

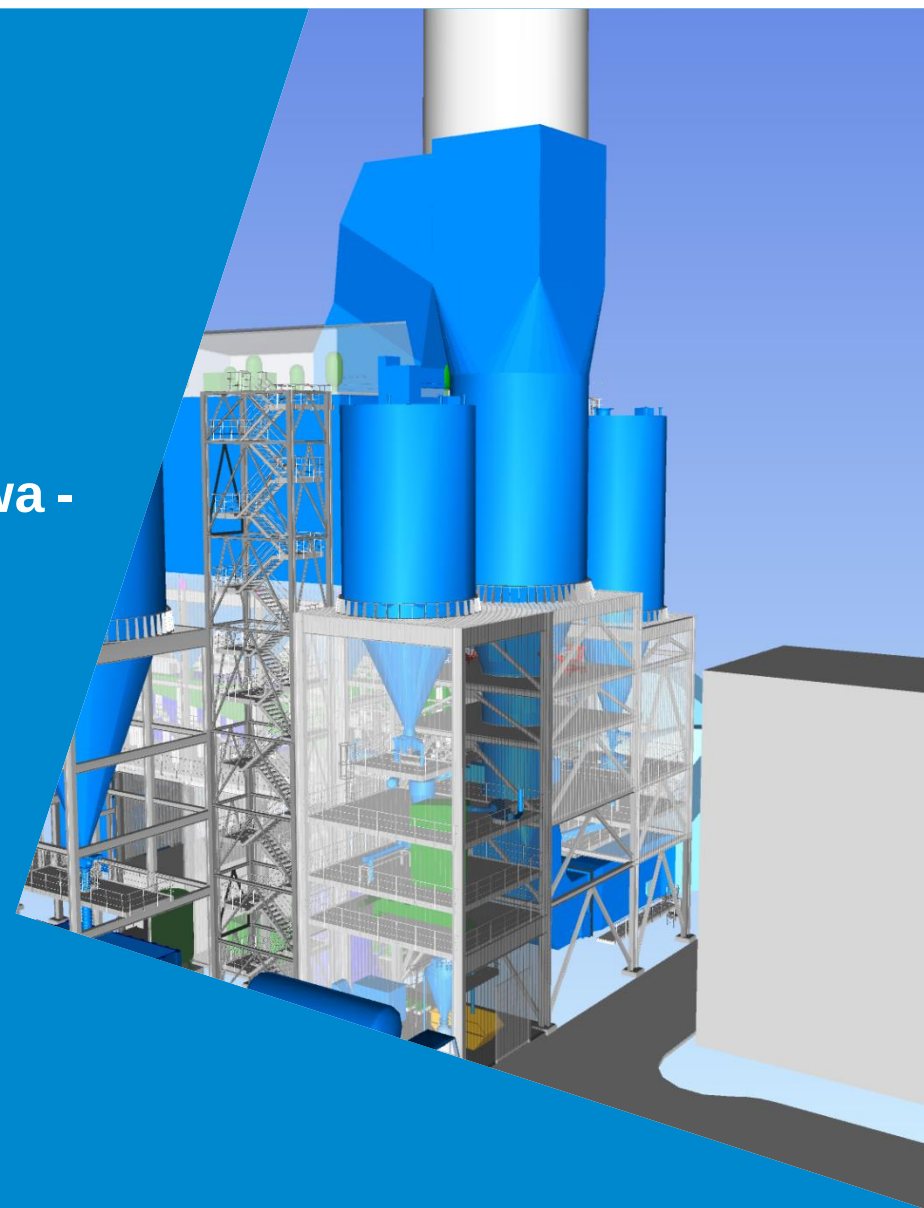
„Oczyszczanie spalin, AQCS, technologie odsiarczania i systemy odpylania“

Polsko-Niemiecka Izba Przemysłowo-Handlowa -
Konferencja:

„Technologie ochrony powietrza i ochrony
przed hałasem. Rynek polski i niemiecki.“

Kraków, 25.09.2018

Dipl.-Ing. Joachim Braasch
Sales Manager
Doosan Lentjes GmbH



Flue gas cleaning, AQCS, Desulphurisation Technology and Dust Removal Systems – for fossil-fired Power Plants and CHP Plants.

- Doosan Lentjes GmbH, a German Technology supplier for Dry FGD
- Circoclean® FGD Technology :
 - Basic Flow Sheet
 - Plant Design
 - Typical Layout & References
- Range of Application
- Doosan Lentjes' Capabilities
- Customer Benefits
- Questions & Answers

Part of the Doosan Group

Doosan Group

Doosan Heavy Industries & Construction

Business Groups

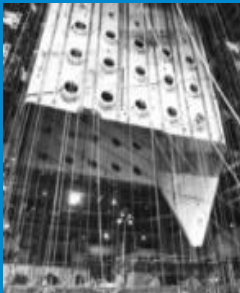
Casting &
Forging



Nuclear



Power
Service



Turbine



EPC



Water



Turnover (2016)

Doosan Heavy
Industries &
Construction

5 Billion €*

Employees (2016)

16,693



*Exchange rate from May 2017

Doosan Lentjes

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Power Service Business Group



Our Product Lines — CFB, WtE and AQCS



Tisova, 100MW_e
Czech Republic

CFB Circulating Fluidised Bed

- *Top tier level CFB OEM technology*
- *References: 113 units (22 GW_{th}, max. 330 MW_e)*



REC Harlingen, NL,
280.000 t/a; 1 line

WtE Waste-to-Energy

- *Top tier WtE OEM technology*
- *References: 77 units (9 mill t/a, max. 35 t/h)*
- *Chute-to-stack or full turnkey supply solutions*



Oroszlany, Hungary
240MW_e, Wet Stack

AQCS Air Quality Control Systems

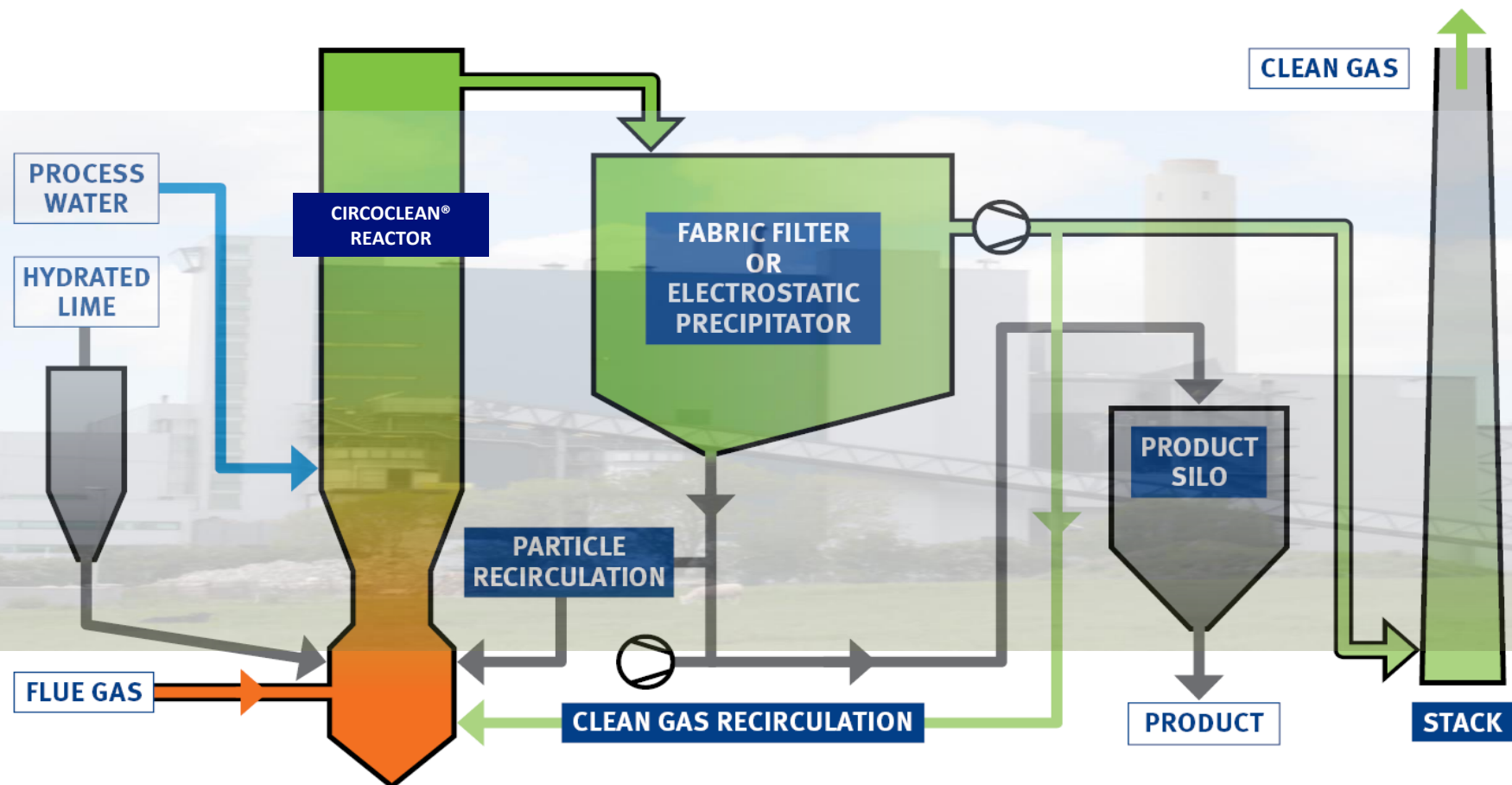
- *Various AQCS OEM technologies*
- *References:*
 - *Wet FGD: 196 units (71 GW_e, max. 1,000 MW_e)*
 - *Seawater FGD: 15 units (9 GW_e, max. 700 MW_e)*
 - *Circoclean® FGD / FGC: 90 units (13 GW_e, max. 305 MW_e)*
 - *SCR DeNO_x*
 - *Fabric Filters and ESP*

Circoclean® FGD / FGC Technology – Origin

2011 – Acquisition by Doosan	Doosan Lentjes GmbH
2007	AE&E Lentjes GmbH
2004	Lentjes GmbH
2004	Lurgi Lentjes AG
2002	Lurgi Energie und Entsorgung GmbH
1998	Lurgi Lentjes Bischoff GmbH
1996	Lentjes Bischoff GmbH
1984 – Acquisition by Lentjes	Gottfried Bischoff GmbH & Co. KG
1910 – Foundation	Gottfried Bischoff GmbH & Co. KG



Circoclean® FGD – Basic Flow Sheet

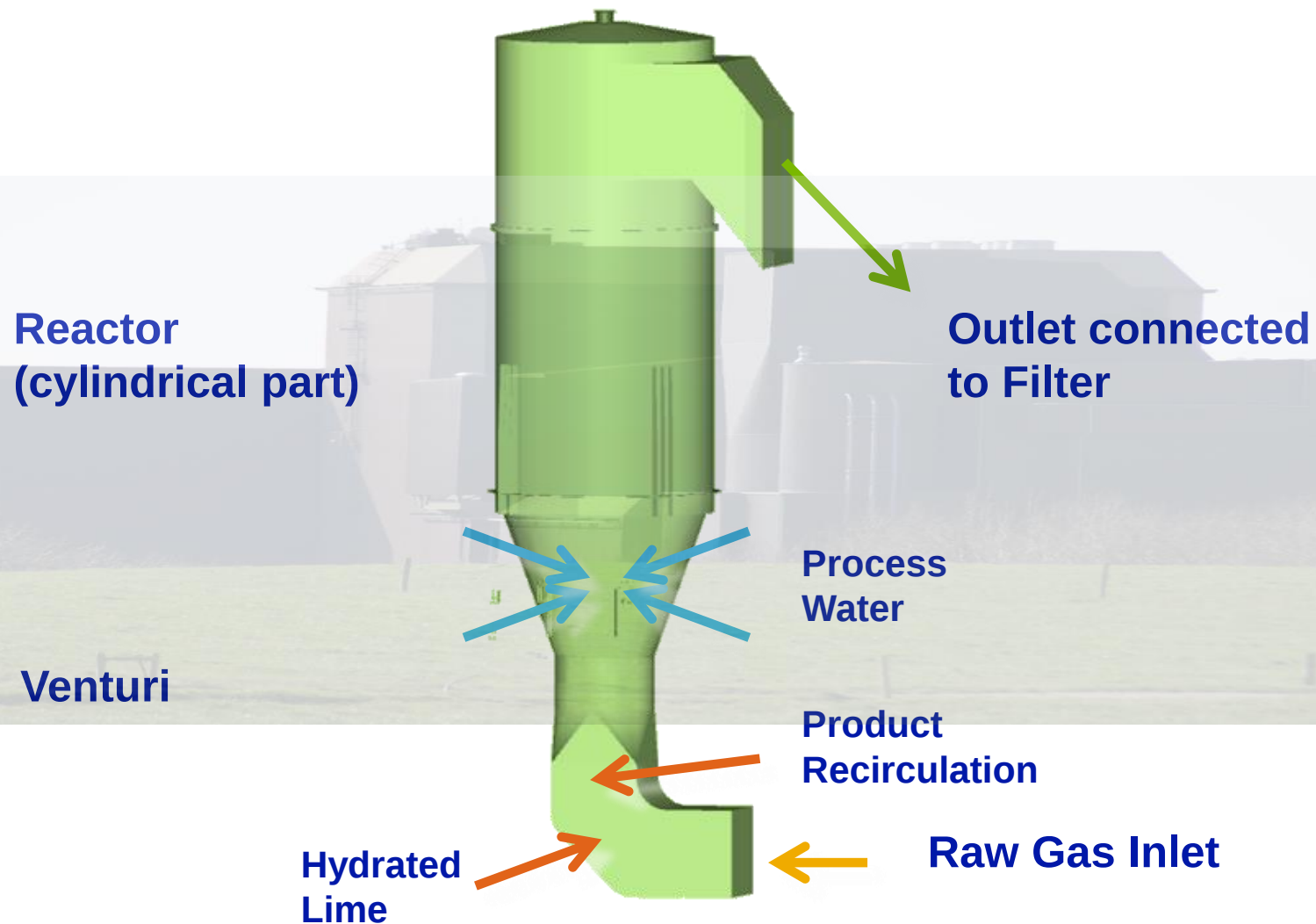


Circoclean® FGD / FGC Plant Design



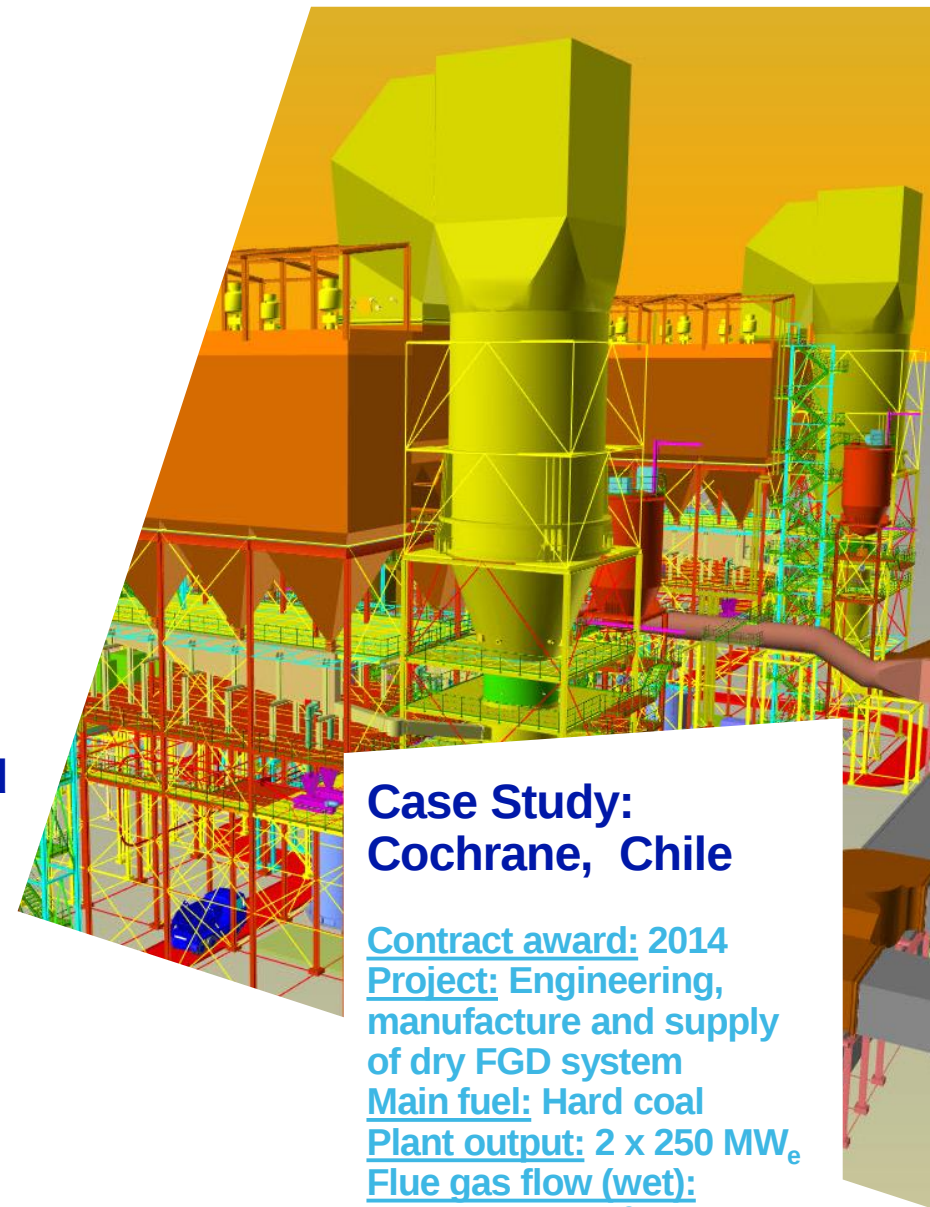
- Circoclean® Reactor (1)
- Filter (2)
- Venturi Nozzle (3)

Reactor Design



Range of Application

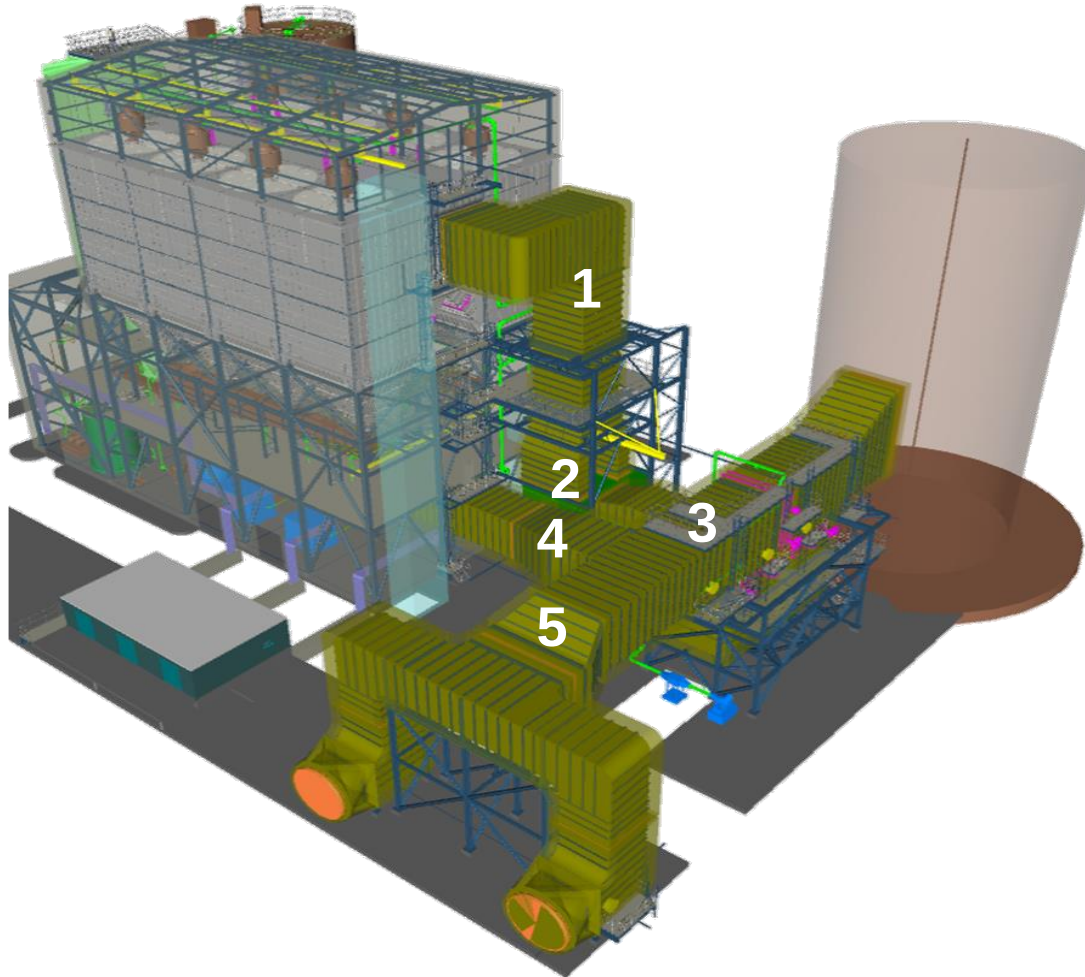
- New-build and retrofit
- Power stations and waste-to-energy plants
- Size: 300 MW_e and even larger
- Wide range of fuels: coal, lignite, heavy fuel oil, municipal and industrial waste
- SO₂, SO₃, HCl, HF removal efficiency of 99% and even greater
- Usage of hydrated lime as additive
- Hydration of burnt lime on site possible
- Usage of limestone in fuel, calcined in upstream CFB boiler
- Removal of PCDD, PCDF and heavy metals with optional activated carbon injection



Case Study: Cochrane, Chile

Contract award: 2014
Project: Engineering, manufacture and supply of dry FGD system
Main fuel: Hard coal
Plant output: 2 x 250 MW_e
Flue gas flow (wet):
2 x 857,000 Nm³/h

Typical Layout



- FGD Clean Gas Duct (1)
- FGD Recirculation Duct (2)
- FGD Bypass (3)
- FGD Raw Gas Duct (4)
- Existing Flue Gas Duct (5)

Doosan Lentjes' Capabilities

Circoclean® FGD / FGC Technology

- More than 30 years of experience
- Worldwide proven technology is own IP of Doosan Lentjes
- High number of references – 13 GW_e in total
- Reactor and filter technology (FF or ESP) from one hand
- Engineering, procurement, construction (turnkey)
- After sales service

Filters

- More than 300 fabric filters built to date *
- High and low pressure pulse jet fabric filters available
- More than 600 electrostatic precipitators built to date *



*Doosan Lentjes in cooperation with Envirotherm



Case Study: Frankfurt a.M. / Germany

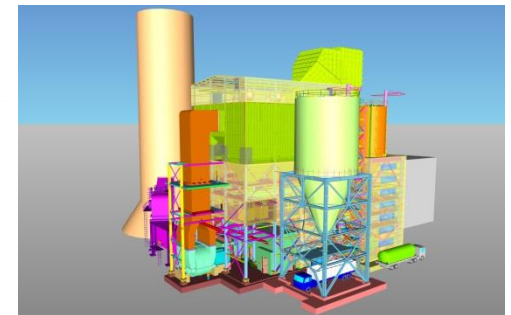
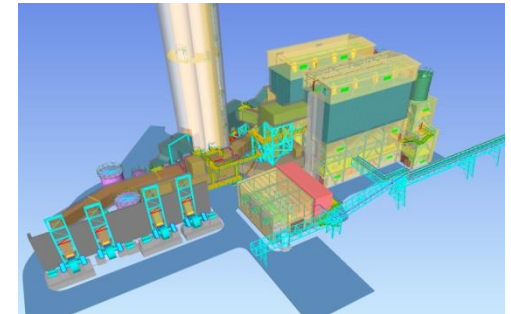
Contract award: 2003
Project: Delivery of four
new WtE process lines,
also encompassing a
Circoclean® FGC system
Main fuel: MSW
Flue gas flow (wet):
3 x 114,000 Nm³/h

Circoclean® FGD Plant References

Location	Pomorzany, Poland
Customer	PGE GiEK Zespól Elektrowni Dolna Odra
Capacity	2 x 156 MW _{th}
Fuel	Coal

Location	Iasi, Romania
Customer	Iasi Municipality
Capacity	1 x 285 MW _{th}
Fuel	Hard coal

Location	Mejillones, Chile
Customer	AES / Empresa Eléctrica Cochrane
Capacity	2 x 250 Mw _e
Fuel	Hard coal



Customer Benefits

- Moderate process water consumption
- Small power consumption
- Small foot print
- No waste water – dry particles only
- High SO₃ removal
- No flue gas re-heating
- Reactor made of carbon steel
- Easy adoption to higher SO_x removal
- Attractive investment costs



Case Study: Iași, Romania

Contract award: 2014
Project: Delivery of key
Circoclean® FGD
technology
Main fuel: Lignite
Plant output: 1 x 50 MW_e
Flue gas flow (wet):
623,500 Nm³/h

Thank you!

Dziękuję za uwagę

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