

## **New technical models set to reduce costs of power generation, distribution for Africa**

Innovative new technologies and architectures set to reduce the costs of power generation and distribution will be presented at the upcoming POWER-GEN & DistribuTECH Africa conference and expo.

Speaking ahead of Africa's premier power sector summit, experts outlined a number of new technologies and approaches that will be presented to reduce maintenance costs, improve performance and lower risk in power generation and distribution across Africa.

### **Bringing VCBs to larger generation plants**

One area presenting promise for power plants in Africa is new applications of vacuum generator circuit breakers (VCBs), says Dr. Karthik Reddy Venna, Technical Expert - Vacuum Switching Applications within Siemens AG's Energy Management Division. "New applications of this existing technology for power plants up to 450 MW promise to bring lower cost, simpler, more reliable and more environmentally friendly circuit breakers to the African market," he says.

Vacuum circuit breaker technology has proved reliable and effective in the medium voltage space, he says, but advances in interrupting capability have made this technology appropriate for larger generators. VCBs are also able to switch off low frequency currents, which traditional technologies are not able to do.

"VCBs also offer a significant advantage in that they offer low environmental impact, which is particularly relevant for governments across Africa, who are trying to bring down the levels of harmful emissions," he says.

Dr. Karthik Reddy Venna will present a paper on VCBs at POWER-GEN & DistribuTECH Africa, including case studies and a real life example of a situation in which VCBs could have reduced damage during a failure.

### **HSIL innovation for improved reliability, lower environmental impact**

The implementation of High Surge Impedance Loading (HSIL) methods on long (line lengths that are greater than 200 km) power transmission lines can reduce or eliminate the need for series compensation, says engineer Lebo Maphumulo, Corporate Specialist: Group Technology at Eskom's Lines Engineering Services department. Maphumulo's research has found that HSIL configurations are not appropriate for varying loads, as a result "The criteria used to select a line for the application of HSIL methods is crucial," she says. "In cases where HSIL lines are applicable, they significantly reduces the capital and maintenance cost of a new power line and the system reliability is also enhanced because the need for ongoing outages to do maintenance on the series capacitors is eliminated. An added benefit is the reduction in the environmental impact."

The application of HSIL methods is highly relevant for power line design engineers, system planning engineers and transmission companies across Africa, says Maphumulo, who will present a paper entitled '*Application and Advantages of Utilising HSIL Methods to Improve the System Performance (Impedance Matching)*' at POWER-GEN & DistribuTECH Africa.

### **Standardising cooling tower fill assessment**

Replacing obsolete asbestos-based cooling tower fills is a lengthy and costly process, and ensuring that the replacement solutions deliver the expected performance can be challenging, says Ockert Augustyn turbine engineer at Eskom. "Despite what various suppliers claim and the data they publish, our tests indicate that in many instances, the performance of the various solutions differs widely when assessed in a standardised way," he says.

Proposing a model for standardised testing which would be applicable for utilities across Africa, Augustyn will speak at POWER-GEN & DistribuTECH Africa on 'Thermal Performance of Cooling Tower Fills – Experimental Investigation' and will seek input from stakeholders on the testing methods.

### **New storage methods for RIP bushings**

As power generation technologies evolve, power producers have moved to adopt Resin Impregnated

Paper (RIP) Bushings, but this move has brought new challenges with it, says engineer Khayakazi Dioka of the High Voltage Plant Engineering Department within Eskom.

“Because RIP bushings are hydrophobic, it is recommended that they be stored in tanks filled with oil, which can become costly, and many facilities are not equipped with long term bulk storage tanks. This is a problem facing utilities and end users,” Dioka says. Dioka’s department investigated solutions to the challenge, and developed a model using repurposed systems to slash to cost of storage and simplify implementation.

At POWER-GEN & DistribuTECH Africa Khayakazi Dioka will deliver a case study on the Development of Alternative Economical and Environmentally Safe Long Term Storage of Resin Impregnated Paper (RIP) Bushings.

### **Flexible operation for combined cycle gas turbines**

As renewable generation picks up, the integration of renewables into conventional power plants is set to challenge power plant operations and potentially drive up maintenance costs, says Dr. Ahmed Shibli, practicing metallurgist and Managing Director of European Technology Development Ltd (ETD).

“This is a challenge affecting power plants across Europe, Asia and the U.S. as they increasingly integrate renewables, and it is an issue African utilities need to address,” he says. “Renewables are quite temperamental – as wind and solar can literally stop within minutes which means the backup power needs to be started up very quickly. Taking it to full load rapidly can cause damage, particularly in older fossil plants that were never built to handle cyclic operations,” he says. ETD, a UK-based consulting and R& D organisation, produces international review reports on the cyclic operation of CCGTs/HRSBs and conventional fossil power plants, covering design, materials, operation, inspection and maintenance and has also developed special expertise in cost modelling, the effect of cold, warm and hot starts and cost mitigation by making the design improvements or materials changes in the existing and new plants.

“Southern African stakeholders need to be aware of the changing demands on the infrastructure, building new plants to address new needs and making older plants more compatible with renewables,” he says.

Dr. Shibli will brief engineers, utilities, plant designers and manufacturers on considerations when using existing plants as backup plants, flexible operating modes, and reduced failure rates in his presentation ‘*Flexible Operation of Combined Cycle Gas Turbine (CCGT) CCGTs/heat recovery steam generator (HRSG) HRSGs and Conventional Power Plants - Technical & Cost Issues*’ at POWER-GEN & DistribuTECH Africa.

### **New CFB technology for maximum fuel flexibility**

Circulating fluidized bed (CFB) technology, now making its mark in countries looking to increase their share of renewable energies, have significant potential for Africa, says Damian Goral, Product Management CFB at Doosan Lentjes GmbH. Goral, who will speak at POWER-GEN & DistribuTECH Africa 2018 on ‘*Highly Efficient CFB Technology Featuring Maximum Fuel Flexibility and Environmental Standards*’, says CFB technology moved from the chemical industry in the 1970s to the power sector in the 1980s, and is becoming increasingly relevant as utilities seek long-term reserve margin security and increased renewable integration. CFB technologies are cost effective, overcome challenges associated with lower quality fuels, and control emissions.

“A key advantage of these technologies is they support a relatively easy switch to alternative fuels, from biomass and agricultural byproducts to industrial and municipal waste,” he says.

### **New standards align with changing technologies**

As technologies change, new standards are also emerging to align with the evolving environment. Sri Chandra, senior director of Standards and Technology India at the IEEE Standards Association, and Norman Shaw, Director of Product and Business Development at IEEE, note that new standards are becoming particularly important as the power sector moves toward smart grids, distributed

generation and interoperable systems.

IEEE, with over 13,000 active standards, focuses heavily on the energy space, and is currently introducing its revised 1547 standard. The IEEE standard 1547-2018 for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces is highly relevant as African operators look to interconnection and start leveraging communications standards within their environment, says Shaw. As with all its standards, IEEE is now supporting the standards documentation by developing a handbook, e-learning tools, multimedia and mobile content to help engineers and legislators apply the 1547 standard, says Shaw.

Sri Chandra will present to engineers, utilities and legislators at POWER-GEN & DistribuTECH Africa on the standards that drive safety, emerging technologies and interoperability. IEEE has over 500,000 members globally and around 7,000 in Africa, and will also use POWER-GEN & DistribuTECH Africa as an opportunity to build its regional base and engage with its African community on standards, tools and support needed across the continent.

*The POWER-GEN & DistribuTECH Africa Conference & Exhibition will be staged from 17-19 July 2018 at the Sandton Convention Centre. This annual event, Africa's premier power sector summit, attracts over 3,000 VIPs and decision-makers from the pan-African and international power sector. For more information, visit [www.powergenafrika.com](http://www.powergenafrika.com) and view the conference programme here <http://events.pennwell.com/PGAfrica2018/Public/Sessions.aspx?ID=64671&View=Sessions&sortMenu=105003>*

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