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GlobalData

FLUE-GAS DESULFURIZATION SYSTEMS MARKET ANALYSIS TO 2020, 2013 UPDATE - GLOBAL MARKET SIZE, EQUIPMENT MARKET SHARE, COMPETITIVE LANDSCAPE, REGULATIONS AND PRICING ANALYSIS

Executive Summary

High Dependency on Coal and Stringent Emission Regulations to Drive Flue-Gas Desulfurization System Installations

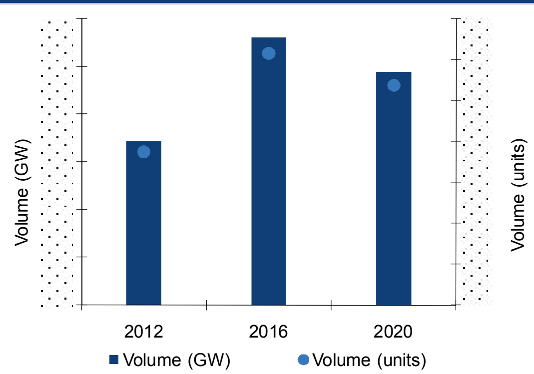
Electricity generation globally is dominated by fossil fuels. With the exception of a few countries, the capacity of fossil-fuel-fired power plants far outweighs the capacity of the alternative sources of energy such as wind, hydro and others. Coal is the dominant fuel used in thermal power plants. The downside of this over-dependence on fossil fuels, especially coal, has been the emissions released into the environment by burning these fuels. Sulfur dioxide (SO2) has had a devastating effect on the environment and the health of living beings all over the world. With such dependence on coal, demand for equipment that could check the pollution caused by coal is huge and will only increase until an efficient and economical method for replacing coal is found. The Flue-Gas Desulfurization (FGD) system is one of the most effective of the technologies used in limiting sulfur emissions.

A number of countries, in order to reduce the emissions from power plants, have formulated stringent regulations. International agreements such as the Kyoto Protocol have set targets for greenhouse gas emission reductions. Moreover, there are selective regulations by a large number of countries to curb sulfur oxide (SOx) emissions.

In the US, the government introduced the Clean Air Interstate Rule and revisions to the Acid Rain Program in 2005 to reduce the US's SO2 emissions. In the UK, the revised Large Combustion Plant Directive (LCPD) in 2008 was put in place, setting new emission limit values for SO2. China has the Atmospheric Pollution Prevention and Control Law (APPCL), which was amended in 2005. This law mandates that all new power plants that exceed the set SO2 emission levels must install a FGD system and de-dusting equipment. These regulations will only get more stringent as time progresses, driving the market for FGD systems. Global FGD system sales are estimated to total XX units between 2012 and 2020.

The chart below shows the global market volume of FGD systems for the years 2012, 2016 and 2020.

Flue-Gas Desulfurization Market, Global, Volume (GW, Units), 2012, 2016 and 2020



Source: GlobalData, Power eTrack [Accessed on October 15, 2013]

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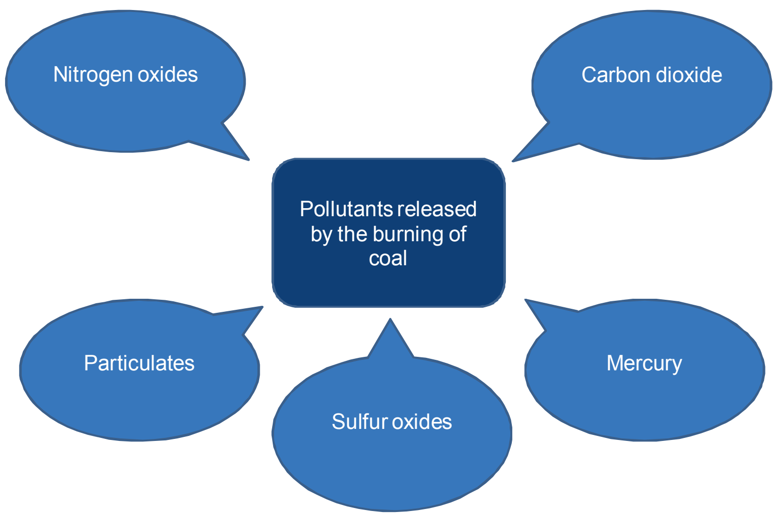
2 Introduction

Coal is a dominant source of energy, and is employed globally as one of the most efficient and economical methods of electricity generation. However, the downside of the fuel is that it's burning releases large amounts of gases that are extremely harmful for the environment. This is due to the pollutants released in the atmosphere by the combustion of coal. Coal has a significant amount of impurities in it. Along with carbon, as a prime constituent, it also contains sulfur, hydrogen, oxygen and nitrogen. When coal is burned in power plants to drive steam turbines, considerable amounts of pollutants are emitted into the environment.

Figure 1: Pollutants Released into Environment by Burning of Coal



Source: GlobalData

Sulfur is one of the main elements in the earth's crust. It is identified most commonly as an impurity in coal, crude oil and other ores. Hence, whenever coal, oil or other derived fuels are burned, sulfur is emitted on a large scale. Sulfur oxides (SO_x) are one of the major pollutants from industrial power plants.

Sulfur dioxide (SO_2) is the predominant form of SO_x. It is produced by volcanoes and by burning fuels such as coal and oil. SO_2 emissions create acidic rain and particulate soot. Both of these pose significant risks to our health.

2.2 GlobalData Report Guidance

- The report begins with an executive summary that provides a snapshot of the key indicators in the global FGD systems market.
- Chapter two covers the report introduction, an overview of the pollutants emitted by power plants and their preventative measures. It also covers the types of FGD processes in detail.
- Chapter three discusses the global FGD market, explaining the drivers and restraints of the market. It also provides details about the market volume, market value, and the market share of the global FGD businesses.
- Chapter four discusses the FGD market in the US, describing market volume, market value, average price, market share and regulations.
- Chapter five contains the FGD market in the UK, explaining market volume, market value, market share, average price and regulations.
- Chapter six covers Spain's FGD market, explaining market volume, market value, market share, average price and regulations.
- Chapter seven covers the FGD market in Germany, explaining market volume, market value, market share, average price and regulations.
- Chapter eight covers the FGD market in China, explaining market volume, market value, market share, average price and regulations.
- Chapter nine covers the FGD market in India, explaining market volume, market value, market share, average price and regulations.
- Chapter 10 covers the FGD market in South Korea, explaining market volume, market value, market share, average price and regulations.
- Chapter 11 covers the FGD market in Saudi Arabia, explaining market volume, market value, market share, average price and regulations.
- The report ends with an appendix section.

Introduction

Please note: The scope of the market analysis data provided in this report is limited to FGD systems in thermal power plants only. Market values have been rounded off throughout the report, which may result in some minor discrepancies caused by errors in the rounding-off. In the tables in the pricing analysis sections, '-' is used to indicate the years in which the actual sale of FGD systems did not occur.

3.4 Flue-Gas Desulfurization Systems Market, Global, Market Volume, 2006–2020

The increasing demand for electricity owing to the growing population and economic development worldwide is the most important factor for the growth of the global FGD market. Thermal power is still the dominant source of energy in the world and although its share is scheduled to decrease, it will remain as one of the most important sources of power for many years. With many new coal-fired plants scheduled to come online in the near future all over the world, the FGD market is expected to grow and experience significant new activities.

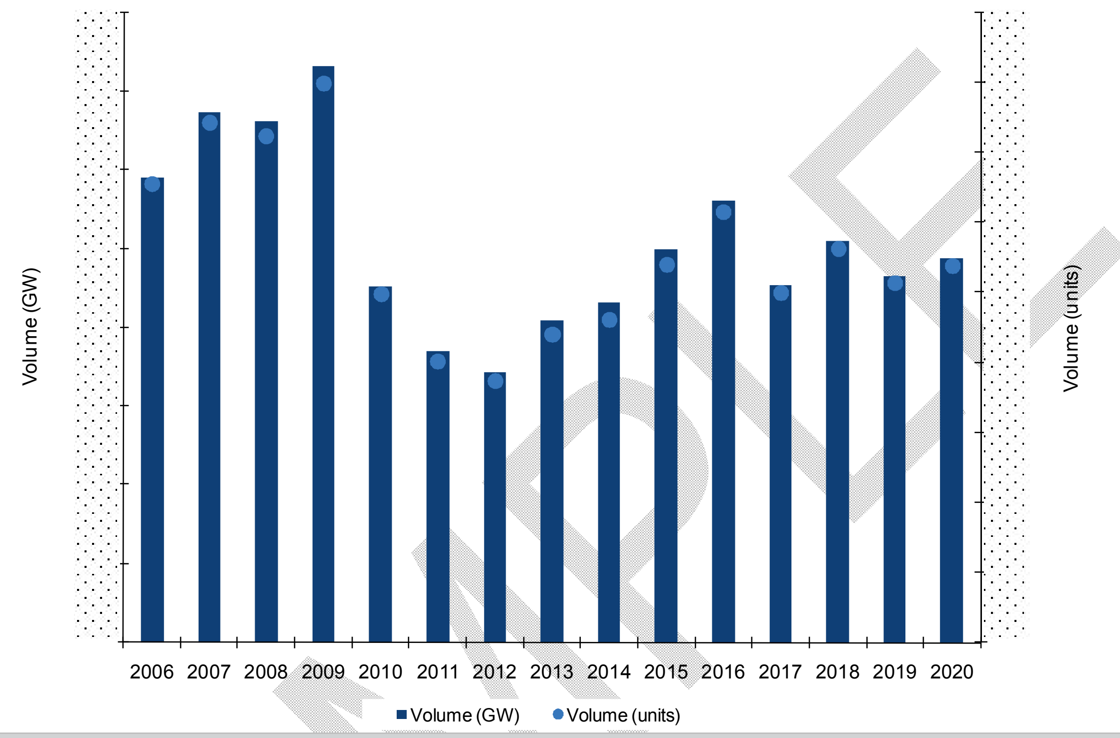
Between 2006 and 2012 there was a sharp rise in the FGD market. The overall increased awareness of people regarding emissions and their harmful impact helped this growth. The number of FGD systems sold in a year increased from XX units in 2006 to XX units in 2009. However, the market experienced a slump after 2009 as a result of the economic crisis. The liquidity crunch that followed the sub-prime crisis resulted in an absence of financing options for various projects, which, along with investors' lack of confidence in most of the projects, resulted in the overall decline of the market. With increasing numbers of power plant projects being abandoned, the global FGD market received a strong hit and its growth was checked. Moreover, the development of the FGD market globally was sluggish between 2010 and 2012, partly because countries failed to impose strict regulations to install FGD in power plants. As a result, the number of FGD units sold decreased from XX units in 2010 to XX units in 2012.

With the expected introduction of more stringent norms and adoption of emission norms in countries where currently there are none, the FGD systems market is expected to grow. The sales volume of FGD systems is expected to increase from XX units in 2013 to around XX units by 2020.

Flue-Gas Desulfurization Systems Market, Global

The figure below shows the global FGD systems market volume between 2006 and 2020.

Figure 8: Flue-Gas Desulfurization Market, Global, Volume (GW, Units), 2006–2020



Source: GlobalData, Power eTrack [Accessed on October 24, 2013]

Flue-Gas Desulfurization Systems Market, Global

The table below indicates the global FGD systems market volume between 2006 and 2020.

Table 1: Flue-Gas Desulfurization Market, Global, Volume (GW, Units), 2006–2020

Year	Volume (GW)	Volume (units)
2006		
2007		
2008		
2009		
2010		
2011		
2012		
2013		
2014		
2015		
2016		
2017		
2018		
2019		
2020		

Source: GlobalData, Power eTrack [Accessed on October 24, 2013]

4.5 Flue-Gas Desulfurization Systems Market, US, Market Share Analysis, 2012

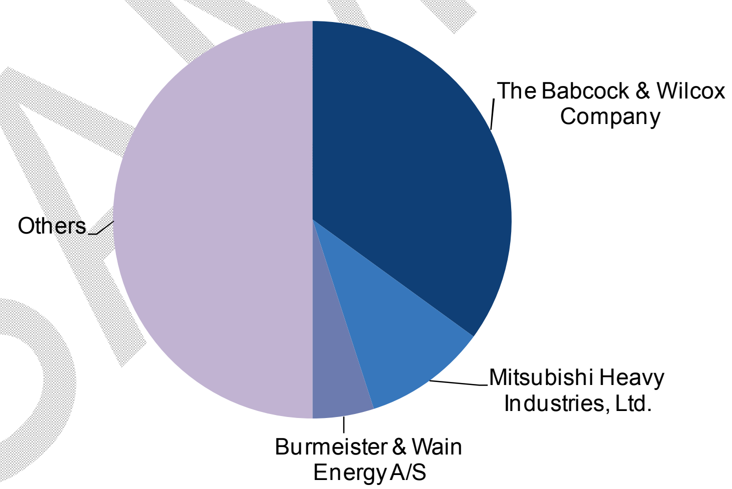
There is one company that has completely dominated the FGD systems market in the US. B&W has been leading the market in the country for many years. No other company has come close to B&W in terms of market value. The brand name of B&W and the expertise of its operations are the main reasons for its dominance in the US. In 2012, the company again led all other players in the market, with a significant share of XX%.

MHI is another player in the FGD market in the country. In 2012, it was the distant second-largest player in the market, accounting for a XX% share.

Burmeister & Wain Energy A/S (BWE) has been in close competition with MHI to secure the third-position in the FGD systems market. BWE specializes in designing advanced Ultra Super Critical (USC) steam boilers and other power equipment for utility power stations worldwide. In 2009, it attained a XX% share of the FGD systems market in the country.

The figure below represents the share of the key players in the FGD system market in the US in 2012.

Figure 14: Flue-Gas Desulfurization Market, US, Market Share (%), 2012



Source: GlobalData, Power eTrack [Accessed on October 15, 2013]

12 Appendix

12.1 Definitions

12.1.1 Power

Power refers to the rate of production, transfer, or energy use, usually related to electricity. It is measured in watts and often expressed in kilowatts (kW) or megawatts (MW), and is also known as ‘‘real’’ or ‘‘active’’ power.

12.1.2 Installed Capacity

Installed capacity refers to the generator’s nameplate capacity as stated by the manufacturer or the maximum rated output of a generator under given conditions. It is given in Megawatts (MW) on a nameplate affixed to the generator.

12.1.3 Active Installed Capacity

Active installed capacity refers to the component of electric power that actually performs work. It is given in kilowatts (kW) or Megawatts (MW).

12.1.4 Electricity Generation

Electricity generation is the production of electric energy by transforming other forms of energy. It also refers to the amount of electric energy produced, expressed in Gigawatt hours (GWh).

12.1.5 Electricity Consumption

Electricity consumption is calculated by adding electricity generated and imports, minus exports and transmission and distribution losses. It is measured in Gigawatt hours (GWh).

12.1.6 Coal-Fired Power Plant

A coal-fired power plant produces electricity from the combustion of coal.

12.1.7 Flue-Gas Desulfurization

Flue-gas desulfurization is one of the most effective and popular processes for removing the SO_2 from the flue gas emitted by large coal-fired power plants.

12.1.8 Renewable Energy Resources

Renewable energy resources are naturally replenishing energy resources that are limited in the amount of energy that is available per unit of time. Biomass, geothermal, solar, small hydro and wind are all examples of renewable resources.

12.2 Abbreviations

Table 40: Abbreviations

Abbreviation	Expanded form
APP	Asia-Pacific Partnership
APPCL	Atmospheric Pollution Prevention and Control Law
ARRA	American Reinvestment and Energy Act
B&W	Babcock & Wilcox Company
BACT	Best Available Control Technology
BCD	Basic Customs Duty
BHEL	Bharat Heavy Electricals Limited
CAA	Clean Air Act
CAGR	Compound Annual Growth Rate
CAIR	Clean Air Interstate Rule
CCC	Central Advisory Committee on Climate Change
CCGT	Combined Cycle Gas Turbine
CCL	Climate Change Levy
CCPI	Clean Coal Power Initiative
CCRR	Coal Combustion Residential Rule
CCTP	Climate Change Technology Program
CCUS	Carbon Capture, Utilization and Storage
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reductions
CERC	Central Electricity Regulatory Commission
CESA	Clean Energy Standard Act
CFB	Circulating Fluidized Bed
CHP	Combined Heat and Power
CIL	Coal India Limited
CSAPR	Cross State Air Pollution Rule
CCS	Carbon Capture and Sequestration
CVD	Concessional Countervailing Duty
DECC	Department of Energy and Climate Change

Appendix

DoE	Department of Energy
EC	European Commission
EC Scheduling	Energy Conservation Power Generation Scheduling
ECRA	Electricity and Cogeneration Regulatory Authority
EEX	Leipzig Energy Exchange
EIEA	Energy Improvement and Extension Act
ELVs	Emissions Limit Values
EPA	Environmental Protection Agency
EPS	Emission Performance Standard
ESP	Electrostatic Precipitators
EUA	Emission Allowance
FDI	Foreign Direct Investment
FGD	Flue-Gas Desulfurization
FSA	Fuel Supply Agreement
FYP	Five-Year Plan
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GHGRR	Green House Gas Reporting Rule
GW	Gigawatt
GWh	Gigawatt hours
HCL	hydrogen chloride
ID	Induced Draught
IEF	Integrated Energy Facility
IEP	Innovation for Existing Plants
IESA	Integrated Energy Supply Areas
IGCC	Integrated Gasification Combined Cycle
JI	Joint Implementation
KfW	Bankengruppe
kW	kilowatt
LAER	Lowest Achievable Emission Rate
LCPD	Large Combustion Plant Directive
LOA	Letter of Assurance
LSS	Large Substitute for Small
m	million
MACT	Maximum Achievable Control Technology
MEP	Ministry of Environmental Protection
MET	Marsulex Environmental Technologies
mg/m^3	milligrams per cubic meter
$\mu g/m^3$	micrograms per cubic meter

Appendix

MHI	Mitsubishi Heavy Industries
MKE	Ministry of Knowledge Economy
MOC	Ministry of Commerce
mtoe	million tons of oil equivalent
MW	Megawatt
MWh	Megawatt hour
NAPCC	National Action Plan on Climate Change
NAAQS	National Ambient Air Quality Standards
NDRC	National Development and Reform Commission
NEP	National Electricity Policy
NERP	National Emissions Reduction Plan
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NETL	National Energy Technology Laboratory
NO_x	mono-nitrogen oxides
NSPS	New Source Performance Standards
NSR	New Source Review
NTP	National Tariff Policy
O&M	Operation and Maintenance
OEMS	Original Equipment Manufacturers
Ofgem	Office of Gas and Electricity Markets
PFBC	Pressurized Circulating Fluidized Bed
PM	Particulate Matter
PME	Presidency of the Meteorological and Environment
PPA	Power Purchase Agreement
ppb	parts per billion
PPII	Power Plant Improvement Initiative
ppm	parts per million
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
RCRA	Resource Conservation and Recovery Act
RfP	Request for Proposals
RfQ	Request for Qualification
RoE	Return on Equity
RRGI	Regional Greenhouse Gas Initiative, Inc.
SCR	Selective Catalytic Reduction
SEB	State Electricity Board
SERC	State Electricity Regulatory Commission
SIPss	State Implementation Plans
SNCR	Selective Non-Catalytic Reduction

Appendix

SO_2	sulfur dioxide
SO_3	sulfurous acid
SO_x	sulfur oxides
SPV	Special Purpose Vehicle
T&D	Transmission and Distribution
TEHG	Treibhausgas-Emissionshandelsgesetz
USC	Ultra Super Critical
ZuG	Zuteilungsgesetz
Source: GlobalData	

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Appendix

12.4 Research Methodology

GlobalData's dedicated research and analysis teams consist of experienced professionals with a pedigree in marketing and market research, consulting backgrounds in the energy industry, and advanced levels of statistical expertise.

GlobalData adheres to the Codes of Practice of the Market Research Society (www.mrs.org.uk) and the Strategic and Competitive Intelligence Professionals (www.scip.org).

All GlobalData's databases are continuously updated and revised. The following methodology has been followed for the collection and analysis of data presented in this report.

12.4.1 Coverage

The report provides comprehensive coverage of global FGD systems market developments for the period from 2006 to 2012 and expected market trends for the period from 2013 to 2020 and the market developments for the following countries: the US, the UK, Spain, Germany, China, India, South Korea and Saudi Arabia. Detailed coverage is provided for the following major topics:

- FGD systems market volume trends (2006 to 2020)
- FGD systems market value trends (2006 to 2020)
- FGD systems market share (2012)
- FGD systems pricing analysis (2006 to 2020)
- Renewable policy changes, financial incentives and policy support for thermal power and updates by country

12.4.2 Secondary Research

The research process begins with exhaustive secondary research within GlobalData's own databases and external sources.

Investment estimates and market growth rates are arrived at by taking the following into consideration:

- Statistics and historical trends provided by government bodies, industry associations and equipment vendors
- Utility expansion plans

- Government and private sector investment
- Government regulations and policies
- GlobalData's proprietary databases such as Capacity and Generation Database and Equipment Markets Database
- Other insights built through secondary research and analysis of company websites, annual reports, investor presentations, industry and trade journals, and association data.

12.5 Disclaimer