

The Way Forward in Renewables

With decision makers worldwide discussing various energy scenarios and the catchword “energy mix” currently on everyone’s lips, Siemens already has solutions for using renewable energy sources to generate the extra electricity that is expected to be required in the future. Leading the push is René Umlauf, a dynamic Siemens manager who in January 2008 moved to head the group’s new Renewable Energy Division.

By Haig Simonian

Although based in Germany, the responsibilities of the Siemens Renewable Energy Division’s Chief Executive, René Umlauf, span the globe as Siemens has expanded through internal growth and acquisitions to become the technological leader in renewables. The group’s products now cover not just traditional sources, such as hydro, but, increasingly, the renewable sources of the future, such as wind and solar power.

“Today, about 3 percent of the world’s energy is generated by renewables, not counting the roughly 15 percent produced hydroelectrically. But to meet the challenges of climate change and rising demand, renewables are going to have to climb to 17 percent by 2030,” says Umlauf during a stroll through the Botanical Garden in Erlangen, Germany.

Siemens has gained an early lead. “The group has focused on wind and solar as the fastest-growing areas and those with the greatest potential for the next 20 years,” says Umlauf. “Siemens is already the foremost maker of equipment for offshore wind-based electricity generation and is a

major player for land-based wind systems.”

The group has also forged ahead in solar power technology, focusing on so-called concentrated solar power – where the sun’s rays are used to provide heat to drive turbines – and in photovoltaic technology, where sunlight is converted directly into electricity.

“We are the number one in offshore wind power, with robust and reliable technologies reflecting more than 25 years’ experience. We now manufacture virtually everything required for an offshore wind farm,” says Umlauf. “And in solar power, recent acquisitions mean we can provide about 70 percent of a contract value ourselves. Customers can really rely on us. We’re not delivering bits and pieces, we can do the whole plant.”

That capability has been based on in-house developments, most evident in offshore wind power, and acquisitions. For example, with the acquisition of the solar specialist Solel in October 2009, Siemens is in a position to offer highly efficient solar receiver and system solutions, such as solar

Photo: Christian Höhn



René Umlauf, Chief Executive of Siemens Renewable Energy Division



Green is as green does: Haig Simonian of the *Financial Times* (l.) and author of this article talks to René Umlauf about renewables in Erlangen's Botanical Garden.

fields or power blocks, as well as complete plant solutions for parabolic-trough power plants.

Together with Siemens' own renewable technologies, and in cooperation with other group operations of the Siemens Energy Sector, such as Power Transmission and Power Distribution, Siemens can offer optimized solutions allowing ideal connectivity to a grid, adds Umlauf.

But in spite of his obvious enthusiasm for renewables, the fast-talking Umlauf is a realist. "I'm not sure there are going to be any revolutionary breakthroughs: The way forward in renewables will be through step-by-

step improvements to raise efficiencies, lower costs and improve reliability," he says.

How realistic and cost-effective are such technologies really? Will they ever be competitive economically with fossil fuels or nuclear power?

UMLAUFT: Renewables will very much play a role it in the future, but the extent depends decisively on "what" and "where." Take New Zealand. By 2020, the country expects to generate 90 percent of its electricity by hydro, wind or geothermal sources and at costs comparable to fossil fuels. Last

year, we built the West Wind wind farm for our customer Meridian. For the first time, the farm will reach wholesale parity – without subsidies. Of course, New Zealand benefits from favorable wind conditions and suffers relatively high costs for conventional fuels. But Mexico and Brazil also have the potential to develop competitively priced renewables. Even on a broader geographical scale, I believe renewables will become competitive with traditional sources in the mid term.

How will that be possible?

UMLAUFT: Costs are falling steadily. The costs for 1 MW of wind power onshore has dropped from 3 million euros to 1 million euros during the last 20 years. California studies show concentrated solar power should be cost competitive within the next six to seven years.

Obviously, the precise figures depend on your choice of scenario: That means not just the likely cost reductions for renewables, through improved technology and manufacturing economies of scale, but also future price estimates for fossil fuels and carbon trading permits. Many countries already have ambitious targets for renewables: Finland is looking to generate up to 35 percent of its power through renewable sources by 2020; the European Union has a 20 percent target.

Where have the biggest technological improvements come so far?

UMLAUFT: Let's start with offshore wind power. Ever larger turbines have allowed output levels in increase from 50 to 100 kW 20 to 30 years ago to

5 MW today. Blades have become bigger, and their aerodynamics have been improved, producing further gains, because that means turbines can produce more power, even when it's less windy. Meanwhile, the costs of manufacturing equipment have fallen as output has increased. Now turn to solar. Here too, experience has meant outputs in concentrated solar power have climbed from 50 to 150 MW to potentially 250 MW – and that's the size of a small, conventional power station! And, as with wind, manufacturing costs have fallen through mass production.

Where do you see the biggest potential technology improvements going forward?

UMLAUFT: In wind, the elimination of the gearbox through direct-drive technology is proving crucial. It hasn't just reduced energy losses through friction, it has also led to much greater reliability – and therefore lower operating costs – because there are fewer moving parts. The gearless turbine is really a game changer. In concentrated solar power, it's a bit more complicated. Until now, the main liquid used to transmit focused heat has been thermal oil, which can reach about 400 °C. Increasingly, it's possible to use molten salt as heat transfer medium in the receiver tube. This allows higher temperatures – 500 °C and beyond – and makes storage easier. The molten salt can be stored in huge 25,000-ton tanks and its latent heat be used to generate power, when the sun isn't even shining.

Photo: Christian Höhn

René Umlauf

René Umlauf, aged 45, was born and brought up in Berlin, Germany. A mechanical engineer by training, he studied at the Technical University of Dresden, one of Germany's top engineering schools. He has spent his entire career with Siemens, starting in gas turbine construction and development at the Kraftwerk Union (KWU) generating business – a venture since 2000 incorporated into Siemens' Power Generation group. "I was originally a fossil fuel guy," Umlauf says.

In January 2008 came a decisive promotion to head the group's newly created Renewable Energy Division. Although based in Germany, his responsibilities now range from wind power manufacturing plants in Denmark and the USA to solar power activities in Israel and Spain. To demonstrate he practices what he preaches, René Umlauf drives a hybrid. "What else do you expect?" he asks.

What distinguishes Siemens from its rivals in renewables?

UMLAUFT: No one can offer as much in-house expertise in wind – both on- and offshore – and in solar technologies – both large-scale photovoltaic and concentrated solar power. Plus, our know-how in transmission and distribution means we can optimize an installation for the grid in a way that can't be done by our rivals. And more: Siemens has decades of experience building and advising on thermal power plants.

We can also offer crucial advice: Take "micrositing" – meaning the optimal location and relation between turbines on a wind farm to maximize efficiency. Such knowledge only comes through long experience that nobody can rival.

Finally, there's monitoring and maintenance. Siemens has installed more than 8,000 wind turbines around the world. We can monitor their performance remotely around the clock, allowing predictive maintenance. By analyzing trends, we can often tell in advance when something may be required – well before it's too late. Obviously, such a reliable package is hugely attractive to customers.

Haig Simonian is Switzerland and Austria correspondent of the *Financial Times*.

Further Information

www.siemens.com/energy/renewables

Siemens Renewables Highlights

1980s	2003	2004	2007	2008	2009	July 2009	September 2009	September 2009	October 2009	October 2009	November 2009
Founding of Bonus Energy, production of 1 st 100-kV turbines that pioneered wind energy	First offshore wind farm, 165.6 MW capacity, in Nysted	Acquisition of Bonus Energy by Siemens – entry into wind business	3.6 MW of wind capacity brought to market	Project CSP plant Lebrija, Spain, brought online with receivers and Siemens steam turbines	Prototype made of gearless wind turbine	Siemens becomes member of the Desertec Industrial Initiative	First floating wind plant, Hywind, put into pilot testing	Dedication of the world's largest offshore wind park, Horns Reef II in Denmark	Acquisition of Solel by Siemens	Siemens becomes a founding partner of DII GmbH	New CSP receiver UVAC 2010 goes commercial