



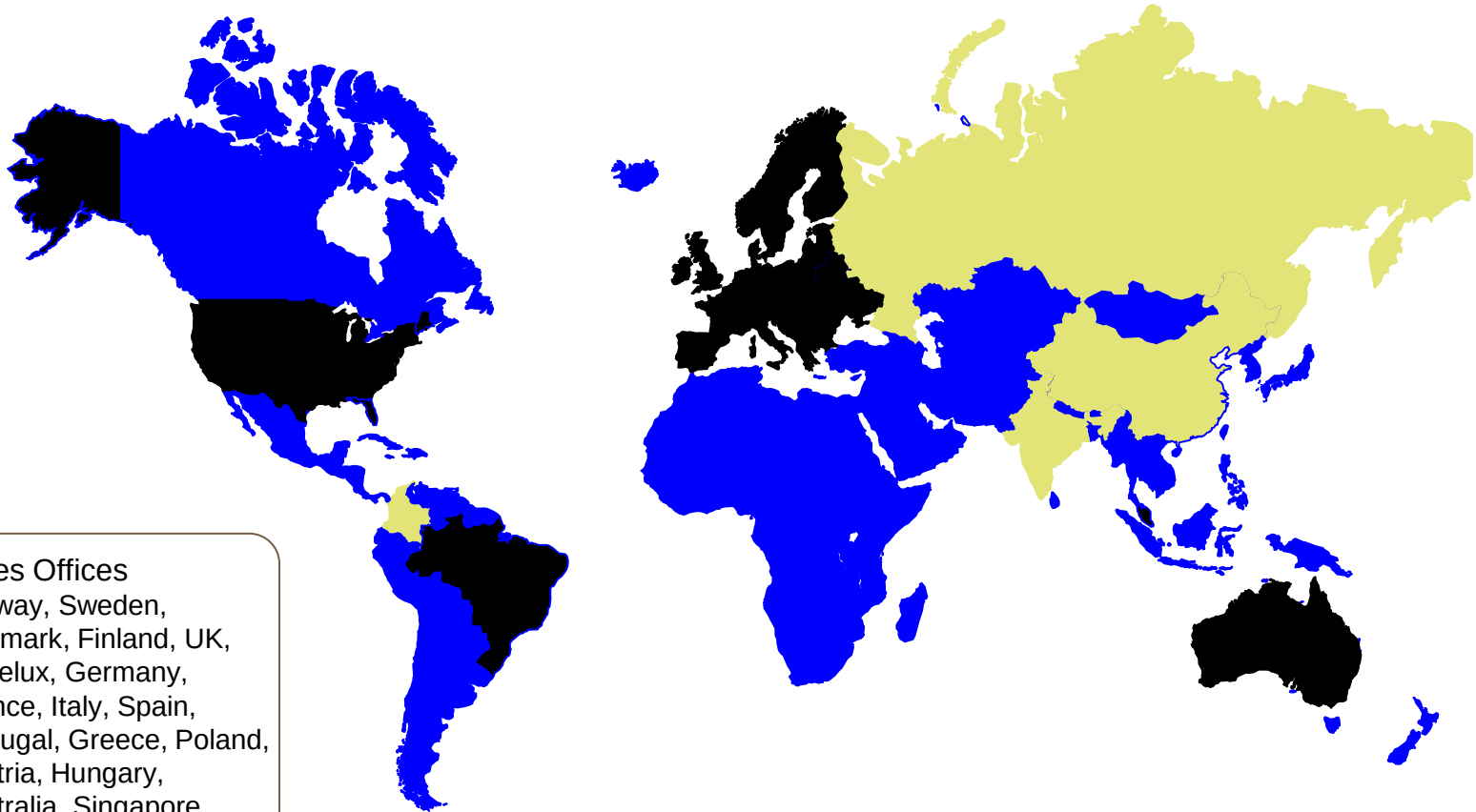
Knowledge grows

Safety and Reliability

**Chemicals, Inerting and SNCR technology for cement
industry**

Sao Paulo November 2012

Industrial – global presence



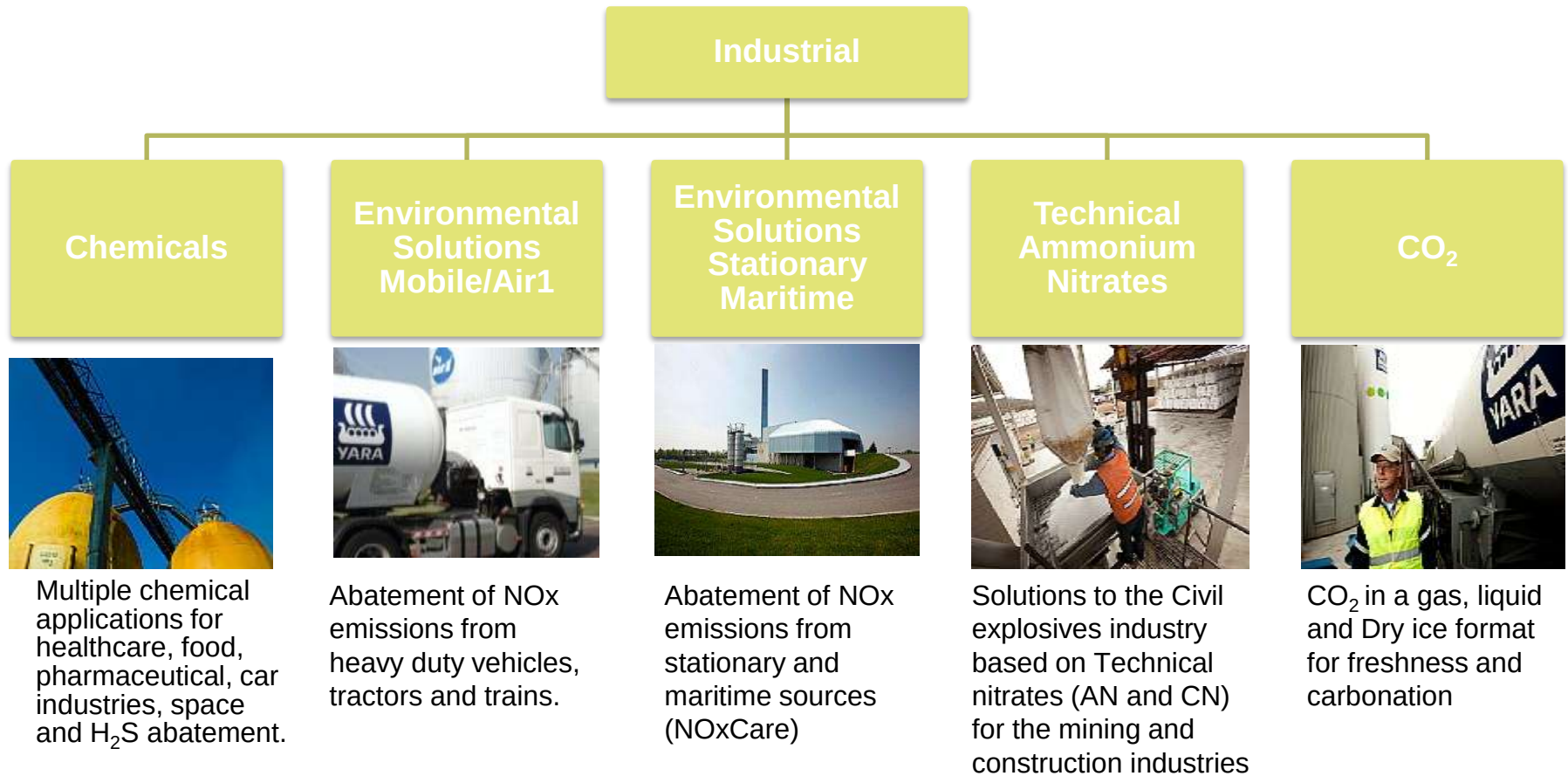
- Sales Offices
Norway, Sweden,
Denmark, Finland, UK,
Benelux, Germany,
France, Italy, Spain,
Portugal, Greece, Poland,
Austria, Hungary,
Australia ,Singapore,
Malaysia, Brazil
- Joint Ventures
Russia, Colombia,
India, Romania and
Czech Republic, China

Yara's leading position in industrial markets

- Largest AdBlue/DEF producer in the world and leading supplier in Europe and North America
- Leading position in solutions for stationary and marine NO_x abatement
- European leader in industrial ammonia, nitric acid and urea
- Global No.1 in odor control and H₂S abatement in wastewater treatment
- Leading independent player in nitrates for industrial explosives
- No. 1 CO₂ producer in Europe
- Leading producer and supplier of dry ice in Europe



Industrial unit with multiple growth applications



Strong performance and global leadership

Revenues (2010)

USD 10.9
billion

Number of employees

> 7,300

located in more than
50 countries

Global #1

in ammonia
in nitrates
in NPK
in specialty fertilizers
in marketing and
distribution

YARA has been present in Brasil since 1977

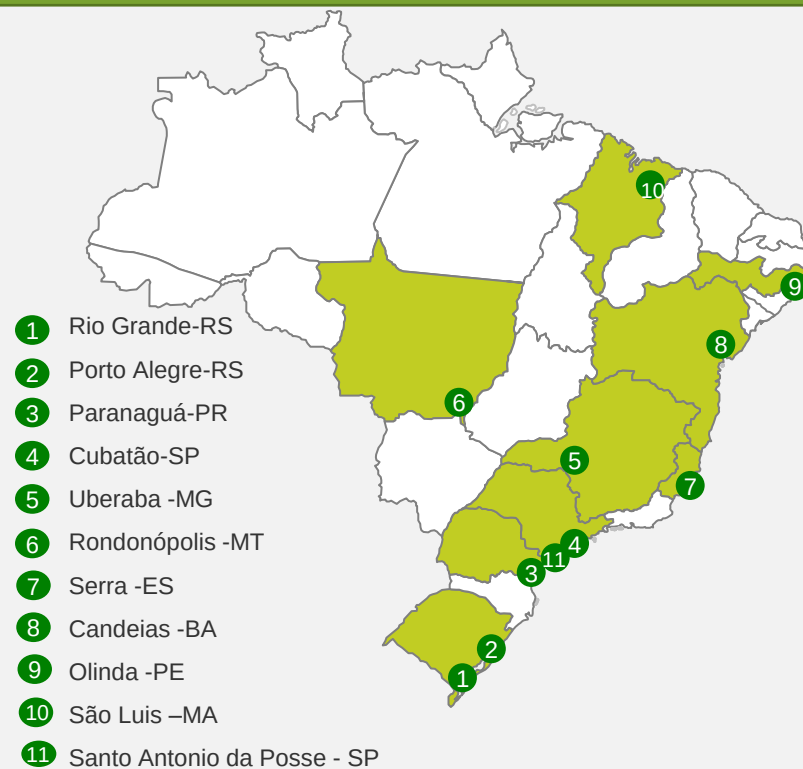
Brief Overview

- Yara Brazil is based at Porto Alegre - RS
- The Company's activities include the import and local chemical production and blending of fertilizers and its distribution to the Brazilian market, as well as the import and marketing of ARLA 32, technical Urea and other Nitrogen based premium products
- Brazilian production setup includes the Rio Grande based chemical GSSP / NPK plant and 11 blending/distribution units in the main market areas

Key Figures

- 1 BUSD revenues/year
- 2,5 million tons of fertilizer distribution/year
- 1,100 employees located in Brazil
- 1 BUSD Market Cap

Geographic Location

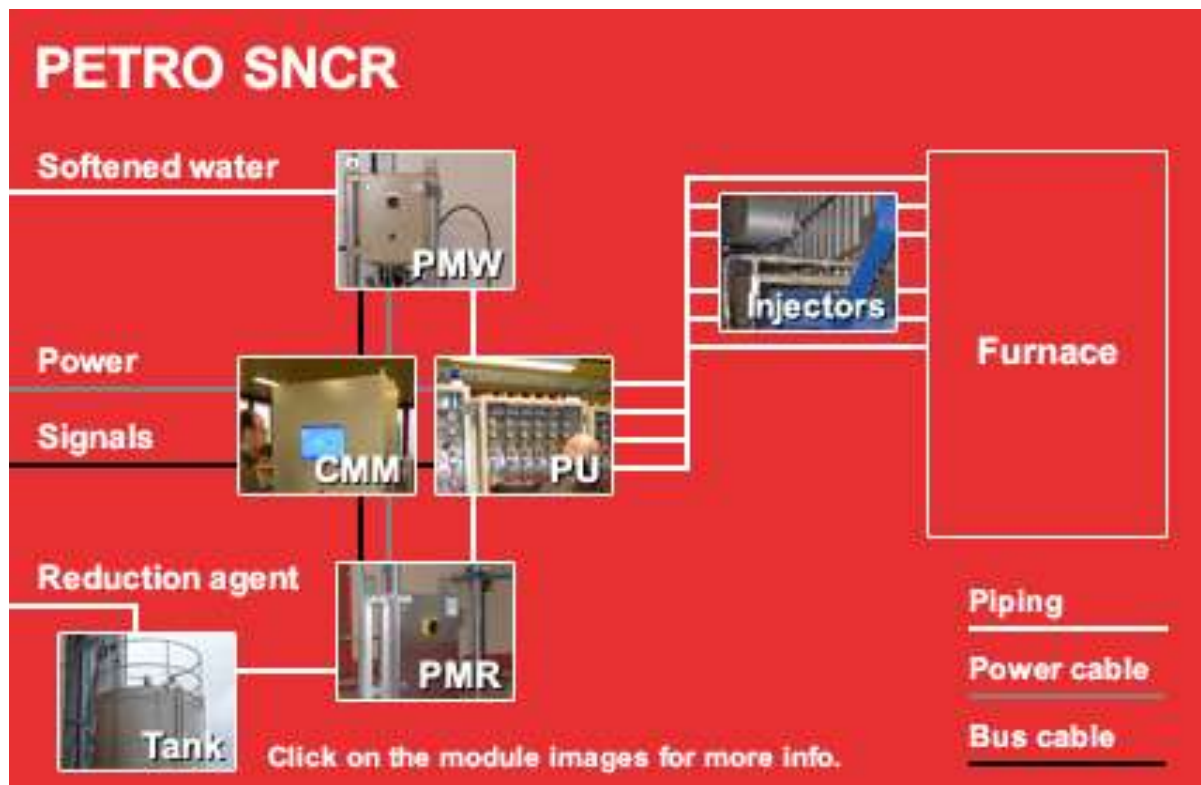


Brazil is and will remain one of Yara's strategic location for Fertilizers and Industrial Nitrogen products



Our SNCR solutions

Modularised and standardised SNCR solution



Design philosophy

The YARA MILJÖ SNCR system is designed for:

- High Degree of Safety
- High Performance
- Reliable Operation

Modular design



Tank module



Pump Module Reduction agent PMR



Pump Module Reduction agent PMW



Process Unit, PU



Control and Management Module; CMM



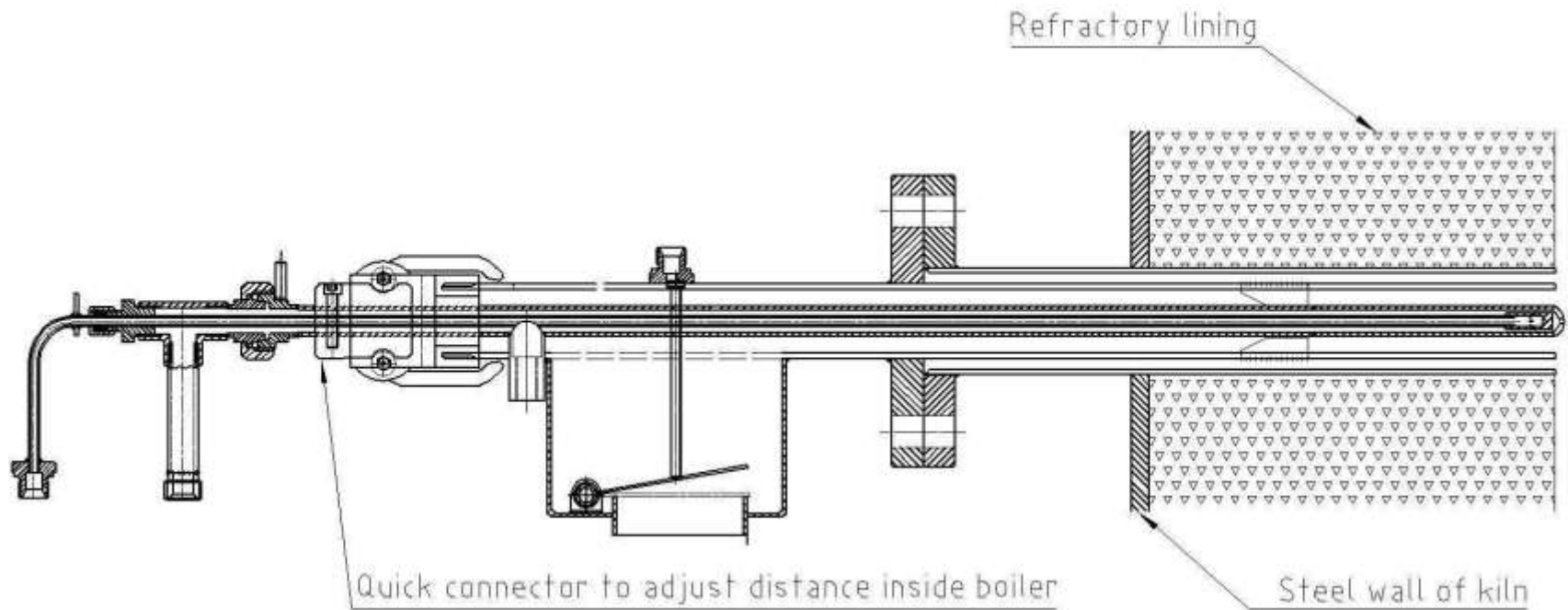
Injector

PETRO high performance SNCR system

Performance with Ammonium-hydroxide

- Up to 90% reduction of NO_x emission
- High efficiency = low consumption
- Low emission of ammonia slip
- Low emission of laughing gas (N₂O)

Injector cement



References

Until now over 180 combustion lines on 125 plants with PETRO SNCR systems:

- ✓ 110 Waste incinerator lines
- ✓ 40 Cement kilns
- ✓ 30 Bio and multi fuel combustion lines





Reference Case I: Cementa

Reference Case I: Cementa

- Low NO_x cement installation
- In operation since 1997
- Base NO_x 1 200 mg/Nm³ at 8 % O₂
- Guaranteed Emission maximum possible, reached < 200.
- To achieve this the system is designed with 12 injectors and 2 process units. The residence time in cement plants are short and a large number of injectors are required
- The plant has been running below 200 since start up and no other cement plant in the world runs continuously at this level of reduction, > 80 %



Knowledge grows

W E L C O M E

- CO₂ / N₂ Emergency Inerting Systems -

Preventive Explosion Protection
in combustible dust environments

*Our systems make your working
environment a safer place*

ISO 9001:2008



We are living in a dangerous world.....

Acc. to German VDI explosion protection conference every year some 400 dust explosions happen in Germany - what about the other countries ?



Inert gases prevent the occurrence of critical operating conditions and consequently any resulting explosions and fires

Effectiveness of different inert gases acc. VDI 2263 part 2 - guideline

1. Carbon dioxide / CO_2
2. Steam
3. Flue gases
4. Nitrogen / N_2
5. Noble gases / Argon

Explosion triangle = Fuel (dust $> 15\text{g/m}^3$) + Ignition + Oxygen

CO₂/N₂ Inerting theory and guidelines dust (VDI 2263-2 / CEN/TR 15281)



Values are fixed in the **E**xplosion **P**rotection **D**ocument by notified body as well as by customer and supplier of the coal grinding system during start up.

Inerting systems avoid dust explosions and suffocate smoldering fires in coal grinding systems by creating an inert atmosphere.

Inerting is one measure of **P**reventive **E**xplosion **P**rotection.

Systems are **Not** protection systems in relation to European Guideline 94/9/EC (Atex 95 – manufacturer). Therefore they don't have to fulfill its standards.

Erection **Outside** of dust explosion area zone (zone 20, 21, 22) according to European guideline 99/92/EC better known as Atex 137 (operating company) is recommended.

Praxis: erection outside of coal mill building or erection in separate room within the building. In case of erection **within** dust explosion area zones guideline has to be applied.



CO₂ / N₂ low pressure tank type 25 or 19 bar with ambient evaporizer



N₂ LP tank with ambient evaporizer SAVA hazardous waste incineration plant

Combines advantages of controlled storage and newest technology. **Operation pressure 17 – 20 bar.** Size of evaporizer depends on **ambient temperature and inert gas volume.**



CO₂ LP tank with ambient evaporizer Lafarge Bamburi Cement plant, Kenya



5 tons – CO₂ tank
RWE - new BoA 2 Power Plant
Niederaußem TBK Silo, Germany

A large, horizontal, white cylindrical CO2 storage tank is shown in an industrial setting. The tank has a rounded end on the right with a circular access door. It is supported by a metal frame and has various pipes and valves attached to its top. A small control box is mounted on the side. The background shows a factory interior with concrete walls and some equipment.

10 tons - CO₂ tank
fives.fcb, Holcim Apasco Hermosillo
cement plant, Mexico



3 tons CO₂ tank
Alstom Power Boiler, Stuttgart
Vattenfall Oxyfuel Power plant
Germany



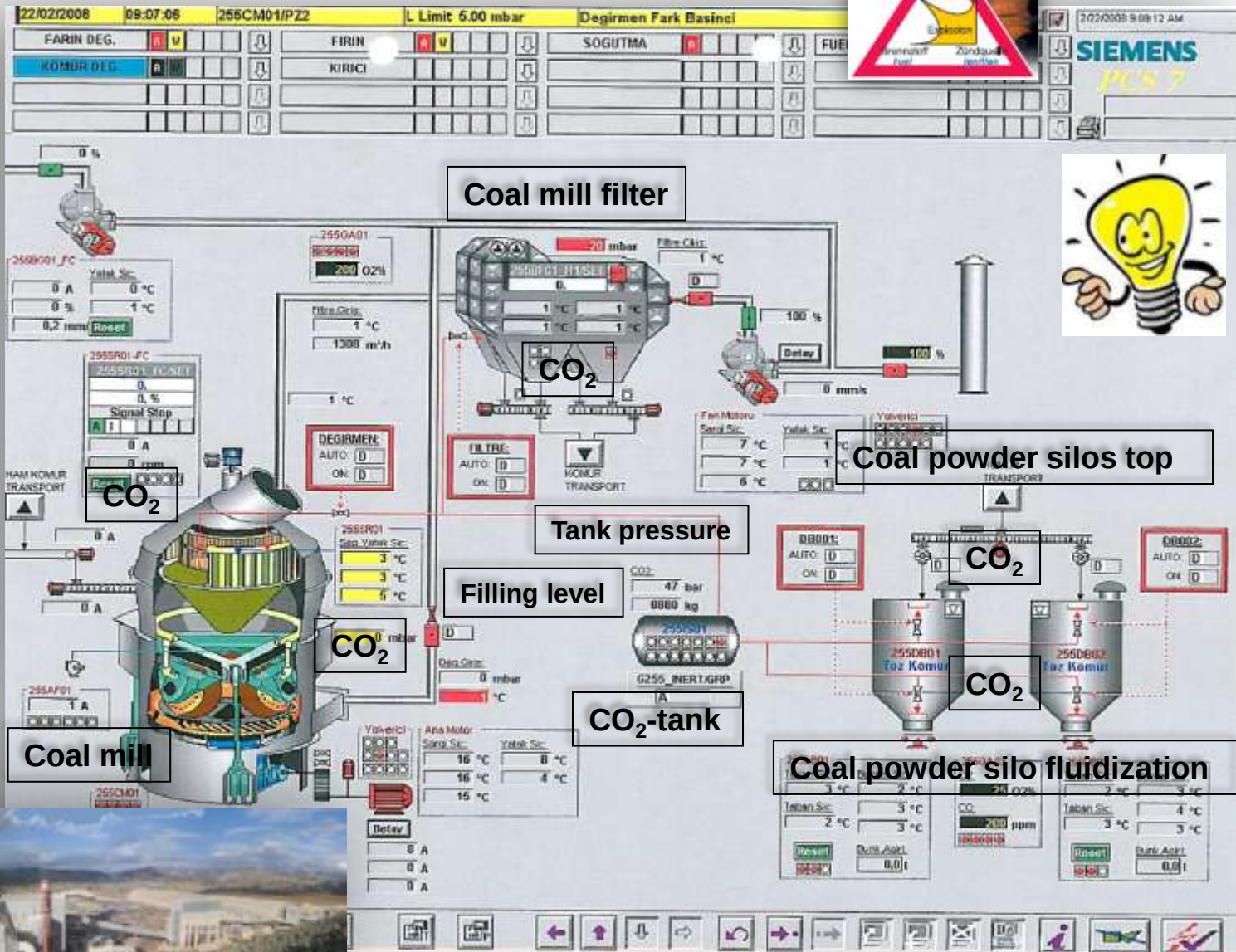
Visualization CO₂ inerting system in PLC



Pressure and filling level tank are permanently indicated in PLC at control stand.

Position of all inerting valves is also indicated to monitor the process.

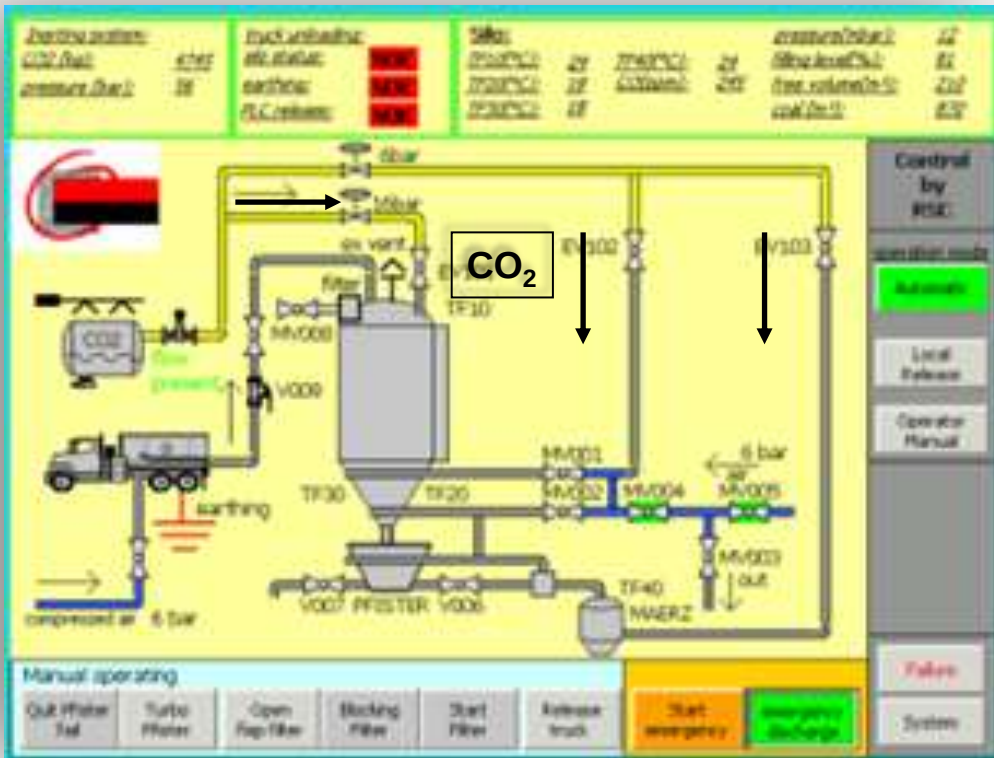
AS Cimento,
Bucak, Turkey



ISO 9001:2008



Coal powder silo Irish CRH Trzuskawica Poland



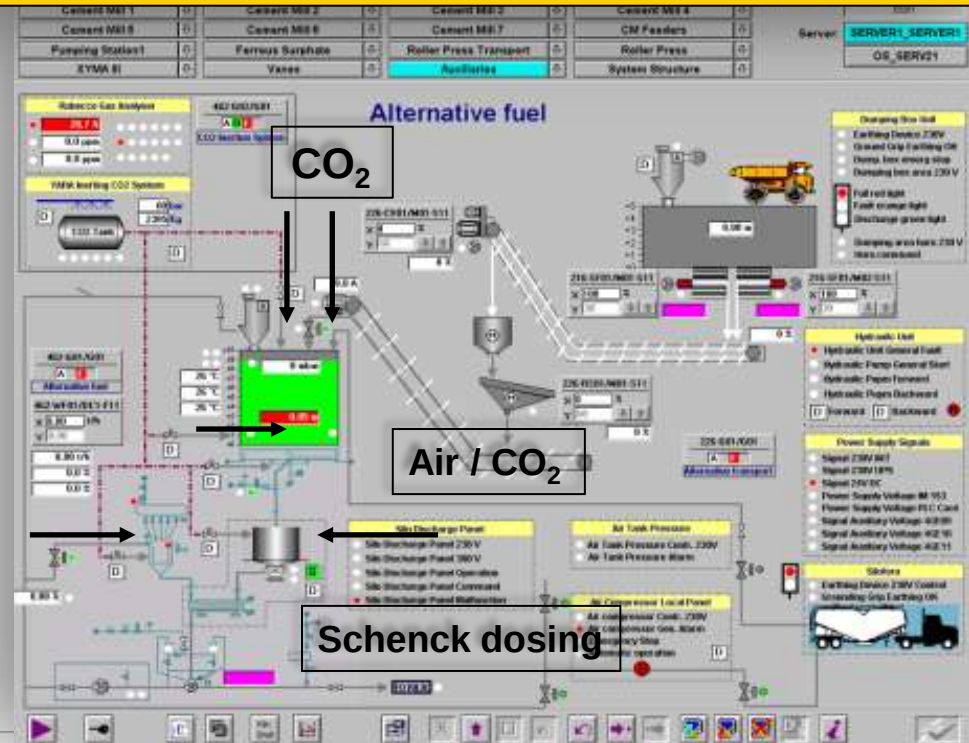
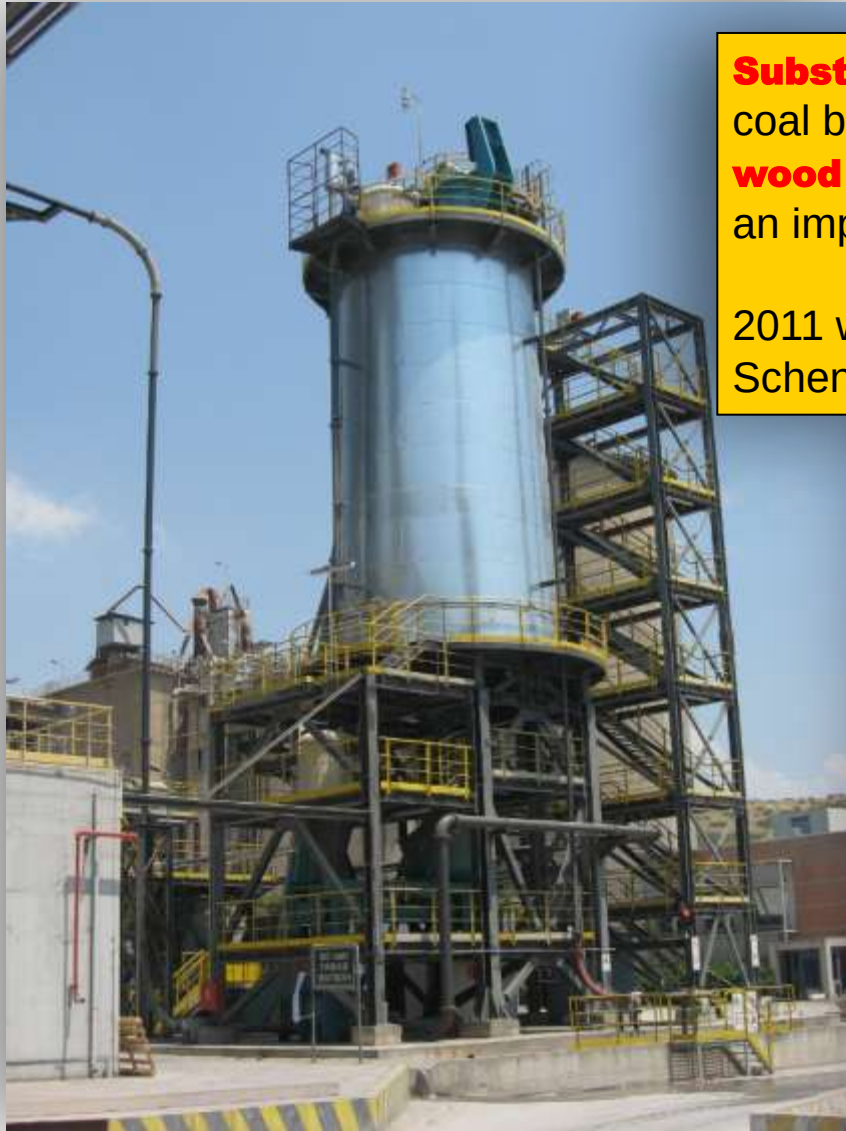
Also limestone vertical kilns are fired more and more with coal (lignite) and alternative fuels. This project was realized together by Silobau Thorwesten (silo), robecco (gas analysis, secure center), Maerz Ofenbau (kiln) and Yara (inerting). **In order to reduce interfaces customer decided to select our common proposal.**

Dried sewage sludge silo Titan Cement Greece



Substitution of coal, anthracite, lignite, waste coal by alternative fossil fuels like **dried sewage sludge, wood powder, animal powder** etc. plays more and more an important role in cement and limestone industry.

2011 we realized a lot of alternative fuels projects with Schenck Process, Titan Cement, Wopfinger, Carmeuse....



Thank you



for your kind attention



Please ask your questions ?

