

Rolling towards the Electrical Energy Age: Electromobile in a Smart Grid

The pairing of green electricity with smart grids is gaining global importance. But while some companies are still scrambling to put all the pieces together, Siemens has already appointed top executives to head teams focused on electromobility and applying smart grid technology within the company's new Infrastructure & Cities Sector. Jan Mrosik and Sami Atiya will be in charge of the Smart Grid and the Mobility & Logistics Divisions, respectively.

By Haig Simonian

Jan Mrosik, 46, will head the Smart Grid Division in Infrastructure & Cities, the new, fourth sector Siemens is establishing from October. A trained electrical engineer with an additional degree in business administration, he has worked for Siemens for the past 15 years in telecommunications and energy. Before taking up his latest job, he was responsible for energy automation and for smart grid applications in Europe, the Middle East, and Africa in the Siemens Energy Sector.



Sami Atiya, 47, will head the Mobility & Logistics Division of the new Infrastructure & Cities Sector. A trained electrical engineer, he also has an MBA from MIT. He joined Siemens in 1997, rising to become head of computed tomography in the group's Healthcare Sector. His new responsibilities will combine business units related to intermodal traffic, transport, and logistics management, including rail automation, infrastructure logistics, intelligent traffic systems and transport solutions, as well as the group's fast-growing electric cars infrastructure activities.

Photos: Christian Kain

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Jan Mrosik, CEO Smart Grid Division,
Siemens Infrastructure & Cities Sector

Just how do smart grid applications and electromobility fit into the bigger picture?

MROSİK: The world's entire energy sector is undergoing massive change. Previously, you had power plants located relatively close to consumers, and electricity transport and distribution networks leading to end users. The principle was: Generation follows demand, and this was the only way to create the perfect balance between supply and demand, which is essential at all times to avoid outages. Now things have changed – and will change even more, if plans to move away from nuclear power accelerate. There will still be big power stations, but there will also be a large number of diversified generating sources, including wind farms and solar plants. That means electricity will be generated decentrally. Also, supply will be much more determined by natural

forces, like the wind and the sun. Power will have to be transmitted over much longer distances – say, from a wind farm in northern Germany to Bavaria. And there will be large fluctuations in renewable generation – in other words, periods when we'll have either too much or potentially too little power. So, to go back to the old principle: Generation will no longer follow demand. Instead, it will be necessary to steer demand to suit generation. We'll have to “measure” and “manage” much more. “Measuring” will take the form of intelligent metering with inbuilt communications, both at homes and at multiple points in the distribution grid. And “managing” means making consumption more flexible to suit swings in supply.

Are the opportunities the same all around the world?

MROSİK: There are three big regions, all of which, for different reasons, will need ever more “smart” technology. In the USA, currently the lead market, the imperative is to update relatively old generation and grid installations and improve quality and reliability. In Europe, we've got extremely well-developed grids, with considerable in-built redundancy. But the challenge is to integrate renewables, with their fluctuating outputs. And in China, the main issues will be electromobility and the need to incorporate what I call “microgrids” – smaller installations serving isolated or independent users who, for whatever reasons, won't have access to the main grid. Together, all these challenges show just how flexible “smart grid” concepts will have to be, as each region will have its own peculiarities and special challenges.

That's all very well on paper. But are smart grids really taking shape on the ground?

MROSİK: They certainly are. Take Austria. A utility in Upper Austria is implementing a project to transform consumers' electricity usage, based on Siemens' Automated Measuring

and Information System (AMIS). Some 28,000 smart meters have been installed, 9,000 of them switchable, in a scheme that will eventually involve 100,000 smart meters. (See report on page 42.)

The meters will not only provide real-time data about consumption, but also play a central part in load management. Take heating and warm water generation, which account for about 85 percent of household energy use. Much of this is already electrical, allowing consumers to vary their usage based on differing tariffs. Increasing installation of heat pumps in buildings will allow even greater flexibility. For utilities, the ability to vary tariffs to meet consumption in a smart grid will make it much easier to integrate renewables.

What is the role of electromobility in all this?

ATIYA: Let's take a step back. At the moment, we don't see many electric vehicles on the road. But that will change. In Germany alone, the forecast is for one million electric cars by 2020. That's not some wild guess; it comes from the National Platform for Electromobility, led by Chancellor Angela Merkel. Worldwide, the estimate is for one million such vehicles to be sold in 2015. China will be at the forefront of this development.

How do these factors relate to your new job?

ATIYA: All those cars offer an enormous opportunity for a group like Siemens to supply electrical infrastructure equipment. Leave aside all the electric motors made by our colleagues from Siemens' Industry Sector. For the new Infrastructure & Cities Sector, there are big opportunities, too.

We're talking about potential links between different transport systems, whether air, road, or other forms of transport. Then there's the broader challenge of managing mobility. In the ever growing megacities of our world, we've got extremely serious issues to face: not just spiraling traffic

and congestion, but rising pollution, especially CO₂, and of course noise. We have to find innovative ways of improving the quality of life in our cities and reducing the traffic burden. Electromobility is just one part of this bigger picture. Siemens is already producing and installing “intelligent” charging poles for electric vehicles and the software that goes with them. Here alone, the technology is moving fast. Recharging times are falling rapidly, and there are solutions using both alternating and direct current. Some of us may recharge our electric cars overnight at home. Big customers may prefer to recharge at their centralized vehicle pools. And all of us might want to top up the power in our cars while in car parks or other semipublic areas. All this could be integrated into parking meter technology, so you'd end up paying one price for time spent and power consumed. There are lots of ideas floating around and lots of opportunities.

MROSİK: Don't forget the potential for using vehicle batteries as controllable load. Clearly, people will want to charge their batteries at the most convenient and economical times. Tariff structures could be constructed that would make it attractive to avoid peak times and switch to downtime. Say at night, when industrial energy demand is low and wind power surpluses can be transferred into the electrical vehicles.

Are modest car batteries really practicable for storing electricity?

ATIYA: Why not? The concepts of storage and renewables are increasingly converging. Indeed, storage may become one of the biggest issues as renewables gain ground. Depending on the circumstances, there are lots of options, from pumped storage power stations to storing energy via heat – although at present, these meet only a tiny fraction of our needs. So car batteries could become part of the solution, especially when it comes to absorbing excess power.

But will battery technology meet the challenge? Aren't we all afraid our electric cars will leave us stranded?

ATIYA: Tests have shown that concerns about range are exaggerated. Take the second cars in households, for instance: 80 percent of them never go beyond 50 kilometers a day, not even on weekends. That's nearly 10 million second cars in Germany alone that could be replaced by elec-

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Siemens Infrastructure & Cities Sector

tric vehicles instantly! Our own experiment at Siemens, involving up to 100 electric vehicles for employees, has so far revealed that 82 percent of journeys made on weekdays were completed with electric vehicles, and just 9 percent with conventional ones. At weekends, when it's widely supposed people want to travel longer distances, the proportion dropped to just 69 percent electric and 14 percent conventional.

And don't forget, battery technology will develop rapidly. Many different business models are already being evaluated for battery ownership. Furthermore, as with other technological breakthroughs, prices will fall as volumes rise; battery life should improve; improvements in charging technology have already cut the time for a full charge to less than one hour. Also, you can be sure that, apart from the schemes already announced, practically all carmakers have further electric vehicles in the pipeline.

Will motorists really buy in?

ATIYA: There are already a lot of ideas about how to offer incentives to people. Take the municipal administration of London, which is already working with Siemens on new transport ideas for the Olympic Games. Owners of electric vehicles will be exempt from the annual road fund tax, and they won't pay the daily congestion charge. Also, there will be attractive pricing schemes for charging. Sepa-

rately, in Italy, we're working with power supplier ENEL on a country-wide rollout of charging stations.

So what's the business potential for Siemens here?

MROSİK: In the years 2010–2014, we estimate we will generate revenues of €6 billion in the smart grid arena, including electromobility – and there's some upside.

Mr. Atiya and Mr. Mrosik, thank you very much for this interview.

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Further information
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