

Siemens' Man in the Grid

Ralf Christian is leading Siemens' push toward new products and technologies to meet the challenges of flexible electricity distribution systems integrating renewable power sources such as wind and solar energy. The development of smart grids is a major part of that job.

By Haig Simonian

A lot is currently being said about smart grids, but not everyone seems to have the same definition. What do you understand by the term?

CHRISTIAN: Let's look at where we're coming from. Today's grids were built 40 to 50 years ago with no communications and little automation. They were made for peak loads – a bit like highways built to cope with morning or afternoon rush hour. But in many cases, they don't use all their capacity, or only do for part of the time. "Smart grids" is an expression for different ways of using a grid more effectively – especially in view of future demands. For generators, this means that in a context of rising electricity demand, existing infrastructure is used more efficiently to avoid unnecessary new capacity investment. It's like keeping your existing two- or three-lane highway, but managing the traffic better. For consumers, smart grids represent much greater freedom – principally the ability to consume electricity more cost-effectively at home by choosing between tariffs via a small box – call it a "pricing manager."

That's fine. But where does renewable energy fit in?

CHRISTIAN: Traditionally, power stations were built relatively close to consumption centers, and could be run up or down, depending on demand. Now, we're concerned about climate change and the need to cut fossil fuel consumption for reducing green-

house gases. That means using renewables, such as wind and solar power. But unlike traditional power stations, the electricity generated by renewables fluctuates for obvious reasons, such as clouds or time of day. As we currently don't have very effective ways of storing electricity, the only way to fully exploit renewables is through smart grids. If you want to become a greener society and reduce your CO₂ footprint, you need to consume electricity when it's available from green sources. This means steering demand. Otherwise, you could find yourself having to shut off wind parks, which are among the cleanest sources of electricity, because there's not enough demand when they're at peak output.

But that surely means storing electricity. Haven't you just said that's hard to do?

CHRISTIAN: In the past, we said generation followed demand: In future, we'll need a system where generators can steer the load. If you want to exploit renewables, you need smart consumption. Failing large-scale storage systems, we need to consider alternatives. Take heating. Rather than maintaining a constant temperature, the occupants of an office building could consider a range, where heating would be turned on in periods when green power was most readily available, and temperatures allowed to fluctuate somewhat thereafter. Water heating is another case. Electricity could be a

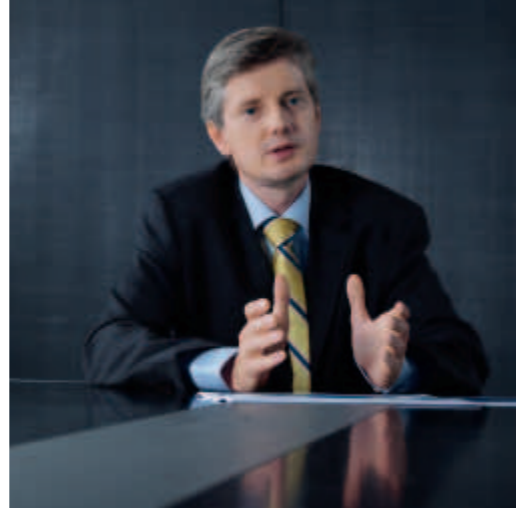
major energy source here. But rather than heating during peak consumption periods, water could be heated when green electricity was most readily available, and then stored in well-insulated tanks.

Finally, although the technology is still a little way off, there's the electric car. Just imagine battery storage requirements and the possibility to recharge at times when significant amounts of renewably generated power make electricity tariffs particularly favorable.

Ralf Christian

Ralf Christian, 45, is Chief Executive of the Power Distribution Division of Siemens Energy and President of the newly formed T&D Europe Association. With a background in economics, business administration and computers, he started his career at Siemens. He rejoined in 2004 as head of the high-voltage division in the transmission and distribution group, moving to his present position in January 2008. Although not a scientist or an engineer, he notes: "My job is not to design a high-voltage circuit breaker. The priority is to bring a lot of experience from different industries. Don't forget, contacts between supplier and customer happen at many levels. We have the right team."

Photo: Kurt Paulus



Haig Simonian of the *Financial Times* (l.) interviewing Ralf Christian about smart grids for *Living Energy*.

That all sounds fine, but doesn't smart metering also have to be a part of the picture?

CHRISTIAN: Smart metering will be essential for steering demand. Currently, householders have a flat rate, regardless of when they consume their electricity. If you want to adapt to the availability of renewables, you need to influence consumers to use power when it's most readily available. That can only come about using flexible tariffs, and those in turn require installing some form of communicating, intelligent metering.

What is Siemens' role in all this?

CHRISTIAN: Smart grids involve the entire electricity production and distribution chain. Siemens is the only company that can offer everything from smart generation, through all the grid elements for transport and distribution, to a full array of products at home. From end to end, everything that's required, Siemens is alone in having such a complete portfolio.

Hasn't moving to smart grids been complicated by deregulation, privatization and all the other big changes of recent years?

CHRISTIAN: In the past, vertically integrated power utilities might have made adopting new technology, such as smart grids, easier because there was only one partner to talk to. On the other hand, one could also ask how keen monopolies were to innovate. Today, you have so many different actors, there's much more competition,

and that boosts innovation. Think of mobile phones and the huge variety of offers available from different providers. Competition has stimulated new ideas and accelerated change. Siemens is in a position to talk to all the parties involved.

What's the role of governments in all this?

CHRISTIAN: You've got to distinguish between before the financial crisis, and after. Since the crisis, many governments – notably the US – have launched huge infrastructure investment programs. The USA alone plan to spend more than 600 billion euro. Not all of that is going into power, but electricity is an important part. Within electricity, about 40 billion euro in the USA are earmarked for transmission and distribution. There's real money on the table now.

But even before the financial crisis, governments were growing increasingly active as people grew more concerned about climate change. Historically, the priority was security of supply. With liberalization, the focus shifted to lower prices and raising competition. Afterwards came environment and climate change concerns. For large-scale use of renewables, you have to have a completely new way of managing the grid. I'd say that in the past three to four years, politicians have started to understand that it's not just about generation sources, but also having the right grid. So political awareness about the need for grid investment has surged.

Are any countries or regions particularly ahead?

CHRISTIAN: The financial crisis has changed everything. Some countries,

notably the USA, are now putting real money on the table. Previously, it was harder to generalize, as there were so many different elements involved. But one could say countries with particularly antiquated grid or metering systems were those moving fastest ahead, as were those with particularly active renewable energy programs because of their natural resources.

Italy is a good example of the first category. It has become a front-runner in installing what I'd call "somewhat" smart meters. Past outages and a new regulatory structure, which imposes penalties for blackouts, stimulated investment. Don't forget that smart meters are the best way for a generator or distributor to detect problems at the local level. Before, the first hint of trouble only came when customers started calling to complain. For years, "intelligence" in the grid was only at the transmission level.

Scandinavia is a prime example of the second group. Denmark, in particular, has exploited its natural advantages and invested heavily in wind power – which, of course, means installing smart grids. Northern Germany is also moving ahead, and the UK is quickly catching up with plans for offshore wind parks.

So what does this all mean for my electricity bill?

CHRISTIAN: That depends largely on whether you can benefit from "time of use" tariffs. Already, pilot projects meeting the right conditions have revealed savings of about 30 percent through changed behavior alone. Households end up consuming less power, but above all, consume it at the most cost-effective times.

So are smart grids going to save the world?

CHRISTIAN: It's not so much a question of how much electricity we save, but how much "dirty" electricity. We now have the technology to become increasingly independent of fossil fuels. This will require two things: an infrastruc-

ture allowing large-scale exchanges of electricity, notably that produced by big wind or solar energy parks, and the integration of tens of thousands of small-scale renewable energy sources. The former will be the backbone of the system, the latter will be what I call "pro-sumers," producing and consuming power. Smart grids will make it possible to use an increasing number of renewable energy sources in the generating grid of the future.

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

Further Information

www.siemens.com/energy/smartgrid

Glossary

■ **Smart Grid:** A smart grid is an integrated transmission system for the delivery of electricity from producers to consumers. The system is smart in that it uses digital technologies to optimize efficiency, save energy and costs and to provide increased reliability and transparency. Smart grids are being promoted in many areas to address energy, environmental and reliability issues for electric power.

For further glossary terms see: www.siemens.com/glossary

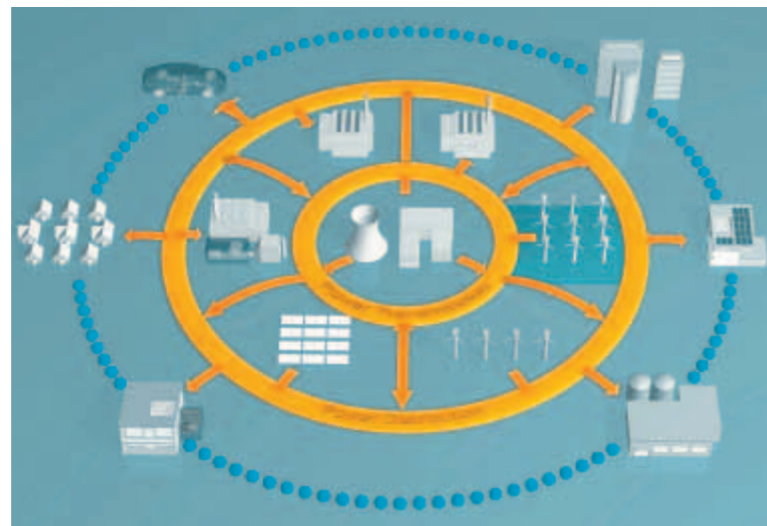
Pioneers' Dialogue

The development of a sustainable and environmentally friendly energy future is not just about creating "green" methods of energy production. Just as important is the delivery of energy from the points of production to the points of consumption. Modernization and innovation in the energy grid system represents a massive and unavoidable investment of technological and financial resources at public and private levels in order to keep up with increased energy demand and different means of production. For this reason, Siemens invited leading stakeholders from the fields of business, politics and science to a Pioneers' Dialogue workshop in Germany on May 13 and 14 in the Bavarian village of Feldafing to discuss the topic "Innovative Power Grids for Europe."

The event in Germany was the first of a series of Pioneers' Dialogue workshops that Siemens will host worldwide on a regular basis. It was a unique forum of high-ranking key decision makers from leading European utilities, the European Commission, selected nongovernmental organizations, environmental organizations, CEOs of Siemens client companies, and leading experts from Siemens AG. The goals of the forum were to develop common perspectives on innovative grids, to identify opportunities for new solutions and relevant decision criteria for innovative grids, and to set up joint initiatives to drive innovative grids forward.

By promoting and actively participating in these workshops, Siemens positioned itself as a pioneer in the area of innovative grids. Pioneers' Dialogues are aimed not only at building important relationships, but also determining the expectations and requirements of key customers and stakeholders, making Siemens an important player in future discussions and developments.

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An integrated transmission system leads to smart consumption.

Photos: Kurt Paulus, Graphic: Siemens