## A Few Recent References

<table>
<thead>
<tr>
<th>Company/Name</th>
<th>Year Built</th>
<th>Fuel</th>
<th>Capacity (MW)</th>
<th>Net Plant Efficiency</th>
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<tr>
<td>Tata Steel BSL Ltd, Dhanbad, Jharkhand</td>
<td>2015</td>
<td>Coal</td>
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<td>NTPC, Chilka, Orissa</td>
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<td>NTPC, Sail, Orissa</td>
<td>2011</td>
<td>Coal</td>
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<td>NTPC, NEDPL, Orissa</td>
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<td>105%</td>
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<td>NTPC, NEDPL, Orissa</td>
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<td>2008</td>
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<td>NTPC, NEDPL, Orissa</td>
<td>2007</td>
<td>Coal</td>
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<td>105%</td>
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**Isogec Offerings**

- **STEAM GENERATORS**
  - Circulating Fluidized Bed (CFB) Steam Generators
  - Atmospheric Fluidized Bed (AFB) Steam Generators
  - TGL/THL/TLH/TLG/SLG Steam Generators
  - CFB Coal Fired Steam Generators
  - LHS Boiler Steam Generators
  - LHS Boiler Steam Generators
- **AUXILIARY EQUIPMENT**
  - Fuel Feed Systems
  - Boiler Feed Water System
  - Boiler Feed Water System
- **STEAM GENERATOR SERVICES**
  - Run-up, Commissioning, & Startup Services
  - Start-up Services
  - Startup Services
  - Startup Services
  - Startup Services
  - Startup Services
  - Startup Services
  - Startup Services
  - Startup Services
  - Startup Services
- **EPC PROJECTS**
  - Industrial Power Plants
  - Refineries
  - Sugar Mills
  - Thermal Power Plants
  - Water Treatment Plants
  - Desalination Plants

**Isogec Heavy Engineering Ltd.**

Isogec Heavy Engineering Ltd. is a leading manufacturer of steam generators, auxiliary equipment, and EPC projects in India. With over 30 years of experience, Isogec has successfully delivered a wide range of projects across various sectors, including power, petrochemicals, and mining. The company is committed to delivering high-quality products and services that meet the needs of its customers globally. For more information, please visit www.isogec.com.
Circulating Fluidised Bed Combustion Boilers

Advantages / Features

Widest Fuel Flexibility
- Capable of firing a wide variety of fuels
  - Lignite, Peat, Sludge, high Moisture (up to 90%)
  - Indian Coal, Washery Rejects, Char - High Ash (up to 46%)
  - Lignite, Peatcoke - High Sulphur (up to 8.2%)
  - Petcoke, Washery Rejects, Char - Low Ash (up to 16%)
- Coals from Indonesia / South Africa / Colombia - Low Ash (up to 4%)
- Char, Woodchips, Washery Rejects - Low heating Value Fuels
- Proven for firing Flue Gas Desulphurisation (FGD) sludge

High Efficiency
- Potential Compact Separator design
- 99.99% collection efficiency for particle size > 60 microns
- Solids recirculation up to 100 times
- Special design of air nozzles for uniform air distribution and efficient combustion
- Tall furnaces, high residence time, and uniform furnace temperature
- Ash classification and cooling using efficient ash coolers

High Reliability and Availability
- Minimum refuelling
- No expansion joint between furnace & compact separator
- Water cooled cross-over duct and combination gages
- Most heavy surfaces located in the second pass after the Compact Separator, thereby minimizing pressure parts failures
- Advanced flak out design (generated at lower furnace) to prevent erosion
- Elimination of maintenance prone mechanical seals in oil separator return leg
- Simple and efficient from flak out feeding, elimination of back firing using high pressure air pulse in fuel tanks
- Elimination of unspent refractory downtime due to cooled compact separator and advanced refractory system with dense flat pattern

Global Experience of Project Execution
- Experienced in executing CFBC Boiler projects globally
  - Including Latin America, Turkey, Morocco, Indonesia, Jordan, and Vietnam
- Recent CFBC Boiler Orders from Corporate Houses
  - DCM Bharat, Nirwa, Wasture, Aditya Mira, Bharatwaj,乙烯, Balkrishna, Nirma Ltd.
-Supplied CFBC Boilers in Representatives and Petrochemical Plants - NPCIL, Mitali Energy and IOCCL
- Latest software tools used for engineering - Tecos for Structural Modeling, News for Circulation Checks, 3D Modelling, and CFD Analysis etc.
- On-site visits by IGECC domain specialists at various stages of installation for critical checks
- Special attention paid to furnace alignments and refractory work during construction

CFBC Boiler with Compact Separator

- Largescale E/CHP
- Reduced maintenance due to compact separator design
- High efficiency and high availability
- Advanced flak out design (generated at lower furnace) to prevent erosion
- Elimination of maintenance prone mechanical seals in oil separator return leg
- Simple and efficient from flak out feeding, elimination of back firing using high pressure air pulse in fuel tanks
- Elimination of unspent refractory downtime due to cooled compact separator and advanced refractory system with dense flat pattern
- On-site visits by IGECC domain specialists at various stages of installation for critical checks
- Special attention paid to furnace alignments and refractory work during construction

Key Benefits
- Advanced FBC Technology
- Clean Burning Process
- Low Combustion Temperature and High Turbulent Mixing is Key for meeting stringent Environmental norms and Higher Combustion Efficiency

Environmental Friendliness
- Low NOx emission due to slagging combustion and controlled combustion temperature
- Low SOx emission due to uniform combustion temperature and effective flue gas evacuation
- Low CO emission due to efficient carbon burn out
- Efficient ash coolers make ash disposal easier
- Lower unburnt carbon in fly ash allows for industrial use facilitating environment drawbacks
- Reduced particulate emission due to increased fuel and sorbent residence time in dense lower combustion zone.

Key Features
- 2 x 125 TPH CFBC Boiler & 2 x 45 TPH Unit at Bhilai steel plant of JSW Steel Ltd. of the IISCO group (India)
- Supplied 125 TPH CFBC Boiler at Tatas Steel Ltd., Jamshedpur for 75 MW Copper Concentrator Plant

Cover Picture: 415 TPH Steam line type CFBC boiler at JSW Energy Ltd., Jhargram, Superhot for 75 MW Copper Concentrator Plant
Circulating Fluidised Bed Combustion Boilers

Advantages / Features

- Widest Fuel Flexibility
  - Capable of firing a wide variety of fuels
    - Lignite, Peat, Slag - High Moisture (up to 90%)
    - Indian Coal, Washed Rejected, Char - High Ash (up to 49%)
    - Lignite, Peat - High Sulphur (up to 6.2%)
    - Peat, Washed Rejected, Char - Low Volatiles (up to 14%)
  - Coal from Indonesia / South Africa / Colombia - Low Ash (up to 4%)
  - Char, Melting, Washed Rejected - Low heating Value Fuels
  - Proven for firing Fictious Biomass fuels such as Julia Fiber, Wood Chips, Saw Dust, Rice Husk, Cotton Stalk,
  - Capable of firing Oil and Gas.

- High Efficiency
  - Potential Compact Separator design, 95.50% collection efficiency for particle size > 65 microns.
  - Solid recirculation up to 100 times.
  - Special design of air nozzles for uniform air distribution and efficient combustion.
  - Tall furnace, high residence time, and uniform furnace temperature.
  - Ash classification and cooling using efficient ash coolers.

- Reliability and Availability
  - Minimum refractory.
  - No expansion joint between furnace & compact separator.
  - Water cooled cross-over duct and connection vagnes.
  - Most heating surfaces located in the second pass after the Compact Separator, thereby minimizing pressure part failures.
  - Advanced link out design (generator) at lower furnace to prevent erosion.
  - Elimination of maintenance prone mechanical seals in solid separator return leg.
  - Simple and efficient from ash handling, Elimination of back firing using high pressure air bubble in fuel chutes.
  - Elimination of unplanned refractory downtime due to cooled compact separator and advanced refractory system with dense ash pattern.

- Global Experience of Project Execution
  - Experienced in executing CFBC Boiler projects globally including Latin America, Turkey, Morocco, Indonesia, Jordan, and Vietnam.
  - Recent CFBC Boiler Orders from Corporate Houses - DSM Shri Ram, Nirma, Wastech, Anodyne, Birla, Bajaj Eustach, Gajendra Group, Dalsey Cement, etc.
  - Supplied CFBC Boilers in Parameters and Performance Points - HPLC-Mittal Energy and IOCCL.
  - Latest software tools used for engineering - Tools for Structural Modeling, News for Circulation Check, 3D Modeling, and 3D Analytic etc.
  - On-site visits by Isgec domain specialists at various stages of installation for critical checks.
  - Special attention paid to furnace alignment and refractory work during construction.

Ispec has an established technology tie-up with Sumitomo SHI FW and Isgec for Uncluttered Fluidized Bed Combustion (CFBC) Boilers.

Sumitomo SHI FW is a world leader in CFBC technology, with the ability to supply the patented high efficiency water/water cooled Compact Separator design, which has been proven worldwide to improve availability & minimize maintenance, lower SOx & NOx emissions, minimize startup time, and eliminate erosion & cracking, which reduce the lifetime of boilers.

The relationship between Isgec & Sumitomo SHI FW Energy goes deeper, since we also have a Joint Venture company - Isgec SHI Boilers Pvt. Ltd.

Key Benefits

- Advanced CFBC Technology
- Clean Burning Process
- Low Combustion Temperature and High Turbulent Mixing is key for meeting stringent Environmental norms and higher Combustion Efficiency

Sumitomo SHI FW Energia & Isgec 500 CFBC Installations Worldwide including 85 in India

CFBC Boiler with Compact Separator

- Water cooled, larger ducts for reduced support and increased efficiency.
- Reduced heat transfer area for reduced refractory and furnace wear.
- Ceramic refractory in separator ensures longer life of refractory.
- Compact separator design is the best in the market.

- Low maintenance, stability, and efficiency.

- Liquid ash cooler with air-cleaning mechanism and 3 years warranty.

- Full-featured water washable biogas cooler, suitable for syngas and gasification applications.

- Compact separator design is the best in the market.
A Few Recent References

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Date of Reference</th>
<th>Location</th>
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<tbody>
<tr>
<td>Sea Steel BDL Ltd. (Dhaka) Ltd</td>
<td>2 x 5 MT</td>
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<tr>
<td>Home Oil Co., Ltd. (Kolkata)</td>
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<tr>
<td>Walcon (I) Ltd. (Gandhinagar)</td>
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<td>HPCD Metal Energy Ltd. (Pune)</td>
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<td>Shriram Metal &amp; Chemical Ltd.</td>
<td>3 x 2 MT</td>
<td>New Delhi</td>
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<td>Bharat Steel Power Ltd., (Madras)</td>
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<tr>
<td>Kushi Industries Ltd., (Surat)</td>
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<td>Modern Carbon Ltd., (Cochin)</td>
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<tr>
<td>IJIT Heavy Engineering Ltd.</td>
<td>3 x 2 MT</td>
<td>Navi Mumbai</td>
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</table>

CFBC Boilers
(Under exclusive license from Sumitomo SHI FW Energia Oy, Finland)

Isgec Offerings

- **Steam Generators**
  - Air-Heated Steam Generators
  - Twin Drum Steam Generators
  - Wet-Back and Dry-Back Steam Generators

- **AUXILIARY EQUIPMENT**
  - Motors
  - Valves
  - Electrical & Instrumentation
  - Burners
  - Fuel Oil Systems
  - OCS
  - Forced Draft

- **STEAM GENERATOR SERVICES**
  - Installation & Commissioning
  - Retrofitting & Modernization
  - Replacement & Upgradation
  - Customization
  - Turnkey Projects
  - O&M Services
  - Boiler & Aux. Spare Parts

- **EPIC PROJECTS**
  - Carbon Steel Plants
  - Steel Plants
  - Valves, Insulations
  - Water Treatment Plants

- **Feed Cyste Equipment** (HP Header, LP Header & Condenser)
- Process Equipment • Presses • Castings • Material Handling • Contract Manufacturing

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Tel: +91-120-4395000, 4395001
Email: isgec@isgec.com
www.isgec.com

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<tr>
<th>Customer/Name</th>
<th>Unit</th>
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<td>Bhopal</td>
<td>120</td>
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<td>Home Ltd (Indira)</td>
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Vesal, Kuku (process of Steam)

An innovative part of our interactive learning process, this unique & one-of-a-kind show helps students on grid-connected turbines as to how our knowledge base and help improve our technology. It also enhances our understanding of how our learning process is not restricted to the classroom experience.

- Display of a wide variety of fuel that Isgec boilers are capable of using.
- 3D & 2D Boiler Models representing the wide variety of technologies that Isgec offers.
- Wide range of Controls and Boiler Parts from different stages of operation.
- Various kinds of features demonstrated.
- Boiler RPM (Remote Performance Monitoring System)
- Housing 100's of case studies and is a bank of experience of more than 6 decades.

Isgec Offersings

- Steam Generators
- Feedwater Heaters
- Condensers
- Process Equipment
- Control & Automation
- Material Handling
- Contract Manufacturing

CFBC Boilers

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Isgec Heavy Engineering Ltd.

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