



Small is best

Anders Lindgren, CEO, Optistring Technologies, is very enthusiastic about the new module-level inverters. He tells PES why...



Anders Lindgren

PES: Thanks for talking with us. Would you like to begin by explaining a little about the background of your organisation and how you currently serve the solar industry?

Anders Lindgren: Parts of the basic ideas of the technology we develop come from power electronics research at the Royal Institute of Technology in Stockholm. We were inspired by this, tweaked it and applied the concept to solar PV inverters. We now have a strong team both on the technology and business side. The products have evolved over 4 generations and we are releasing our first integrated electronics junction box to our first module customers.

PES: Is solar/PV a growing business area? How are you capitalising on this growth?

AL: Yes it is and the segment we operate in is growing even more than the market and inverter market in general. We are seeing a stronger demand and much more interest in our module-level solution. Customers want to get as much energy out of the PV modules as possible and have better monitoring capabilities. On top of that, the module-level safety features are becoming increasingly required by both customers and regulations. Compared to regular module-level solutions such as optimizers and micro inverters we give the customers even more energy out of the system which is well in line with how the market is evolving.

PES: Please tell us about Optistring's high end inverters for PV energy systems?

AL: They are based on a new and different way of doing the conversion; we only have

one conversion stage in the system. Everything is done at that stage: optimisation, safety shut-off and conversion from DC to AC. Keeping it to one power stage simplifies the hardware, increases the efficiency and reduces the cost. The breakthrough is in the control firmware. This is where the intelligence of the system comes in and that's where a lot of the innovation is hidden.

Reduction of hardware is key to making systems more efficient; our 4th generation of inverters has 99% European weighted efficiency, including all the module-level functionality. The central unit which connects the system to the power grid is 3.5kg; the complete system for 16 PV modules is roughly 5 kg.

PES: What are the advantages, both in technological terms and for the end user?

AL: The end user gets more functionality at lower losses in a system that optimises each of the PV modules. This system harvests 3-25% more energy than a conventional string. The actual levels depend on external conditions causing the mismatch. With 99% conversion efficiency only 1% of the optimised and harvested energy is lost on its way to the power grid. Our system only has half of the losses a string inverter does, even a good one. The end customer will also be able to monitor exactly how each of the PV modules produces. Normally a good feature for the very technical users, but with the software we are developing it will be good for everyone. We are adding module performance automated analysis to alert the system owner when module gets dirty or degraded. When it comes to safety the system automatically detects problems with the wiring and shuts down each of the modules. This prevents dangerous voltages and arcs, which can cause fire. It makes the system and house safe for both the family living there as well as for firemen or service personnel. The whole system is lighter and takes up less space and if I may say so myself, it is far better looking.

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PES: How complex is this technology when compared to more conventional inverter architectures?

AL: There are two sides to the complexity of our system. The hardware is simpler than our competitors to begin with. Further, the key metric when designing the electronics is simplicity; this reduces cost and increases reliability. It is easy to install as well, just connect the cables, and hook it up to grid and internet, that's it. The complexity is within the system. How the units on the PV modules are controlled and how they interact with each other. But the users don't have to worry about this, it is all hidden within the firmware developed by our engineers. The software also make sure everything works on both 50 and 60 Hz grids. It contains a lot of IP, which we don't divulge.

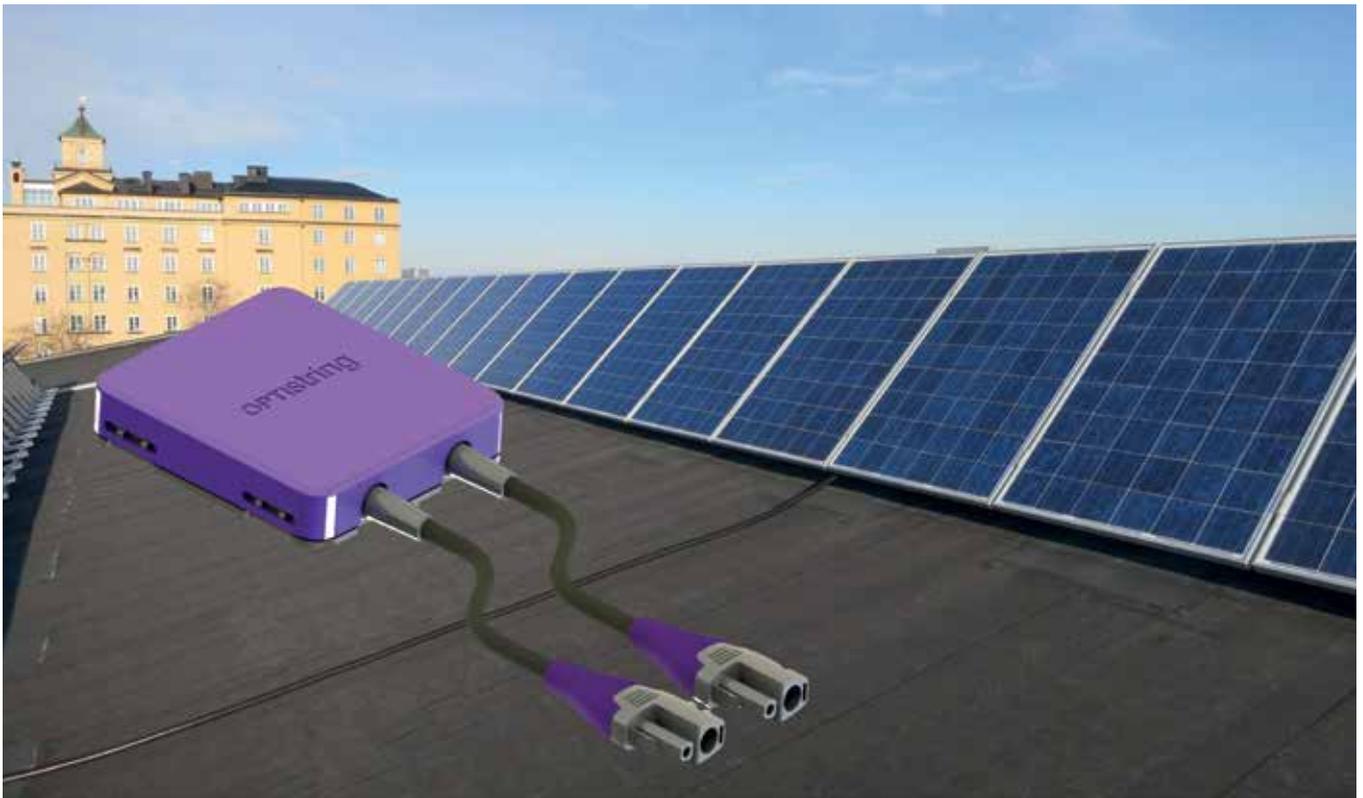
PES: What about features such as rapid shutdown and module-level monitoring? Can these be easily integrated?

AL: They are already in there; technically both of them come almost intrinsically with the topology. Talking about rapid shutdown I have to say the requirement of 10 seconds isn't rapid in our world. Our systems shut down in less than a millisecond in the event of wire failure, lost grid. A commanded shutdown takes a little longer, 0.1 s. Module - level monitoring is also in there, we are able to collect a lot of module parameters, for example voltage, current, the temperature etc. At full resolution these are all saved every second, but that is a little too much detail for most system owners.

PES: I imagine the most pressing question is cost. How does the cost of the Optistring system compare price wise against the other technologies available?

AL: I like this question, probably because I don't have to try to hide behind just the increased performance. When we founded Optistring, 5 years ago, we thought that it





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should be possible to increase performance and reduce cost with our technology. I know for sure that both are possible. For the complete system, including all module-level benefits, our costs are comparable to a string inverter. Compared to other module-level solutions: roughly half the cost compared to optimiser systems and 1/3 compared to micro inverters

PES: Geographically speaking, where are the key markets for Optistring and do you have any plans for expansion into other areas?

AL: Residential installations are on the increase in US and Europe. Safety is becoming more and more important, especially in the US. However, we are promoting ourselves on a more global scale, as we don't want to be tied down to any specific country. We have booths at many different trade shows, the most recent being last month, at SNEC in China.

PES: Which is the main target group for you currently? Are we talking Utility scale, commercial or residential?

AL: Right now it is residential, that is where our benefits are optimal and of most value. Our system today is tailored for 3-5kW to match a typical installation in this segment. But we are not stopping there; we are developing a 10kW system for the US market as well as a 25kW system for both the US and the rest of the world. We want to move on in to the commercial area, moving with the current trend of using more and smaller inverters instead of one single unit. The module electronics will be the same for all systems, so we are only changing the central unit for grid connection. We also have some far out ideas for the utility sector, but those will take more time to develop.

PES: What are your thoughts about prospects for 2016 with regard to your organization, and the solar industry in general?

AL: Optistring is going to market through the major module manufacturers. Our system will be an integrated part of smart panels, offering increased end customer value and system integration. Branding, sales and distribution will be driven by our customers enabling a small organisation like Optistring to enter the global market confidently with quality products. Our prospects are with the largest module manufacturers in the world enabling them to increase product value and benefit from the growing module-level electronics market. ■

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