

Collaborating for an evolving smart-grid future

An interview with **Guido Bartels**,
Chairman, GridWise Alliance,
General Manager, Global Energy & Utilities Industry, IBM

Pilot projects and scale deployments around the globe are highlighting the vast potential of smart grids to succeed ageing electricity infrastructure and mobilise larger shares of renewables-based electricity. The recent inaugural [GridWise Global Forum](#), organised by the GridWise Alliance and the United States Department of Energy, in partnership with IEA and others, was held in Washington D.C (United States) on 21-23 September. It enabled leading representatives from governments, business, NGOs and academia to brainstorm on win-win approaches to the evolutionary smart-grid process. Guido Bartels, Chairman of the GridWise Alliance, shares with *OPEN Bulletin* readers his vision of the role of smart grids in tomorrow's energy systems and discusses the challenges to be faced.



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Chairman, GridWise Alliance,
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OPEN Bulletin. What, in a nutshell, makes an electricity grid smart? What are the components of a smart grid?

Guido Bartels. In short the smart grid is about overlaying the power grid with state-of-the-art information and communication technology. It is the coming together of the world of electrical engineering and ICT. It provides two-way communications and control from power plant down to meter. It allows all participants on the grid to have more choices and options. It enables not just communication, but expanding the use of renewable energy sources. It is a holistic system that creates a more reliable, more flexible, more efficient, more secure and cleaner electric grid. Finally, as a means to an end, it combines

¹ The IEA [OPEN Energy Technology Bulletin](#) is a free, web-based periodical newsletter published by the International Energy Agency (IEA). Views expressed in *OPEN Bulletin* articles or interviews do not necessarily reflect the views or policies of the IA Secretariat or of all its individual member countries.

sophisticated software and hardware to build intelligent energy systems that mesh harmoniously with other aspects of an increasingly smart world.

***OPEN Bulletin.* What specific benefits can smart grids offer to the energy sector and the public at large?**

Guido Bartels. The benefits of smart grid are numerous, but we first must put the term 'smart grid' into context. Power grids are large and complex systems. In fact, the grid covering Northeastern United States and Canada is by far the biggest and most complex machine ever built. By providing reliable and affordable electricity, these massive machines have been foundational for economic growth in the developed world and helped shape societies as we know them today.

In celebrating the beginning of the 21st century, the United States National Academy of Engineering took on the non-trivial task of identifying the single most important engineering achievement of the 20th century. The Academy compiled an estimable list of twenty accomplishments which have affected virtually everyone in the developed world. Unanimously, electrification was chosen as "the most significant engineering achievement of the 20th Century", ranking well ahead of other engineering masterpieces which we all have gotten so accustomed to, such as the Internet (13th) and highways (11th). But what was smart yesterday, will not necessarily be equally smart tomorrow. When we talk today about 'smart grid' we are basically referring to the challenge of how to transform a 20th-century, centralised, one-way and analog electric system into a distributed, bi-directional and digital system, ready for the vastly different demands of the 21st century.

Now, I said that the benefits of smart grid are numerous. In addition to integrating centralised and distributed renewable energy resources while maintaining or increasing overall reliability, smart grid can help reduce carbon emissions, provide consumers with more information, help to lower bills, foster improved operational efficiency, provide for greater interconnectivity and help balance the system. Further, as the production and use of electric vehicles expands, smart grid will help electrify the transport sector, with obvious significant environmental benefits. Simply put, smart modernisation of the entire electric value chain is critical for a sustainable energy future and energy security, as well as fundamental to economic growth and prosperity around the world.

***OPEN Bulletin.* Why should industry and governments invest heavily in smart grid research, development and demonstration?**

Guido Bartels. Collectively, all stakeholders in this critical transformation need to step up their game. Transforming the entire value chain - from generation of electricity all the way down to its consumption - is fundamental to economic growth and a sustainable energy future. But what is often forgotten is that smarter energy systems are also a critical underpinning to optimise some of our other crucial and complex systems like large cities, healthcare, water and transport systems. So, because of the far-reaching benefits, smart grid should be a top priority for industry, governments, academia and for society at large.

What should further increase our collective sense of urgency is that we are way beyond the time when we could fix our energy grids by simply upgrading or repairing them. We need a

massive step-change; we need to radically transform the electric system. Given this context of criticality and urgency for the smart grid transformation, all stakeholders must do more. Perhaps the single most important topic for all stakeholders to collaborate on is ensuring that there is a policy and regulatory environment which supports investment in the transformation of the electric grid.² One of the main reasons why we founded the GridWise Alliance back in 2003 was to facilitate such collaboration. And at the recent GridWise Global Forum in Washington, the GridWise Alliance and the national smart grid advocacy organisations from six other countries founded a new organisation, the Global Smart Grid Federation (GSGF). Through consensus-building within the international community, the GSGF aims to help accelerate smart grid advances on a global scale.

Already, we can point to lots of positive developments around the world. First, there is most definitely consensus-building between all parties on why smart grid is critical. Secondly, under the leadership of the United States National Institute of Standards and Technology (NIST), good progress is being made towards interoperability of smart grid devices and systems.

Also encouraging is that we see the first evidence of moves from the large number of pilots towards scale deployments. In part helped by the United States and other governments through their economic stimulus programmes, funding has become available for both fully-fledged projects and demonstrations, from which we will get much information and learning.

Meanwhile, eleven utilities from around the world who are collaborating to accelerate the modernisation of the electric system³ have developed the Smart Grid Maturity Model (SGMM), the industry's first comprehensive roadmap for smart grids. Already used by more than 70 utilities worldwide, this extensive framework was also recently endorsed by the United States Department of Energy and the GridWise Alliance. This group of utility companies have handed the SGMM over to the wider industry in an 'Open Source'-like model, so that every utility, and even an entire country, can use it to develop its own plans and roadmaps. The Software Engineering Institute of Carnegie Mellon University, which very successfully manages other maturity models, is now the ongoing steward of the SGMM. Similarly we can expect valuable policy perspectives to carry the effort forward in the upcoming *IEA Technology Roadmap: Smart Grids*.

OPEN Bulletin. What must be done to engage electricity consumers in efforts to promote smart grids?

Guido Bartels. With regard to consumers, we have a lot of work to do. In the United States, for example, a recent poll indicates that about 80% of Americans have not heard of smart grid; but about 75% of those who have heard of it believe that smart grid will give them the information they need to make better decisions about their electricity usage. Clearly, engaging electricity consumers, especially residential consumers, is a major

² "The energy regulatory system in the U.S. is a relic of 1860 or something... it has fundamentally no basis in the modern world." Jeffrey Immelt, Chairman and CEO, General Electric, in a fire-side chat with Pulitzer Prize-winning author and journalist Tom Friedman, GridWise Global Forum, September 23 2010, Washington D.C.

³ The Global Intelligent Utility Network Coalition: CenterPoint Energy, Oncor, PHI, Sempra, Progress Energy, ERDF, Alliander, DONG Energy, Country Energy, North Delhi Power, CPFL Energia.

component in developing smart grid. Consumer buy-in is essential and this requires that local utilities initiate and carry out effective information and education efforts with their customers. That is why the GridWise Alliance was a founding member of the Smart Grid Consumer Collaborative (SGCC), an independent non-profit group recently formed in the United States to foster mutual understanding between industry and consumers regarding the creation of a next-generation energy infrastructure.

In the discussion about smart grid the realisation is finally setting in that we must design a system that is optimised for the consumer. IBM Chairman, President and Chief Executive Officer Samuel J. Palmisano recently summed this up as follows: "And doing that isn't a matter of dashboards, or advertising, or advocacy. It means designing a system that is optimised for them. One that considers the many modes and motives of energy users - from productivity-conscious manufacturers, to strip-mall landlords, to low-income renters, to green-conscious citizens. One that gives them easy ways to control their energy usage, and that engages their hearts and minds to take a more active role in doing so." ⁴

OPEN Bulletin. **If smart grids are necessarily an evolving process, what can be done to ensure that regulations and standards keep pace?**

Guido Bartels. All the stakeholders in smart grids are aligned around the objective of making sure standards and regulations keep pace. The energy industry has a long history of supporting standards, due to the long life of equipment used in the production and delivery of energy. The NIST process is an example, with the several hundred people and organisations involved in the standards process in the United States.

Regulations generally follow technology. In the United States, the 50 states as well as the federal government, have a significant policy role in smart grid. But we need to get rules aligned at both legislative and regulatory levels. Once we get the rules right, utilities will be able to operate within those rules, sustain their businesses and deliver to consumers and society on the value of smart grid. The challenge is compounded by the fact that technology - from sensors to communications to renewables and customer energy efficiency systems - are changing more rapidly. But the industry is up to the challenge and is committed to securing value from smart grid investments.

OPEN Bulletin. **Why is it so important to place the smart grids focus on an international scale?**

Guido Bartels. Because of the global nature of some of the most pressing issues of our time, which modernisation and expansion of the electric systems can help address, namely driving economic growth, tackling energy poverty, combating climate change and ensuring energy security. I believe that through exchange of ideas and sharing of knowledge about smart grid development and deployment in our respective countries and industries we can help overcome barriers and make smart grids a global reality. This is why it is so encouraging that national smart grid organisations in seven countries (United States, India, Japan, South

⁴ Samuel J. Palmisano, Chairman, President and Chief Executive Officer of IBM, opening keynote address, GridWise Global Forum, September 21 2010, Washington D.C.

Korea, Australia, Ireland and Canada) recently announced the formation of the *Global Smart Grid Federation* to which I have already referred. Like the collaborative programmes of the International Energy Agency, this body will facilitate an unparalleled level of communication and collaboration within the international community to advance the smart grid around the globe, thus improving efficiency, stimulating economic growth, integrating renewables and reducing CO₂ emissions. Smart grids can make a real difference to people's lives everywhere. By working with our partners around the world we can make that happen faster.