

# Clyde Bergemann News

Clean Energy Solutions

Edition 01/08



## ☐ Turkey – election results raise hope for stimulation of the energy market

The Turkish government reshuffle after the elections of 22 July 2007 is confirmed. With it, the relationship between the presidency and the government changed from tense to normal which gives reason to hope that implementation of necessary structural reforms, and above all the stalled privatisation of the energy sector, gain momentum. This is mandatory as the country seeks private investors with readiness to invest in the Turkish energy market. According to experts, funds of minimum US Dollar three billion are needed every year until 2020 for building new power plants in order to meet growing power requirement. An average increase of energy use of more than 8 percent per year is expected until 2015. This means a disproportionate growth to the gross domestic product. At the moment, power consumption per capita is 2,254 kWh annually which is about one third of the European usage. [>> Page 2](#)

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## ☐ Turkey – election results raise hope for stimulation of the energy market

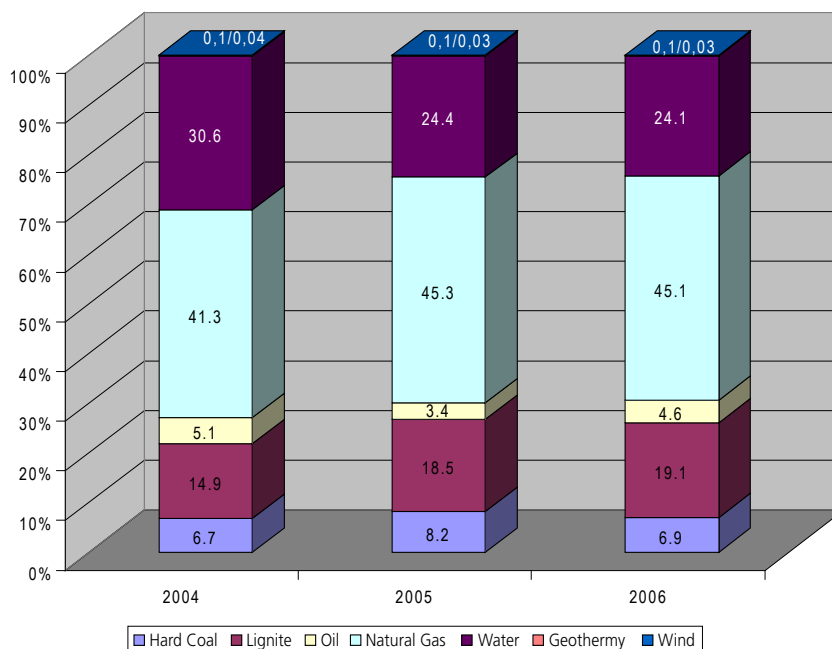
The infrastructure development is also an important step towards increased international competitiveness. Complete privatisation of the grid and the liberalisation of the power generation market are the targets of the country's energy policy. A further aim is the increased usage of domestic energy resources in order to reduce import dependency and to increase diversification of energy sources. 72 percent of primary energy for power generation is currently sourced from abroad. This is why, amongst others initiatives, utilisation of Turkish lignite deposits should be increased in new build, environmentally friendly coal-fired power plants. Official information states there are 4.2 billion tons of domestic coal deposits, which is a world market share of 0.5 percent. There are also estimations of over 9.6 billion tons of real deposits. Tenders are already in progress or in preparation for the construction of 4,710 MW in total in regions with larger quantities of lignite resources.

### Planned new coal-fired power plants in Turkey

| Power Plant (Lignite) | Existing coal deposit (in million tons) | Capacity (in MW) |
|-----------------------|---|------------------|
| Afsin Elbistan C      | 680                                     | 1,200            |
| Afsin Elbistan D      | 680                                     | 1,200            |
| Adana                 | 214                                     | 600              |
| Manisa                | 100                                     | 600              |
| Kütahya               | 100                                     | 300              |
| Tekirdag              | 129                                     | 300              |
| Bursa                 | 39                                      | 160              |
| Bolu                  | 39                                      | 150              |
| Cankiri               | 51                                      | 100              |
| Bingöl                | 26                                      | 100              |

Source: Federal Office for Foreign Trade, Energy Market in Turkey 2006/2007, 04 June 2007

% shares of energy sources for power generation



Source: Federal Office for Foreign Trade, Energy Market in Turkey 2006/2007, 04 June 2007

The Turkish lignite is very sulphurous and has a low calorific value with an average 1,100 kcal. Only 3.4 percent of the lignite deposit has a calorific value of over 4,000 kcal.

The existing coal-fired power plants with a total capacity of 9,336 MW, accounting for 26 percent of the electricity generation in 2006, require modernisation. According to a press release of the imap Institute, published early July 2007, new regulatory statutes of the Turkish Ministry for Environment and Forestry stipulate the installation of environmentally friendly filter systems for all power plants within the next four years. Even the coal-fired power plant Afsin Elbistan A located in the province Kahramanmaras, which alone produces 10 percent of the yearly power consumption in Turkey, is now threatened by closure if it will not be retrofitted.

“Our innovative products and solutions along the boiler process chain are appropriate for the difficult process conditions of Turkish coal-fired power plants. The country has a considerable backlog of state-of-the-art technology for on-load boiler cleaning, materials handling and air pollution control, which we can provide backed by the experience of worldwide references”, says Franz Bartels, President & CEO of the Clyde Bergemann Power Group.

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## Waste heat recovery systems required worldwide



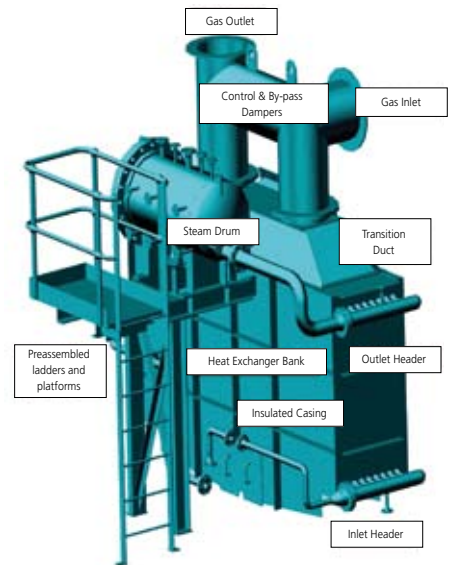
BP Refinery Bulwer Island - Brisbane, Australia

Having officially joined Clyde Bergemann Power Group, the last 12 months has been both hectic and exciting for Clyde Bergemann Senior Thermal (CBST), Australia. As designers and suppliers of economisers and waste heat recovery systems for the last 40 years, CBST have built an extensive installed base across the Pacific Rim. Now, with a vision to expand into new markets, CBST will use their years of knowledge and expertise in heat recovery to target new competitive overseas markets.

CBST's references have ranged from several hundred kilowatt of recovered heat to a 34 MW Heat Recovery Steam Generator (HRSG) at BP Refinery Bulwer Island in Brisbane. This plant was designed, manufactured, installed and commissioned by the Sydney operation in 1999.

One of the challenges for CBST is the marine waste heat boiler market and in particular FPSO (Floating Production Storage and Offloading). This is a growing market due to the need to process many marginal and deep ocean oil fields around the world. The customers are located in three main areas of the world, Houston in the USA, Norway and Singapore. In April 2007, CBST received their first order for waste heat recovery for FPSO from Prosafe Production Services (PSS). PSS are based in Singapore, the most important and highly competitive market where 70% of FPSO's are manufactured. The scope of supply included 3 x 210 T/hr Water Heaters recovering 13.56 MW of heat from three 14 MW Solar Gas Turbine Titan 130's due for delivery to Singapore in February 2008.

In addition to this order, CBST was awarded a contract for a land based waste heat recovery unit from Apache Energy in Western Australia (Varanus Island). This takes the number of waste heat recovery units supplied to the Apache facility in Varanus Island to nine in the past fifteen years.



Waste heat recovery from diesel exhaust

CBST can also specialise in waste heat recovery (WHR) reciprocating engine exhaust. A unit was recently shipped to an installation on the Island of Nauru where CBST designed and supplied three steam generators recovering heat from 2 x Paxman and 1 x Ruston Diesel Engine each producing approximately 1,500 kg/hr of saturated steam.

CBST waste heat recovery units offer the following advantages:

- Robust heating surface – Steel 'H' design
- Proven heat transfer performance over 40 years
- Delivered as largest transportable pieces thereby reducing site installation time and cost
- Increased thermal efficiency to the process
- Optional supplementary firing to increase heat recovery potential
- Ideal for retrofit applications
- Custom made designs are available for specific customer requirements
- Turnkey experience in delivery
- Low maintenance costs

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## ⋮ Clyde Bergemann head hunted and awarded 1.5 million euro contract



Kagal Power Station with newer unit 3 boiler in the foreground

Clyde Bergemann Ltd, Scotland has been head hunted by Hungarian Boiler Manufacturer, Transelektro, to refurbish two boilers at Kagal Power Station in Turkey. The total contract awarded to the group is worth an impressive 1.5 million euros, providing a huge boost to the Power Group's international market position.

For several years Turkey has struggled with a growing under-capacity problem and the Turkish Government and EUAS, which

owns and operates Kagal Power Station, had to decide whether building new power stations or modernising older boilers in existing stations, or indeed a combination of both would be the correct way forward.

To facilitate this decision, Transelektro, as the original equipment supplier to the power station, was appointed to undertake a feasibility study and as a result it was decided that the two older boilers at Kagal would under-go a refurbishment. Having already supplied an efficient, state-of-the-art sootblowing system on the newer Unit 3, Transelektro selected Clyde Bergemann Ltd as their key partner for this project.

All equipment was delivered before the end of 2007 to enable Transelektro to have both refurbished boilers fully operational in 2008.

Iain Carruthers, Sales Manager at Clyde Bergemann commented: "The decision to award this significant contract to Clyde Bergemann is a great recognition of our expertise and a testament to the high level of technical and commercial support we have provided over a period of two years during the feasibility study. This is an endorsement of the equipment we installed successfully on Unit 3 ten years ago, which is still operating effectively and efficiently."

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## ⋮ Modern and innovative sales tools to help drive market penetration in the US

Clyde Bergemann Americas (CBAM) has developed a new kind of sales tool designed to transport marketing materials to customers and help them understand the breadth and depth of its solutions. The first is a Clean Energy Solutions Technology Trailer which can be taken directly to power plants and boiler manufacturers and includes a full demonstration of the latest state-of-the-art products and solutions, including:

- A capabilities video that presents a broad supply of Clean Energy Solutions for our customers
- SMART CLEAN solutions that provide outstanding benefits to our customers

- Key components that differentiate our materials handling solutions including the eXTreme Rotary Valve and the Spheri Valve
- Air Pollution Control capabilities including SO<sub>2</sub>, Mercury, and particulate
- Aftermarket parts and service solutions

In addition, two smaller Regional Technology Trucks have been added to CBAM's portfolio of sales tools. These demonstration vehicles are smaller and can be altered with solutions that meet individual customer needs. They can be delivered to the customer by Sales Representatives which provides broader coverage of customers.



The Clean Energy Solutions Technology Trailer demonstrates on-site the capabilities of state-of-the-art technology

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## International Sales Conference indicates worldwide potential for energy and environmental technology

In early November 2007, the Clyde Bergemann Power Group invited more than 100 key personnel of the R&D and sales departments out of 20 countries to come to Bocholt in Germany for the annual exchange of ideas and experiences. The two day event focused on product innovations as well as successfully conducted customer projects. The presented market trends and figures show continued high potential for technologies made by the world market leader of power plant equipment.

The worldwide strong demand for new build fossil-fired power stations as well as the required modernisation of the existing plant fleet keep all 24 companies of the Clyde Bergemann Power Group confident of the future. The 30 percent increase in turnover from the previous fiscal year backs this rating.

Efficient power plant technologies are the main topic of the company's research and development work. The integration of process optimisation methods leads to intelligent systems providing optimized

plant condition and therewith increasing efficiency and plant availability. An optimized and efficient plant operation in turn is an important requirement for low-emission power generation.



Over 100 key personnel took part in the International Sales Conference

## Indian delegation visits Clyde Bergemann at German headquarters



The team congregate outside the Wesel office

Twelve chief engineers of the Indian utility Punjab State Electricity Board visited the German headquarters of Clyde Bergemann in Wesel to get an update on the latest products and solutions for on-load boiler cleaning and materials handling at coal-fired power stations. The two day visit is part of an eight-week professional training programme, coordinated by the "Kraftwerksschule e.V." in Essen, Germany.

The visitor group was particularly taken with SMART CLEAN, an on-load boiler cleaning principle invented by Clyde Bergemann. This technology that cleans boiler's heating and reaction surfaces is demand driven and targeted instead of executing fixed cleaning cycles.

The presented materials handling technology proved very suitable for specific process related challenges of coal-fired power stations in India. Bottom ash, as a result of coal-combustion, is normally handled by submerged scraper conveyor. But water is a very precious commodity in India. The materials handling system of Clyde Bergemann uses air to cool ash. This is a green technology and provides higher efficiency due to additional heat gain out of the re-burning effect.

In China, a country with comparable water shortage, first installations of DRYCON systems was concluded in 2007.

For Clyde Bergemann, India is a market with huge potential. Experts assume energy demand to increase minimum four times until the year 2032. Currently, more than half of the existing generation capacity is coal-fired but the total number of power plants needs to be increased significantly to avoid shortages.

## Major US utility modernizes 2,550 MW power station's on-load boiler cleaning system



Many coal-fired power stations around the globe are manufacturing and operating under arduous conditions which can result in a need for modernization, upgrades or maintenance of existing technologies within the plant. Clyde Bergemann Americas's (CBAM) solutions approach to the market, in line with the Group strategy, allows a close relationship to develop between CBAM and the customer in order to ascertain problem areas and present cost effective solutions to help improve boiler performance.

CBAM recently set out to support an installation in the Southwest of the US which has three 850 MW, supercritical boilers firing a blend of lignite and PRB coal and are in need of cleaning technology upgrades. In addition to derating by high reheater temperatures, the principal reasons for boiler inefficiency were an insufficient quantity of originally installed

sootblowers which had also become obsolete and ineffective despite excessive air consumption and tube leakage as a result of clinker fall and thermal fatigue.

After evaluating the boiler cleaning equipment and controls a proposal was submitted by CBAM which included an upgrade of the existing equipment to Clyde Bergemann SMART CLEAN technology. Sootblowers from the SMART range will replace the critical retractable sootblowers to increase cleaning effectiveness and reduce tube erosion. These blowers would also be installed on the front wall to prevent clinker formation.

In order to reduce the problem of thermal fatigue, a SMART CANNON system was recommended to improve cleaning effectiveness in the furnace. This would become a completely efficient closed-loop system with the implementation of

'Intelligent Sootblowing (ISB)' which would introduce sensors as diagnostics tools into the boiler to target 'only' the areas which require cleaning.

The power station awarded CBAM the contract to supply three complete SMART CLEAN ISB systems, one per boiler, as well as contract management. The project is currently underway and completion is projected for May 2008.

The new system at the US power plant is expected to recover \$21.5 million of annual cost savings by implementing this solution realizing an investment payback period of only 5 months.

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## ☐☐☐ Clyde Bergemann do Brasil is well positioned to pursue the growing opportunities in Brazil and South America

Due to strong economic development in recent years Brazil is now the largest economy in Latin America and the ninth largest economy in the world. Its industrial sector accounts for three fifth of South American industrial production as a whole and the pulp and paper industry especially continues to provide good opportunities for business.

As a pioneer and leader in the manufacture of short fiber eucalyptus pulp, pulp & paper companies in Brazil have, over the past ten years, increased the capacity of their existing mills and invested in several new ones providing good opportunities for Clyde Bergemann's cleaning solutions for chemical recovery boilers.

Clyde Bergemann do Brasil's (CBdB) sales coverage now includes most of South America – also for other production facilities of Clyde Bergemann Power Group (CBPG). The company helped to win the majority of recovery service sootblower orders for new chemical recovery boilers and it is now well established as the market leader in this sector throughout Brazil and South America.

In 2004 CBdB moved under the new leadership of General Manager Nelson Takahashi into its new facility in Mogi Guacu, São Paulo with skilled staff to allow for further growth in the service sector and facilitate local manufacture. Since then, more than 300 sootblowers have been manufactured and installed successfully in several projects and CBdB has also been contracted to supply all parts and perform sootblower maintenance by local pulp and paper mills.



Aracruz Celulose Pulp Mill, Brazil is installed with 260 Clyde Bergemann sootblowers

Following the global growth of energy demand, Brazil also needs more power generation capacity to satisfy future needs. While currently over 90% of the 58 GW of installed capacity is provided by hydro power plants, coal is expected to play a larger role in Brazil's power generation. Several projects for coal-fired plants are already being planned and pursued providing further opportunities for CBdB to expand future market activities for all product lines including on-load boiler cleaning, materials handling and air pollution control.

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## ☐☐☐ First contract to supply Selective Catalytic Reduction system in China

In recent years, with the increase of Government attention to environmental protection, Selective Catalytic Reduction (SCR) has been developed and implemented step by step. The market for SCR in China is fast growing and 150,000 MW is expected to be installed in China by 2020 as part of a program to reduce NOx emissions.

Clyde Bergemann Huatong (CBH), Beijing won their first contract to supply an SCR system in September 2007 to be installed on Unit 5 of Tongling power plant, China.

Tongling power plant phase VI project is an expansion project with 2 x 1000 MW units, among which Unit 5 will be installed with the SCR system.

The SCR technology supplied by CBH is based on the license agreement between Clyde Bergemann Power Group (CBPG) and STEAG LLC signed in May 2006. The sub-license agreement was then signed between CBPG and CBH in August 2006 giving CBH authorization to develop SCR business in China's mainland territories and in Hong Kong.

local manufacturers taking over the supply of equipment and components which are normally imported. Therefore, developing this business will be a challenge in such a competitively intense market however CBH's marketing policy is continuing at a steady and positive pace, making breakthrough at key points, and achieving successful reference.



Illustration of the Tongling Power Plant

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Boiler manufacturers and a large number of engineering companies are actively marketing the SCR technology as well as

## Events Diary

| FEBRUARY  | MARCH   | APRIL  |
|---|---|--|
| <p><b>Maintenance of Power Plants</b><br/>13th - 14th February 2008<br/>Bochum, Germany</p> | <p><b>National Sales Meeting</b><br/>10th - 11th March 2008<br/>Baltimore, MD USA</p> | <p><b>BLRBAC USA</b><br/>7th - 9th April 2008<br/>Atlanta, USA</p>   |
|   | <p><b>PowerGen India</b><br/>26th - 28th March 2008<br/>New Delhi, India</p>          | <p><b>Africa Power &amp; Electricity Congress &amp; Exhibition 2008</b><br/>15th - 16th April 2008<br/>Gauteng, South Africa</p> |
|   |   | <p><b>Russia Power</b><br/>15th - 17th April 2008<br/>Moscow, Russia</p>   |

## Personnel Developments



**Roger Lawton** has been appointed as Vice President of Sales for **Anthony Ross Company, USA**. He has had a long history of key leadership roles in the pulp and paper industry prior to arriving at Anthony Ross.



**Dilip Kumar Sinha** joined the Clyde Bergemann Team as Managing Director of **Clyde Bergemann India Pty Limited**. He will build our operations in India and promote our products and solutions portfolio in the growing Indian market.



**Dr. Christian Mueller** has been appointed Leader of the **Clyde Bergemann Power Group** R&D Team coordinating worldwide all activities in this section.



**Michael Shirlow** has joined **Clyde Bergemann Senior Thermal** in Australia as Commercial Manager.

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