

# NEWS



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Franz Bartels | President & CEO

Our Cover Story:

## Poland – A Transition to Lower Emissions and European IED Compliant Solutions

### The shift from total reliance on coal to low-carbon options in Poland

Poland has experienced impressive economic growth over the last few years and this is set to continue with a moderate GDP growth, a continuous increase in electricity demand and consistent investments. The country needs to manage the transition towards a low-emissions economy as it faces some potentially costly policy actions from the efforts to transpose EU environmental legislation.

### Challenges ahead

Nearly 80 % of electricity in Poland’s energy sector is generated from coal and its dominance as a fuel for power generation does not appear to be diminishing given its significant capacity for building coal burning power plants. (Turow, Jaworzno, Opole, Kozenice power plants). Fuel structures for power generation will be changed and coals’ share in the energy mix should reduce to 55 % by 2030, allowing for more shares of renewables and gas in the mix. However coal will remain the basic fuel for power generation as the consensus is to keep the use of coal as the fuel to generate energy but with new technologies, that are more efficient, thereby creating more efficient facilities that produce energy in a clean way. The new power units which are currently under construction (Kozenice, Opole, Turow, Jaworzno) are being redesigned in terms of air pollution control to meet current and upcoming emission standards and this reflects how fast the regulations towards low emissions are progressing in Poland.



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### Clyde Bergemann offers IED compliant solutions

Poland is a key market for Clyde Bergemann Power Group; we are currently undertaking a contract, providing the desulfurization DeSOx control for the Będzin Power Plant in Poland. The project itself is an example of Poland’s shift and transition to a lower emis-

sions’ economy to meet the defined limits of Emission Limit Values (ELVs) that are part of the European Industrial Emissions Directive (IED). The IED came into force in June 2011 and requires existing large combustion plants to meet minimum standards for the emissions of toxic air pollutants such as acid gases and particulate matters in a short term time frame. The recently designed and supplied flue gas desulfurization system mitigates acid gases and particulate matter on three boilers at Będzin Power Station. A Circulating Dry Scrubber followed by a Pulse Jet Fabric Filter was the Clyde Bergemann Power Group Air Pollution Control technology selected to meet Sulphur Dioxide (SO<sub>2</sub>) emissions below 130 mg/Nm<sub>3</sub> and Particulate Matter below 15 mg/Nm<sub>3</sub>. Other acid gases such as Hydrogen Chloride (HCl), Sul-

phur Trioxide (SO<sub>3</sub>), and Hydrogen Fluoride (HF) can also be considered. In addition to these Air Pollution Control technologies our range also includes Electrostatic Precipitators (ESPs); a filtration device removing fine particles, which can also be used for particulate matter control. There are several options for mitigating Sulphur Dioxide to meet the IED regulations which can be chosen. For dry scrubbing, Dry Sorbent Injection, Spray Dryer Absorber and Circulating Dry Scrubber (all with a pulse jet fabric filter) can be chosen. There are a number of considerations for selection including total capital equipment cost, plant operating costs, the sorbent availability and costs, auxiliary equipment costs, additional manpower costs and unit flexibility to meet future regulations on acid gas mitigation.

Clyde Bergemann can offer plants who are required to become IED compliant with value engineering evaluations that include unit flexibility and that can address unit turn-down capabilities as well as future emissions reductions flexibility. This gives the plant the information to select the right technology. Our broad Air Pollution Control product range and expertise coupled with a global presence enable us to offer tailor made solutions for our customers.

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## Clyde Bergemann Awarded Pulse Jet Fabric Filter and Dry Sorbent Injection System for the Albany Green Energy Project

Clyde Bergemann Awarded Pulse Jet Fabric Filter and Dry Sorbent Injection System for the Albany Green Energy Project

### The Project

Valmet, Inc. awarded Clyde Bergemann Power Group Americas (CBAM) a \$ 3.3 M contract to supply one Pulse Jet Fabric Filter System (PJFF) and one Dry Sorbent Injection System (DSI) for the Albany Green Energy biomass project. This award marks the continuation of a strong relationship with the industrial focused supplier of fluidized bed boilers and involved three different Clyde Bergemann product groups.

### Project History

The Albany Green Energy project is a 50 MW biomass-fired cogeneration plant located in Albany and Georgia, USA. Development of the new construction project is the result of a partnership between Constellation Energy and Proctor & Gamble Co (P&G). The plant will utilize a Valmet-supplied CFB boiler to fire locally sourced wood scrap. Under a 20-year steam supply agreement, the new facility will provide up to 70 % of the energy and 100 % of the steam to one of P&G's largest U.S. manufacturing plants. In addition, Constellation, who will build, own and operate the more than \$ 200 M facility, has secured a 20-year commitment from Georgia Power to supply upwards of 42 MW of renewable energy to the local grid.

### CBPG Scope of Supply

The pursuit of this project involved pooling the resources and expertise of CBAM's Air Pollution Control group located in Hanover, MD for the supply of the PJFF system; the Material Handling group located in Malvern, PA for the supply of the DSI system and the Controls group located in Atlanta, GA.

### PJFF

For this project CBAM's in-house fabrication facility located in Jesup, GA will provide

a modular pulse jet fabric filter designed to maximize the use of shop welding, thereby saving construction costs for the customer.

The unit is comprised of eight compartments; each equipped with 360 bags with a 3.4 Gross Air-to-Cloth Ratio, and 3.9 Net Air-to-Cloth Ratio. The polyphenylene sulfide (PPS) fabric bags and cages are 28 ft (8.5 m) long with a 6 inch (15 cm) diameter. PPS fabric has long been regarded as a preferred material choice for biomass applications. This material, coupled with an inlet manifold that was designed to reduce pressure drop, improve ash and gas flow distribution, and promote longer bag life, allowed CBPG to offer an operational life expectancy of four years for the bags.

### DSI

For the mitigation of acid gas emissions, CBAM offered a sodium bicarbonate DSI system. This system is designed to accept truck-unloaded sorbent materials into the storage silo, then meter and pneumatically convey the materials into the flue gas duct injection points through a single injection piping system.

The 2,900 ft<sup>3</sup> (82 m<sup>3</sup>) storage silo, manufactured at the Jesup facility, will be shop welded and include a skirted area around the cone. Each feed train will include a gravimetric "loss-in-weight" weigh hopper to maintain a high level of accuracy in the feed of the reagent material. The sodium bicarbonate will be metered into the injection line by a Clyde Bergemann "HD" Heavy Duty rotary valve with a maximum rate of 1,000 pounds per hour.

All of the material feed and electrical equipment located inside the skirted area of the silo will be shop installed and shipped complete as one unit.



### SMART Controls TM

Clyde Bergemann will also provide the hardware and programming required to operate the Air Quality Control Systems (AQCS). The scope of supply will include a fully-assembled main PLC control panel, HMI and Remote I/O panels. Both the hardware and software components will undergo full functional testing and review to ensure high quality standards and efficient installation and commissioning.

### CFD Modeling

To ensure optimal flue gas flow distribution and sorbent distribution, CBAM will also provide a computational fluid dynamics (CFD) model study. This study will be conducted in-house by the highly trained and qualified staff located in Hanover, MD, and will include all baghouse compartments, gas flow turning vanes baffles, partitions and any internal stiffeners.

### The Sale

In a sales process that took more than a year from the first contact by Valmet, CBPG was able to leverage its long relationship, strong sales presence and innovative design offerings to drive this opportunity. Communication and coordination between the various groups was a key factor to making the short list of vendors to Valmet. Sales efforts included numerous visits to the Valmet offices, including a visit with the Demonstration truck, to gain valuable commercial insight and understanding of the customer drivers. Ultimately, it was the successful history between the two companies that allowed CBPG to not only win this project, but also, secure a follow on order for the Boiler Cleaning equipment on the CFB boiler.

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## Saudi Electricity Company Trusts Again in the "On-load" Cleaning Technology of Clyde Bergemann for Al-Qassim Power Plant

Clyde Bergemann has once again gained the trust of Saudi Electricity Company (SEC) with an order for the delivery of 168 x PS-H sootblowers for the Al-Qassim Power Plant, located in Central Region of Saudi-Arabia.

The existing Al-Qassim II & III power plant is part of the SEC \$ 80-billion investment plan to increase its power generation capacity by 30,000 MW by 2018 to meet the increasing power demand in this region. The oil-fired plant is being expanded through a conversion from simple cycle operation to combined cycle operation. The conversion is done by adding the Heat Recovery Steam Generator (HRSG), Steam Turbine (STG) and related equipment to the existing Gas Turbine (GTG), based on three blocks of 4+4+1 configuration. Each block with 4 x HRSG's, 4 x GTG's and 1 x STG. This will increase generation capacity by approximately 360 MW.

The Belgian engineering company and main EPC contractor, CMI Energy, was awarded to design and supply the HRSG. The HRSG uses the gas turbine exhaust energy to generate steam to power the steam turbine. The gas turbine exhaust ducting to the HRSG includes a diverter and a bypass stack system to allow for simple cycle operation of the gas turbine as well as in combined cycle operation with HRSG. CMI considered Clyde Bergemann as one possible partner for the "On-load" boiler cleaning systems which meet the need of the heat recovery boilers.

Clyde Bergemann is a recognized supplier for the delivery of sootblowers for SEC in Saudi-Arabia. However the bid was fiercely contested by the traditional competitors. After several internal meetings on the engineering and construction side at the end of 2014, Clyde Bergemann submitted a tender of exceptional quality as well as a sootblower design with reasonable costs and was ultimately selected as the key partner for this project in April 2015. The scope of the supply consists of 168 PS-H retractable sootblowers, 12 air ventilation skids, 12 control cabinets and spare parts to be installed in 12 boilers units. The equipment

for the first block is already delivered. The delivery for the second and third block is scheduled for November 2015.

The won project shows the culmination of a dedicated and focused effort of involvement from both parties, CMI Energy and Clyde Bergemann. The technology of Clyde Bergemann has been a successful part of the investment plan of SEC also in the past. The delivery of 10 sootblowers for the Shoaiba II combined-cycle plant made a valuable contribution to improve boiler efficiency while minimising the impact on the environment.

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## SMART Clean Compact – SMART Clean for Small Boilers Newly Defined



In addition to the existing SMART Clean product line for steam generators from 250 MWel, Clyde Bergemann is now able to meet the growing demand for the intelligent “On-load” boiler cleaning of small industrial boilers with the SMART Clean Compact.

SMART Clean Compact is a sophisticated simulation software that uses important process parameters of the steam generator process. The system allows for flexible integration into the existing plant infrastructure and requires no further sensor systems. In this way, it is the best and most cost effective alternative for small industrial boilers, waste incinerators and biomass plants.

The new system is specifically designed to meet the requirements of smaller boilers. It takes into consideration the changing fuel qualities and, thus, the nonhomogeneous deposit characteristics. The use of cleaning devices such as SMART Cannon, SMART SCS, sootblowers, rapping devices and ex-

plosion generators is individually controlled and managed, thereby avoiding insufficient or excessive cleaning.

The cleaning results of SMART Clean Compact speak for themselves. The operator of a 20 MWel biomass boiler, for example, experienced a reduced consumption of sootblowing steam in some areas up to 50 %, resulting in a reduction of the boiler off-gas temperature, as well as an increase of steam generator effectiveness of up to 0.25 % points.

Overall, SMART Clean Compact convinces with efficiency, simplicity and customized adaptability. If you would like to attend a free webinar to learn more about the benefits from this technology please get in touch with us by emailing Fabia Brinkmann at [fabia.brinkmann@de.cbpg.com](mailto:fabia.brinkmann@de.cbpg.com).

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## Clyde Bergemann entwirft und liefert DRYCON-System zur Handhabung von Trockenboden- und Flugasche an das Kraftwerk Punta Catalina

**Clyde Bergemann EP Tech S.r.l. part of Clyde Bergemann Europe won a contract to design and supply their Dry Bottom, Fly Ash Handling System DRYCON™ with hopper, primary crusher, and secondary conveyor, 400 m<sup>3</sup> silo including the silo unloading system (wet and dry). The contract is for the two 360 MW coal-fired boilers at Punta Catalina Power Plant for Corporación Dominicana de Empresas Eléctricas Estatales (CDEEE) in the Dominican Republic.**

The contract was awarded by Italian engineering and procurement contractor, Tecnimont S.p.A., part of Maire Tecnimont Group, who is developing the project as part of a consortium with Construtora Norberto Odebrecht S.A. and Ingeniería Estrella S.R.L. Tecnimont S.p.A. is the main subsidiary of the Maire Tecnimont Group, a global industrial player with specific skills in plant engineering, particularly in the hydrocarbons sector (Oil & Gas, petrochemicals and fer-

tilizers), as well as in power generation and infrastructures. The project relates to the realization of an industrial complex of strategic importance for the country's development (a coal-fired thermal plant, an offshore terminal, and other associated facilities). The client and operator of the plant is CDEEE, the Dominican Republic's state Company.

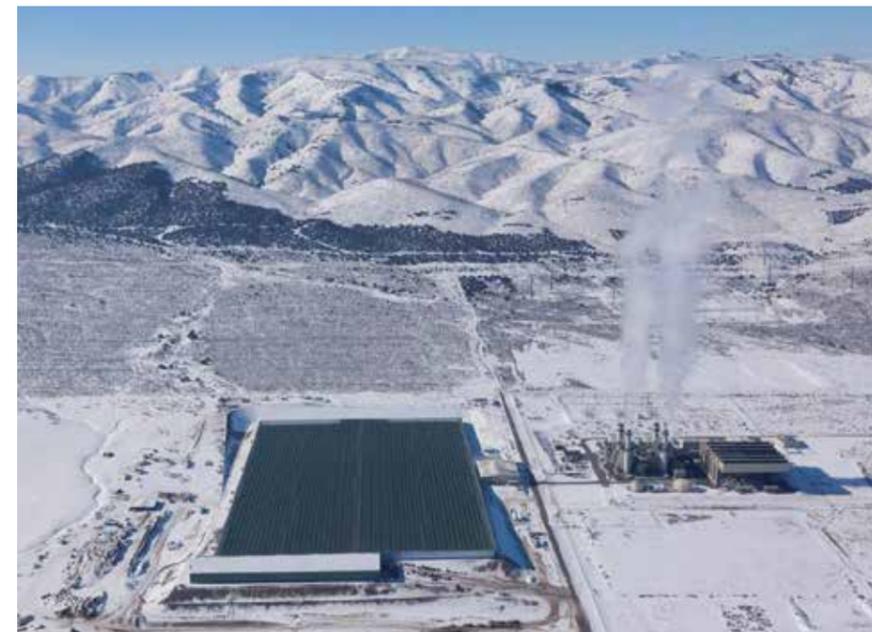
“We are excited to be a part of this important energy infrastructure project. Growing

demand for power, energy shortages and the need for affordable energy presents great opportunities for Clyde Bergemann to demonstrate the benefits we can offer our customers and operators with our global expertise and capabilities.” Says Franz Bartels, President & CEO of the Clyde Bergemann Power Group.

Design work for the project is underway with delivery scheduled for late 2015 for unit 1 and early 2016 for unit 2. Design work has already started with deliveries being scheduled for January and May 2016.

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## “Greener” Tomatoes Using CHP and Carbon Capture for Sustainable Agriculture



**Ask CEO Casey Houweling what's new at his commercial farming business and he'll be eager to tell you all about the company's state-of-the-art greenhouse that was developed in a unique collaboration with a power utility.**

Near Salt Lake City, Utah, Houweling's Tomatoes has constructed a 115,000 m<sup>2</sup> (28.3 acre) agricultural complex adjacent to an existing natural gas-fired power plant. PacifiCorp Energy is the owner/operator of the 525 MW Currant Creek Power Plant, and Rocky Mountain Power supplies the electricity for Houweling's operations.

The project required \$ 58 million in capital investment and will create more than 280 jobs. Houweling's company developed and patented the “Ultra Clima®” Greenhouse design, which has now been built all over the world, and installed the first combined heat and power (CHP) greenhouse in the U.S. at its California facility.

In the Utah project, this environmentally-friendly concept is taken a step further. By building next to the power plant and utilizing its Ultra Clima® technology in conjunction with proprietary patent pending heat and CO<sub>2</sub> capture technology, Houweling's is able to capture waste heat and CO<sub>2</sub> from

the power plant and divert it directly into the greenhouse. This, combined with supplemental lighting, allows Houweling's to harvest fresh vine-ripened tomatoes 365 days a year.

“As far as we are aware, this is the first commercial-scale operation in the world that will pull both heat and CO<sub>2</sub> directly from a power provider,” said Houweling.

The innovative project evolved as a close collaboration between Houweling's, Clyde Bergemann, the owner's engineer, Burns & McDonnell, and the power plant operator. Clyde Bergemann's sales and technical teams studied the customer's special requirements and developed an ideal engineered solution.



Clyde Bergemann Power Group America's (CBAM) Air-Gas Handling Product Division designed and supplied isolation dampers at each end of flue gas ducting, as well as non-metallic expansion joints installed along the duct that runs between the power plant and the heating systems of the tomato nursery. The duct conveys up to 20 % of the exhaust gas from the heat recovery steam generator (HRSG) stack to the greenhouse through an elevated duct approximately 183 meters (600 ft) long.

The HRSG stack breach is isolated by a 3 m x 3 m (10 ft x 10 ft) Bachmann™ ISO-Flow tandem louver with electric actuator and sealing air system designed for man-safe entry for inspection and maintenance of the FRP duct which was supplied by others. The scope of supply for the HRSG stack isolation also included an outlet blanking plate erected during the spring 2015 tie-in outage. The actuator, seal air fan and isolation damper were delivered soon after, in time to support a 2-day installation schedule.

At the nursery inlet, a 2.9 m (114 in) diameter isolation damper was installed between the flue gas transport duct and the distribution plenum in the nursery. The nursery inlet damper is a single-blade-row, parallel round-louver with electric actuator. The HRSG Stack Outlet and Nursery Inlet dampers will cycle opened and closed on a regular basis in response to needs from the tomato nursery for either heat or CO<sub>2</sub> supply. The expansion joint portion of the scope was eight (8) Bachmann™ “B-Style” flanged non-metallic belts of 6.4 mm (0.25 in) nominal thickness, 2-ply aramid-reinforced Viton, with stainless steel clamp bars, and clamping hardware.

Following the success of Phase 1, Houweling's Tomatoes has plans for an expansion of the original facility, which will include the penetration of a second stack and installation of second near-duplicate set of flue gas ducting, isolation dampers and expansion joints from the PacifiCorp facility to the greenhouse.

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## Successful European Tour with the “Clean Energy Solutions” Truck

In the last two months the Clyde Bergemann truck visited 31 places and several plant sites throughout Spain, Portugal, France, Belgium, the Netherlands and the UK to demonstrate products and solutions for energy related industries. The focus was on a 46 square meter exhibit inside the truck, supported by six product models, animations and live demonstrations.

Our experts explained the powerful portfolio for improved boiler efficiency, effective on-load boiler cleaning and ash handling, reliable combustion gas control and sustainable energy recovery. At each stop, selected customers as well as their employees took the opportunity to obtain an overview and expand their knowledge of the solutions available to help reduce costs and improve efficiency by using Clyde Bergemann products.

In total around 450 interested people participated on the mobile exhibition tour. Across the board, the public was very impressed and enthusiastic to touch and see each part of the displays. There was a lot of interest in the live demonstrations and sometimes a new solution was found for the customer’s problem at the same time.

We are happy that the first part of the tour went very successfully from every perspective. After the summer break the Clyde Bergemann truck was back on the road again. We completed our second tour with stops in Germany, Denmark, Sweden, Finland, Estonia, Poland, Austria, and Italy.

The roadshow was a complete success!

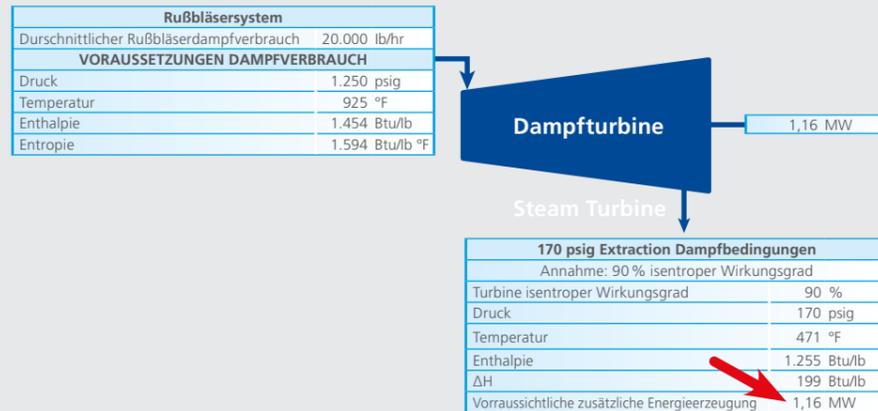


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The Roadshow was a Complete Success!

## CBPG's First Low Pressure Drop Sootblower Retrofit Project in the USA – Weyerhaeuser Port Wentworth

Steam Saver Sootblowing Technology is one of the key advancements that Clyde Bergemann Power Group (CBPG) has introduced to the Pulp and Paper industry within the past few years. The technology has evolved further where for the first time, it allows a pulp mill to run sootblower operation using as low as 8–11 bar (115–160 psi) steam from turbine extraction (Ultra Low Pressure Drop Sootblowing). As a result, a more attractive business case can now be made for a complete sootblower retrofit project, allowing pulp mills to generate 1–3 MW of additional green power.



► Additional power generation with Steam Saver Technology implementation

CBPG approached Weyerhaeuser Corporate in early 2015 and presented the business case to fully retrofit Port Wentworth mill's existing sootblowers with this technology, taking advantage of their scheduled turbine upgrade project in June 2016.

### Additional power generation with Steam Saver Technology implementation

Although our competitor was also considered in the bidding process, they were disqualified due to lack of successful installations with low pressured drop sootblowing. CBPG worked very closely with Weyerhaeuser corporate engineering and the mill to build the solution that will meet with both corporate and mill requirements. After careful site evaluation and feasibility studies, CBPG's Boiler Efficiency division offered the customized application that fits the project's technical requirements as well as the outage time table. Clyde Bergemann's Southeast

Regional sales team's excellent track record with the mill in supporting aftermarket and boiler efficiency needs for many years was a critical factor in Weyerhaeuser's decision making process. Both the mill and Weyerhaeuser's corporate teams voted for CBPG and the project was awarded in June 2015.

With this project, CBPG established the following key milestones:

- First 100 % retrofit project in the USA
- Port Wentworth had competitor's sootblowers for more than 25 years. This project will convert 74 sootblowers to Clyde Bergemann products in both the recovery boiler and power boilers at the same time, getting our competitor completely out of the mill.
- The mill's project payback is less than 2 years, generating an additional 1.16 MW capacity of green energy
- CBPG maintains 100 % of the Low Pressure Drop Sootblowing installations

in the USA, keeping our competition completely out of the US market

- CBPG Low Pressure Drop Sootblower installations in the US were only on new recovery boilers until this project came to life. As the majority of the US pulp & paper industry for this technology requires retrofitting, this win establishes a true retrofit reference that will help CBPG unlock the potential for the 200 recovery boilers in US and Canada
- First Steam Saver sootblowing application in a hog fuel power boiler

We are excited to see Weyerhaeuser's leadership in adapting new technologies in the US pulp and paper industry and we look forward to help Weyerhaeuser's efforts to conserve energy and generate additional power in Port Wentworth mill.

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## We Energies Elm Road Generating Station (ERGS) SMART Clean Project

### We Energies ERGS seeks the experts in boiler cleaning for 100 % PRB conversion

CBPG has been solely sourced for the system design, equipment supply, and installation of the SMART Furnace at We Energies ERGS in Wisconsin, USA, making this a true turnkey solution. Clyde Bergemann's SMART Furnace solution package comprises the complete cleaning technology upgrade in the furnace section with SMART Cannons, SMART Flux Sensors, SMART Pumps, and integration of the Thermodynamic Whatif simulation modeling into the furnace section.

The collective effort of multiple departments within CBPG over the course of the last 10 years led to the continued expansion of the CBPG installation at the site, which is part of the Oak Creek Power Plant. Regional Sales support of the existing installation coupled with the Performance Monitoring, New Equipment and Aftermarket divisions have forged a strong relationship between ERGS and CBPG.

The trust developed over the years between the two companies is reflected in the recent \$ 3.5 million award to expand the SMART Clean suite of technologies on Unit 2 at the site. The solution includes the following:

- 4 Cannon System
- Redundant Pump Skid
- 41 Heat Flux Sensors
- Electrical & Mechanical System Design
- Electrical & Mechanical Installation
- SMART Clean SMART Furnace & SMART Convection

### History

In 2005 CBPG was awarded a equipment supply contract for the sootblower systems on (2) 615 MW Hitachi supercritical pulverized coal boilers at WE Energies Elm Road Generating Station (ERGS). The units were subsequently put into service in 2010. Each unit was equipped with the following:

- (26) 37" Travel USX Blowers
- (12) 18.5" Travel USB Blowers
- (36) VS Wallblowers
- Basic SMART Control System

### PRB Conversion

ERGS sought CBPG's experience in dealing with the unique slagging characteristics of Powder River Basin (PRB) coal. The boilers were originally designed to burn Eastern Bituminous coal. In 2012 ERGS kicked off a fuel flexibility project with the aim of converting to 100 % PRB. CBPG's Boiler Efficiency Product Division developed a solution that incorporated additional modules to expand the intelligent soot blowing system. Subsequently, CBPG was awarded the first installment of the SMART Clean System which included 2 SMART Clean Systems with Thermal Dynamic Models (TDM) for both units with modules for both the furnace and convection passes including:

- (2) SMART Clean System including SMART Convection and SMART Furnace SMART Convection: With TDM
- (2) FEGT Pyrometer SMART Furnace: TDM and FEGT based Wallblower Control
- (2) Start up Assistance, (2) Training, (2) 6 months Remote Performance Optimization, (4) SMART Flux Sensors

Once the additional SMART Clean modules were installed, the Remote Performance Optimization of the system was utilized to further secure our position for the additional system upgrades. The performance monitoring group stayed close to the ERGS team through the performance optimization process which deepened our understanding of the installation and further strengthened the confidence ERGS has in CBPG boiler performance solutions.

In October 2014 Clyde Bergemann was contracted to conduct performance monitoring services for the 100 % PRB test burn. Confirming CBPG's hypothesis, the results of the test demonstrated that the current furnace cleaning equipment would be unable to keep up with the slagging. The SMART Cannon system was found to increase the furnace area cleaning coverage to 84 % of the furnace vs. 12 % of coverage offered by the current wallblower set up. Clyde Bergemann's ability to quantify the benefits using boiler evaluation and performance data was one of the key factors in securing this performance based project.

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## Clyde Bergemann Wins a Major Fly Ash Handling Contract with Daewoo E&C Ltd. for Safi Independent Power Project

Clyde Bergemann Doncaster part of Clyde Bergemann Europe was awarded a first contract from Daewoo Engineering and Construction Co., Ltd. (Daewoo E&C) in Seoul, South Korea. The contract is for the delivery of 2 Fly Ash Handling Systems which will be installed in the Safi coal-fired power project located near the city of Safi in Southwest Morocco.

Safi Energy Company S.A. ("SAFIEC") the End User of the Safi coal-fired power project is owned by a consortium of GDF SUEZ S.A. (France), Mitsui & Co., Ltd. (Japan) and Nareva Holding (Morocco). The consortium won the independent power project after an international open tendering process. The total project cost is estimated at US \$ 2.6 billion (MAD 23 billion).

The Plant will have two 693 MW coal-fired units and will be the first to use state-of-the-art ultra-supercritical technology in Africa which will enable the plant to have significant CO<sub>2</sub> reductions and lower fuel costs.

The project is a key part of Morocco's national strategic plan to meet the growing

demands for electricity, while lowering costs and at the same time protecting the environment.

Daewoo E&C, Ltd., a major Engineering, Procurement and Construction (EPC) contractor in South Korea was awarded as the EPC contractor for the Safi Project. Following the completion of the project, which is planned for 2018, the electricity produced from the plant will be sold to L'Office National de l'Electricité et de l'Eau Potable ("ONEE") under a Power Purchase Agreement for 30 years.

The fly ash handling part of the project is valued at US \$ 7.6 million and will involve the supply of two complete fly ash handling

systems provided by Clyde Bergemann Doncaster including the conveying systems, silo design and ancillary equipment, pipework and control systems to Daewoo E&C for the Safi Power Project. The erection works will be completed by the client.

"We are delighted to have won the contract for this prestigious project, Daewoo E&C are one of the World's largest EPC contractors and we look forward to fulfilling the delivery of a high specification system for the project." Says Franz Bartels, President & CEO of the Clyde Bergemann Power Group. The project has a very short timescale of 12 months with the equipment shipping requirements due in May 2016.

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## First Reference for New "Shower-Clean System" Technology in Europe – Clyde Bergemann Supplies Six "SMART SCS" to a German 55 MW Waste Incineration Plant

To optimize the boiler cleaning, Dueseldorf (Germany) based waste incineration plant "Flingern" decided on Clyde Bergemann's patented "Shower-Clean System" (SCS) and chose the new generation SMART SCS system for furnace cleaning.

The plant is designed for the incineration of household and household-type commercial waste. The waste passes through unloading units in a large waste bunker and is further conveyed via feed throats to the six boilers. In the combustion chamber, it is then transported downwards through stepped metal rolls.

For the combustion of inhomogeneous fuels, Flingern has developed its own method, called roller grate firing. The waste is incinerated at temperatures of about 1.000 °C.

tion of waste and biomass. The SCS uses water to clean the wall heating surfaces in the furnace. The water is brought into the boiler from the equipment located on the boiler roof, with the help of a cleaning nozzle mounted on a flexible, temperature-resistant metal hose. To ensure an efficient and flexible cleaning of the boiler, the cleaning parameters (time, amount of water and cleaning velocity) are adjusted based on the intensity of deposition.

As part of a revision of boilers 3 and 4, Flingern tested Clyde Bergemann's SCS technology as early as in 2011. Reliable cleaning results and an improved boiler efficiency were convincing factors for the customer. Consequently, Clyde Bergemann received its first order to supply the SCS system and exchange the steam wall blowers in the both boilers.



In the past, deposits in the furnace or persistent heavy slagging on the furnace wall resulting from the incineration process were cleaned with the help of Clyde Bergemann steam wall blowers. However, to achieve complete cleaning in the furnace, it was necessary to look for a different solution.

As early as 2004, Clyde Bergemann designed the "Shower-Clean System" to meet the challenges associated with the combus-

In the meantime, Clyde Bergemann further developed the proven "Shower Clean System". The experts revealed potential for optimization by over-hauling major components to achieve higher cleaning efficiency even for aggressive deposition. Further changes were also considered in the new SCS regarding securely sealing the apertures against flue gas leakage during hose entry as well as provision for cleaning the hose during its ascent with compressed air to in-



crease its overall life span. Adding flexibility to the hose winding drive was considered an additional challenge and could be achieved with the help of a new, patented hose drive mechanism. The rotating drive system can easily overcome hindrances when inserting the metal hose. Furthermore, a special gear train enables an indexing functionality independent of the hose winding or unwinding movements. This in turn, facilitates the use of special jet nozzles to be fixed around the nozzle head periphery to envisage higher cleaning intensity as compared to the standard umbrella nozzle. The new generation is hence called "SMART SCS".

As the first generation of the SCS has been successfully in operation since 2011, the Flingern operator has decided to exchange the remaining steam wall blowers in boiler 1, 2, 5 and 6 as well. During the planned retrofit, a six-month trial operation of SMART SCS was conducted in boiler 2. The new system with its enhanced features quickly convinced the operator through the achievement of excellent cleaning results. Thereupon, Flingern awarded a contract to Clyde Bergemann to additionally equip line 1, 2, 5 and 6 with the new SMART SCS. Parallely, the existing SCS system in boilers 3 and 4 will be replaced by SMART SCS as well. Thus, after completion of work, all six lines will be equipped with state-of-the-art technology in terms of furnace cleaning.

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## Global Roll Out of Preventing Bribery and Corruption 'Interactive' e-learning Course

Clyde Bergemann Power Group (CBPG) continues to strive for improvement and excellence with President & CEO, Mr. Franz Bartels, launching the e-learning course "Preventing Bribery and Corruption" on the 30<sup>th</sup> of August 2015 marking a significant milestone for the Compliance Program.

President & CEO, Franz Bartels, executing the global launch of the Compliance e-learning course during a Strategic Management Outside Meeting in Bamberg, Bavaria.

This online training course from SAI Global replaces the face to face training which was executed in 2012 and 2013 together with the implementation of the Global Anti-Bribery and Anti-Corruption Compliance Program. The e-learning course is available in the new Clyde Bergemann Academy

Learning Management System (LMS). The system itself provides a great platform with interactive scenarios that give employees the opportunity to make choices that lead to whether you have answered questions right or incorrectly based on your knowledge and thinking. Hence, the tool and the training is fun, given that you will automatically develop an emotional connection with the situations or scenarios being discussed and learn about the corresponding right appropriate behaviour and reaction.

This state-of-the art e-learning tool comes with a user friendly interface providing content in most of the languages spoken within the CBPG, including Mandarin and Indonesian. It allows participants to use it with audio function or silently with the relevant transcript. Another great characteristic is its modular structure which allows an adaptation of the content for the refresher online training in two years' time.

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## Schoellershammer Paper Mill Optimizes Ash Handling with Clyde Bergemann DRYCON Technology

Dueren, Germany based paper mill Schoellershammer has invested in an additional paper machine thus doubling its existing capacity from 250,000 to 500,000 tons of corrugated board base paper per year. The company generates the heat and electricity needed for the production with its own lignite-fired power plant with a steam output of 70 t/h, as well as co-generation and an efficiency of 80 %.

Next to the expansion of the production capacity, Schoellershammer decided to modernize the bottom ash handling system of the power plant by replacing the existing one with Clyde Bergemann's DRYCON dry ash handling system.

The previous wet ash system faced environmental constraints and no longer met the requirements of an environmentally friendly, economical and efficient ash removal system. With DRYCON, the patented dry ash handling system, Clyde Bergemann delivers an efficient solution to convey the ash, reduce CO<sub>2</sub> emissions, water consumption and pollutant discharge.

DRYCON, the air-cooled dry ash handling system, replaces the previously used wet de-ashing system. Based on a mechanical steel-plate conveyor, DRYCON automatically conveys and cools the ash, thus completely avoiding the use of water. In addition to an increased boiler efficiency based on the post combustion of the heat energy, DRYCON offers significantly lower operating costs and the possibility of selling a dry ash byproduct.

In November 2014, Clyde Bergemann received the order to manufacture, assemble and commission the DRYCON system, including a double pendulum flap at the drop shaft of the fly ash and a paddle mixer at the outlet of the DRYCON. At record speed of four months, Clyde Bergemann was able to implement the entire project successfully.

Since March 2015, the Schoellershammer paper mill's dry ash handling system with a conveying distance of 22 meters (72 feet) is in commercial operation. The ash is collected in the plant and due to the low moisture content, can directly be loaded and transported to the power plants residue landfill.

The conversion from wet to dry ash handling already shows measurable results and a short payback period. Schoellershammer utilizes the water saved by the use of the DRYCON to operate the new paper machine.

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## Events Diary

DATE	NAME OF EVENT	COUNTRY, LOCATION
<b>December 2015</b>		
Dec 8. – 11.	Power-Gen	Las Vegas, NV USA
<b>January 2016</b>		
Jan 26. – 28.	Energy Generation Conference	Bismark, ND USA
<b>March 2016</b>		
Mar 02. – 03.	VGB Conference "Maintenance in Power Plants 2016"	Hamburg, Germany
<b>April 2016</b>		
Apr 19. – 21.	POWER-GEN Russia 2016	Moscow, Russian Federation
<b>June 2016</b>		
Jun 21. – 23.	POWER-GEN Europe	Milan, Italy

## Personnel

### Dr. Guido Zimmermann

... joined CBPG as Chief Operating Officer & Vice President CBPG Corporate Development. He will be responsible for corporate and business development, improving the company's competitive position and increasing efficiency. He will also be responsible for the group wide, global CRM system and the coordination of the global sales activities.



### Hans Schwade

... has taken over the position as President of CBAM and Group COO & VP in June 2015 for an interim period. This is a return for the former President of the Americas division who had been appointed CBPG Chief Technology Officer in 2013, working for the Group for more than more than 25 years.



### Stephan Bovet

... is appointed IT-Director CB Europe Division effective August 2015. In this new function he will be responsible for further improving the IT application within the CBEU division and bundle the existing IT resources.



### John Cherry

... is appointed Director of Contracts for Clyde Bergemann Doncaster. In this function he will be responsible for contract management, supply chain, site construction and commissioning.



### Matt Keep

... is appointed Engineering Manager for Clyde Bergemann Auburn. In his new position he will be responsible for managing the engineering team at Clyde Bergemann Auburn.

