needed more power. Existing sources barely met demand, but the government could not afford much new construction and faced ominous shortages unless it could attract significant private investment. Its privatization program was stalled, bringing no foreign investors over six years.

Then came the game-changer: the \$530 million sale of the Magat hydroelectric plant.

Located in northern Luzon, Magat was an attractive 360 megawatt asset. But the market had just been deregulated, moving to a wholesale system whose lack of long-term supply contracts created some initial uncertainty. The new model was a positive step forward, but still untested in emerging Asia.

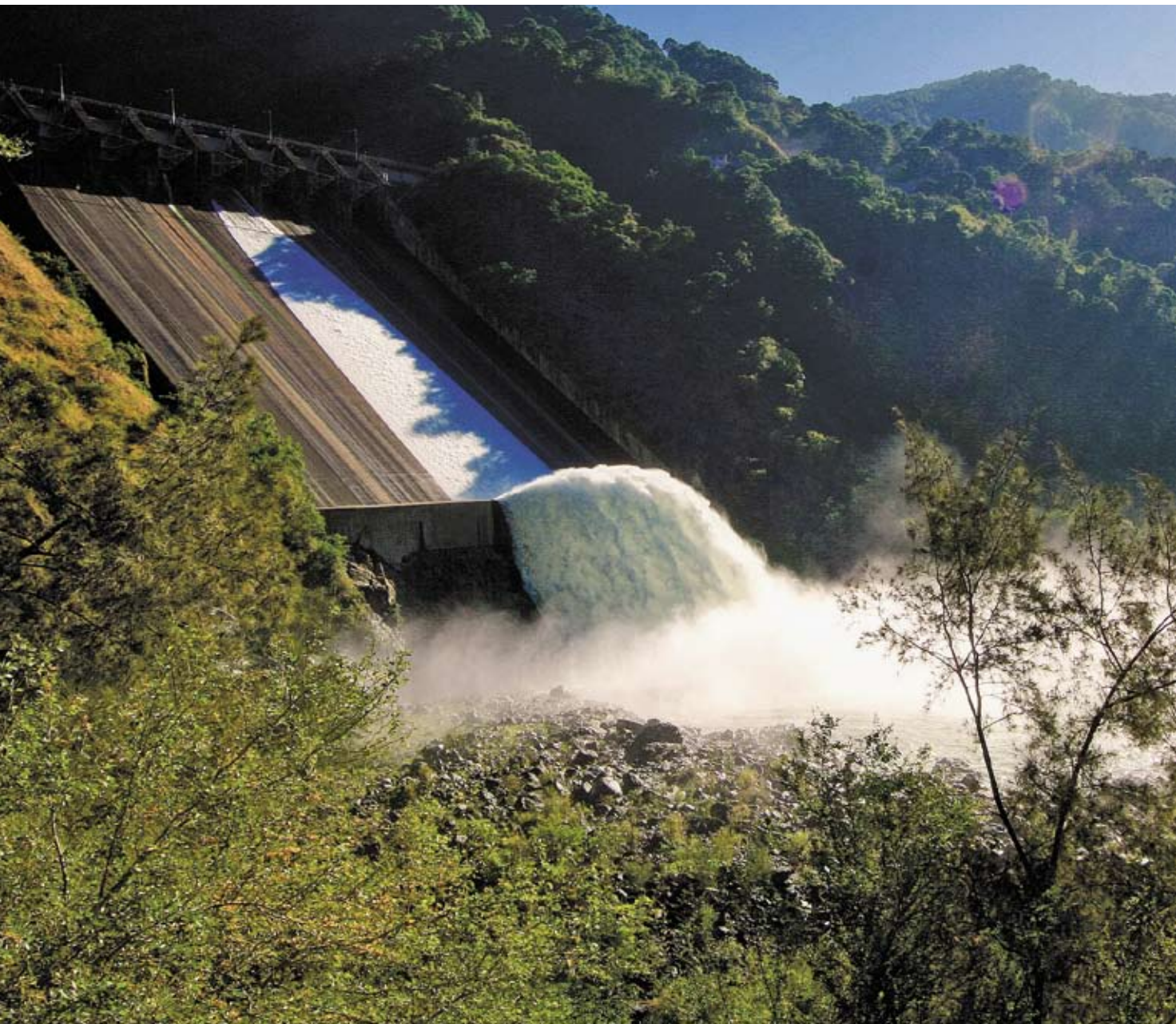
In came SN Power Invest, a Norwegian renewable energy specialist that had succeeded in other deregulated markets. It teamed with a top local conglomerate, Aboitiz Equity Ventures, to bid for Magat in a new joint venture called SN Aboitiz Power (SNAP).

“Magat matched our investment criteria,” says SN Power’s Erik Knive. “We’d be the first foreign mover into the Philippine power market. But we took a chance. That’s what we’re set up to do.”

Local and international banks came on board when IFC provided its stamp of approval with a \$105 million, 15-year loan. Soon HSBC and the Nordic Investment Bank joined in, and Magat earned Deal of the Year awards from *Project Finance International* and other industry publications. Now SNAP is adding up to another 180 megawatts at Magat.

Further bolstering the privatization program, IFC financed two other larger hydro plants that SNAP acquired in 2008 as turnarounds. One, 100 megawatt Binga, was producing no power more than half of the time. Under its new owners it is now fully operational and being expanded. The other, 75 megawatt Ambuklao, had been closed since 1990 due to earthquake damage. It is being rehabilitated using North Sea oil rig technology and will reopen at 105 megawatts next year.

Since the landmark Magat deal, private sponsors have pledged to invest more than \$6 billion in the Philippine power sector—avoiding electricity shortages by adding new capacity, much of it from clean hydro power.



When social and environmental issues are properly managed, large-scale hydroelectric power is a clean, reliable renewable energy option. Ambuklao (*above*) is one of three major IFC-financed hydro privatizations in the Philippines sponsored by SN Aboitiz Power (SNAP).

MINI-HYDRO

Proof of Concept

Small-scale hydroelectric power offers a quick, low-cost, and eco-friendly way to meet growing electricity demand—especially in countries like Colombia where wind and solar energy are not yet economically feasible. With the right financial support, it can succeed.

Private capital has been scarce until now. But by backing a pioneering Colombian firm, IFC has opened the eyes of local lenders previously reluctant to participate in the sector.

“When IFC gives you a stamp of approval, that opens doors,” says Daniel Petrie, Treasurer of Century Energy.

Following IFC’s lead, local banks have now agreed to lend \$39 million to its next “mini-hydro” projects—one of 10 that Century will build over the next five years. All told, Century will add 250 megawatts of capacity to Colombia.

Hydro plants of 30 megawatts or less suit the mountainous country, where abundant rain feeds steep downhill streams. They are also a viable alternative to the costly large-scale dams that provide about 80 percent of Colombia’s electricity, yet require reservoirs and thus can have major environmental and social impacts.

Century, part of a large diversified local corporation, saw opportunity in mini-hydro plants, which divert fast-rushing stream water without any need for reservoirs

that can flood land and displace people. Century knew they made business sense, since local regulators were offering mini-hydro incentives for selling electricity into the national grid.

The firm built one small plant with its own capital in 2007, but needed additional financing to expand. Local lenders, however, were unfamiliar with the sector and were unwilling to step in.

So Century teamed with IFC, which agreed to lend \$15.5 million to two projects in a river basin north of Medellín. The two-year construction projects for Caruquia (9.5 megawatts) and Guanaquitas (9.8 megawatts) were launched in 2008. Both times, IFC’s financing became a blueprint for local banks to follow.

The two projects are now fully operational. Their clean power is expected to offset more than 40,000 tons of greenhouse gas emissions, making them eligible for carbon credits under the Kyoto Protocol.



Tapping the power of water that naturally runs downhill, mini-hydro is a perfect choice for mountainous countries like Colombia, where IFC has financed a breakthrough project sponsored by Century Energy (*above*).

A GROWING FORCE

The Power of the Earth

Geothermal energy is a high-potential natural power source, but still largely untapped. IFC is helping expand its use, beginning in the Philippines.

Driving electrical turbines with underground heat, geothermal plants' proven technology could bring clean, affordable power to many developing countries. But so far only three—the Philippines, Indonesia, and Mexico—give it major focus. And it is in the Philippines, the world's number two country in geothermal after the U.S., that IFC is helping build an emerging industry leader, Energy Development Corporation (EDC).

In the 1970s the government began tapping the country's vast subterranean steam reserves, including one on Leyte island that is considered near-perfect, able to produce cheap, emission-free energy for hundreds of years. EDC was originally a state-owned enterprise, but in 2006 authorities changed course, listing it on the local stock exchange. IFC took a \$50 million early equity stake, boosting investor confidence at the critical pre-IPO stage.

"Everyone here knows that IFC stands for financial discipline, good corporate governance, strong social and environmental standards, and fair labor practices," EDC President Richard B. Tantoco recalls. "Having that seal of approval from a financial institution that maintains the highest standards was really a positive signal for us at the beginning of our privatization process."

The IPO was a success, and in 2007 one of the country's private infrastructure leaders, Lopez Group of Companies, took a controlling interest in EDC and began steering it in impressive new directions. When the global credit crunch threatened to halt momentum in late 2008, IFC again stepped in, providing an \$82 million-equivalent local currency loan.

"No one else was lending to us at the time," Tantoco says. "That one took us over the tipping point, opening up our access to local bond markets and major banks that wouldn't have shown interest in us before."

Today EDC is a profitable, progressive company. It has revived its existing Philippine geothermal sites, begun new ones, and launched international operations, focusing on promising markets such as Indonesia, Chile, and Colombia. Within three years it expects to surpass Chevron as the world leader in its industry, using a low-carbon business model to help meet global energy demand.

EDC: An emerging global leader in geothermal, privatized with IFC support in 2006.



Advanced cooling towers are just part of the impressive technology at the Philippine geothermal plants owned by EDC, a key player in this important form of renewable energy.

THE NEXT STEP

Reducing Risk

Turkey, too, has great potential in geothermal power. With help overcoming the obstacles, it could become a model for others.

Working with funds from the Global Environment Facility (GEF) and Turkish client Zorlu Energy Group, IFC is developing a new market-based risk mitigation instrument to help stimulate the sector.

Turkey, a net oil and gas importer, has recently attracted considerable private investment in hydro and wind. But not yet in geothermal, where it has enough reserves to power 1.2 million homes. Analysts see potential in Turkey for 2,000 commercially viable megawatts of geothermal, an efficient source with minimal environmental impact. Yet only 82 megawatts are in operation. Risk perceptions have slowed the pace of development.

Up to half a geothermal plant's costs can come in drilling



High Potential: Local sponsor Germacik's 47.4 megawatt facility is the largest geothermal plant to date in Turkey.

and exploration, with much uncertainty about new wells' ability to produce sufficient energy. In most countries, investors must bear these upfront costs. This inability to share the exploration risk puts geothermal at a disadvantage vis-à-vis other technologies. The discrepancy between potential and reality is particularly striking in Turkey.

IFC is using \$10 million in donor partner funds from the GEF's Geofund initiative to help clear the way. The funding allows us to provide advisory services for the creation of a new drilling risk-mitigation product and related financial incentives to demonstrate its application. Due to be launched in 2011, this package would help sponsors recover a percentage of their costs if they do not find geothermal resources.

Since insurers have little knowledge and experience in the area, their initial premiums are expected to be high. GEF funds would thus help reduce the costs of the first policies, then be scaled back as projects get off the ground, success rates are established, premiums decline, and market forces take over.

Zorlu Energy, which has already drilled its first wells and has plans for many more, is closely involved in the process. The insurance industry also appears receptive.

By reducing project developers' risks, this new tool could spur geothermal investment—not only in Turkey, but later in other countries as well.



Like so many other emerging countries, fast-growing Turkey needs to simultaneously increase its power supply and reduce emissions. IFC is helping it unlock the commercial potential of its substantial geothermal energy reserves.

HIGHER EDUCATION

The Role of Renewables

Renewable energy has a wide reach—even touching other top development priorities like education in Africa.

In Ghana, IFC is financing the \$6 million expansion of a highly regarded institution of higher learning, Ashesi University College. Installing an innovative biogas treatment plant is a key part of the project.

The \$58,000 plant will turn food waste and raw sewage into clean methane gas to fire the school's kitchen stoves and pathogen-free water for use in landscaping the grounds. It avoids the usual local practice of dumping untreated waste into the sea that comes back to affect freshwater quality, leaving the government with expensive cleanup bills.

"We are trying to bring about the transformation of African society through the kind of education we provide," says Ashesi President Patrick Awuah, recently



Patrick Awuah: President of Ashesi University College.

named one of the country's 10 Most Respected CEOs by PricewaterhouseCoopers and a leading local newspaper, *The Business and Financial Times*. "The use of renewable energy is consistent with that vision. It is cost-effective, and shows we are committed to protecting the environment."

Ashesi offers a curriculum that Awuah could not find as a youth in his country's rote-based system and had to travel to Swarthmore College in the U.S. to receive: one based on critical thinking, problem-solving, and a sense of social responsibility. Those skills helped him land a job at Microsoft, where he met perhaps the most influential man of his era, Bill Gates, and began planning a new undergraduate school to groom Africa's next generation of leaders. He opened Ashesi (the word for "beginning" in a Ghanaian language) in 2002.

A new campus under construction outside Accra will boost enrollment from 500 to 1,000 over the next 10 years. With local banks unwilling to back the necessary long-term capital expenditures, IFC's \$2.5 million loan fills a void, enabling Ashesi to raise the rest from private donors.

Tuition ranges from just \$10 to as high as \$5,000 a year, depending on the student's ability to pay, and opens doors with Africa's leading employers. All alumni to date are fully employed.



Ashesi University College student Kobla Nyomi spent the summer of 2010 working as a software engineer for Google in Switzerland. He is a computer science major at the Ghanaian school, whose IFC-financed expansion includes installation of a new biogas plant to recycle waste into water and cooking gas.

SOLAR COMPONENTS

Lowering the Costs

Many factors must combine to make solar power a large-scale, mainstream global industry.

But one is most important, and applies to other forms of renewable energy as well: *bringing costs down*.

When seeking to finance conventional power generation projects, sponsors must factor in not only plant construction and maintenance, but also their ongoing purchases of oil, coal, natural gas, or other thermal sources over a period of several years. Not so with solar, wind, geothermal, and hydro.

There, the source is free, and a project's upfront capital expenditures are all-important. The lower these costs become, the more profitable projects will be—in turn attracting more private capital, allowing the industry to scale up and do more to fight climate change.

This is why IFC invests not only in renewable energy



Spain: The Valdeballeros solar plant is one of Europe's largest, using technology from China's Suntech. power generation projects, but manufacturing ones

as well—investing more than \$150 million a year at all levels of the supply chain to reduce equipment costs, building the industry's efficiency. We focus on both existing and emerging technologies, and raw materials as well as components with wide applications. In 2007, a \$22.5 million IFC loan helped Moser Baer become one of India's top solar panel makers. Three years later we provided \$75 million in financing to expand SunPower's Philippine solar cell and module plants.

At the low point of the global financial downturn in 2009, when private capital was especially hard to come by, IFC also invested \$50 million in China's Suntech, one of the world's largest producers of solar cells and modules. The financing strengthened the R&D-driven firm's base at a critical time. It helped it continue to develop increasingly efficient new technologies and supply projects in more than 80 countries—large-scale utilities in Europe, homeowners in China, rural schools in Lebanon, remote villages in Indonesia, and others.

IFC's support helps attract long-term private capital for such projects, many of which must use Suntech products for 25 years and need an international stamp of approval on their bankability.

"We like to think beyond buildings," says Suntech CEO Zhengrong Shi. "It's about having a tangible, positive impact on the future of our planet."



Strengthened by IFC financing, China's Suntech is one of the world's most sophisticated manufacturers of solar industry components.

SILICON SUPPLY

Key to Cost Reduction

The solar supply chain reaches far and wide. Global solutions can be found in many places, including the emerging high-tech players of Russia's frontier regions.

In the Irkutsk peninsula, a continent away from Moscow in the Russian Far East, IFC's \$50 million equity investment is helping Nitol Solar start producing a key input that the industry often finds in short supply: highly conductive polysilicon.

Nitol's parent chemical company is one of Russia's leading producers of chlorine-based compounds. A former state-owned enterprise purchased by local entrepreneurs in 2003, it works from a location in Irkutsk that offers two key areas of competitive advantage for solar suppliers: proximity to a producer of the key raw material (metallurgical silicon), and ready access to inexpensive energy.



Silicon: The solar industry's key raw material.

Feeling its remote Siberian site may be one of the world's lowest-cost locations for polysilicon production, Nitol Solar has received IFC's financing and corporate governance advice to enter the global market, signing purchase agreements with several international buyers. Although still in the early stages, it has achieved good initial results in lowering polysilicon production costs through its technology innovations and quality improvements.

We have also lent \$10 million to Monocrystal, one of the largest local employers in Stavropol, where incomes are 40 percent below the national average. Owned by the 3,800-employee electronics firm Energomera, it produces another key component in the solar supply chain: pastes used in silicon-based cells.

IFC's five-year loan will support Monocrystal's investment and modernization program. The company is Russia's largest exporter of synthetic sapphire products and photovoltaic metallization pastes. The investment will help increase Russia's domestic and global supply of advanced materials used in solar power generation and a wide variety of other energy-efficient high-tech applications, including the production of high-efficiency LED lighting.



With IFC's support, Russia's Nitol Solar is pioneering new ways to meet the solar industry's supply chain needs.



New Frontiers

Bringing Financial Institutions into the Renewables Market



BANKS

Sharing Risks for a Cleaner Tomorrow

Many emerging economies show great demand for reliable, affordable clean energy sources. Local lending institutions are beginning to answer that call.



Sri Lanka: With IFC's support, a local bank has just financed the country's first commercial wind power plant.

Until recently, sponsors developing renewable energy projects in emerging markets have had difficulty attracting commercial bank financing due to a combination of technology risk, country risk, and other factors. Banks have lent to small hydro projects selectively, but projects in less familiar technologies such as wind, solar, and biomass have had a harder time finding financing.

This is starting to change.

In South Asia, IFC offers a risk-sharing facility to help partner banks manage risks on a portfolio basis across a number of renewable energy projects. The product enables banks to expand access to energy, funding more projects tapping sources such as wind, biomass, and run-of-river hydro.

Under this model, IFC agrees with local banks on eligibility criteria for loans in each energy source and bears half the losses in the event that any loan in these portfolios

goes bad. This makes the banks more comfortable assuming the risk of financing renewable energy projects, gradually building their exposure in the sector.

Commercial Bank of Ceylon was the first to participate, receiving a \$30 million IFC facility in 2009. NDB Bank followed, taking a \$25 million facility in 2010 with additional Global Environment Facility (GEF) support.

As a result, Sri Lanka's first grid-connected wind project featuring megawatt-class turbines was commissioned earlier this year. Partly funded by Commercial Bank of Ceylon, Senok Wind Power's 10 MW project in Kalpitiya is also the country's first commercial wind project.

IFC also helps enhance participating banks' ability to appraise renewable projects. An advisory component supported by our donor partners Ireland, Japan, and the GEF and co-founded by our clients on a 50/50 cost-sharing basis helps banks build needed skills in this area. IFC hosted the first such training session for banks in Colombo in May 2010.

To provide wholesale financing for clean power projects through financial institutions in India as well, IFC has recently made a \$75 million-equivalent loan to Infrastructure Development Finance Company. It will help support projects in renewable energy, energy efficiency, and cleaner production.

INVESTMENT FUNDS

Opportunities in Renewable Energy

Like many other villages in Honduras, the community of La Esperanza used to lack electricity. But the arrival of a new hydroelectric facility has brought it new energy—in more ways than one.

Today this rural area near the Salvadoran border houses one of the first privately owned small hydroelectric plants in Honduras. A \$16 million, 13.5 megawatt run-of-river facility, it provides power to 40,000 people in La Esperanza and the surrounding area while also feeding the national grid. Its owner, local company CISA, has transformed the area, bringing not just electricity, but more than 75 jobs and more than 40,000 newly planted trees.

CISA built the La Esperanza project in three stages between 2003 and 2008 with ongoing support from E+Co., an IFC-backed, US-based fund manager that specializes in clean energy in developing countries. E+Co.'s \$1.25 million helped CISA attract considerably more from other investors, turning a long-closed hydro facility into a high-impact, successful business. It was just one of 34 renewables projects that IFC supported through an \$18.7 million grant to E+Co from the GEF.

We invest in a wide range of clean energy and cleantech-themed private equity funds, many of them planning to make substantial renewable energy investments. Already IFC has committed more than \$150 million to funds now under active management. Such funds typically invest in smaller projects than IFC can support directly, while also offering coinvestment opportunities for larger deals.



Honduras: Students prepare for class at a school receiving electricity from the La Esperanza mini-hydro facility.

Examples include:

- **Africa:** The Evolution One Fund
- **Asia:** The Aloe II Asia Environment Fund for China and India; the South Asia Clean Energy Fund; the Clean Resources Asia Growth Fund; and the China Environment III Fund
- **Europe and Central Asia:** The Green for Growth Fund in Southern Europe
- **Latin America:** The Latin America Clean Tech Fund II.

Other funds are also under active consideration across all of the emerging markets in which IFC operates.

CREDITS

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Our vision is

That people should have the opportunity to escape poverty and improve their lives.

Our core corporate values are

- Excellence
- Commitment
- Integrity
- Teamwork

Our purpose is

To create opportunity for people to escape poverty and improve their lives by:

- Promoting open and competitive markets in developing countries
- Supporting companies and other private sector partners where there is a gap
- Helping to generate productive jobs and deliver essential services to the underserved
- Catalyzing and mobilizing other sources of finance for private enterprise development

In order to achieve its purpose, IFC offers development impact solutions through: firm-level interventions (direct investments, advisory services, and the Asset Management Company); standard-setting; and business enabling environment work.

Creating Opportunity Where It's Needed Most

