SAFETY IS ALWAYS OUR TOP PRIORITY

- Ambition of zero injuries to people and no major process related incidents
- Product stewardship program
- Production according to high technical standards
- Reliable transport and shipping concepts
- Best practice sharing on storage and handling with partners and customers
KEY NUMBERS

Revenues and other income (2014)
USD 15.1 billion

Number of employees
12,073

Located in more than
50 countries

Sales to more than
150 countries
YARA PRODUCTS AND SOLUTIONS SHARE A COMMON PLATFORM

CORE PRODUCTS

- Urea
- Nitrates
- CN
- NPK
- Nitric acid
- Gases

PRODUCT BRANDS AND APPLICATIONS

- Global fertilizer brands
- Environmental solutions
- Industrial applications
WE SERVE A WIDE RANGE OF CUSTOMERS through an extensive offering

<table>
<thead>
<tr>
<th>End users</th>
<th>Yara value proposition</th>
<th>Yara competitive edge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Automotive</strong></td>
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<tr>
<td>Trucks</td>
<td>• AdBlue: High-quality urea solution</td>
<td>• Global reach</td>
</tr>
<tr>
<td>Off-road vehicles</td>
<td></td>
<td></td>
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<tr>
<td>Cars</td>
<td></td>
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</tr>
<tr>
<td><strong>Stationary</strong></td>
<td>• NOxCare: high-quality urea solution and ammonia solution</td>
<td>• Strong market infrastructure</td>
</tr>
<tr>
<td>Power plants</td>
<td>• SCR Technology</td>
<td></td>
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<tr>
<td>Cement factories</td>
<td>• SNCR Technology</td>
<td>• Reliable supply</td>
</tr>
<tr>
<td>Waste Incinerators</td>
<td>• Hybrid-systems</td>
<td>• Proximity to customers</td>
</tr>
<tr>
<td><strong>Marine</strong></td>
<td>• NOxCare40: High purity urea solution</td>
<td>• High-quality products</td>
</tr>
<tr>
<td>Cruise and ferries</td>
<td>• SCR Technology</td>
<td>• Proven technology</td>
</tr>
<tr>
<td>Coast-near vessels</td>
<td>• SOx scrubbers</td>
<td>• Strong Yara brand</td>
</tr>
<tr>
<td>Deep sea vessels</td>
<td>• Design and engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Commissioning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Operational training</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Safety training</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Maintenance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Spare-parts</td>
<td></td>
</tr>
</tbody>
</table>

**Yara value proposition**
- Reagent
  - AdBlue: High-quality urea solution
- Technology
  - SCR Technology
  - SNCR Technology
  - Hybrid-systems
- Services
  - Dispensing bulk equipment
  - Telemetry
  - Training
  - Optimization of operations, emissions reduction, safety and performance improvement
  - Commissioning
  - Operational training
  - Safety training
  - Maintenance
  - Spare-parts

**Yara competitive edge**
- Global reach
- Strong market infrastructure
- Reliable supply
- Proximity to customers
- High-quality products
- Proven technology
- Strong Yara brand
Go for the most cost efficient system to abate NOx and control and optimize your CAPEX and OPEX costs over lifetime by choosing Yara.
30 YEARS OF WORLDWIDE EXPERIENCE
We work on a global scale with references in all major continents
Press Release

Yara acquires Tata Chemicals’ urea business in India for USD 400 million

Oslo, 10 August 2016: Yara International ASA has entered into an agreement to acquire the Tata Chemicals Ltd (“TCL”) Babrala urea plant and distribution business in Uttar Pradesh for USD 400 million on a debt and cash free basis, including normalized net working capital.

“This acquisition represents another significant step in our growth strategy, creating an integrated position in the world’s second-largest fertilizer market. India has strong population growth and increasing living standards, and significant potential to improve agricultural productivity,” said Svein Tore Holsether, President and Chief Executive Officer of Yara.
In the Cement Industry the first orders for SNCR DeNOx systems have been placed (kiln installations).

YARA won 3 projects.

- Birla Corporation Chanderia
- Birla Corporation Satna
- Aliacem Lukavac
FIRST QUALIFIED BHEL (TRICHY) VENDOR

Bharat Heavy Electricals Limited
Tiruchirappalli - 620 014: Tamil Nadu: India
Supplier Development Cell / Materials Management

Ref : SDC/MM/BOI

Date : 20.05.2017

To
M/S YARA ENVIRONMENTAL TECHNOLOGIES Gmb
FLORIDSDORFER HAUPTSTRASSE
1-7/2 OG,
1210 VIENNA, , Austria

Kind Attention: Mr. RICHARD BUDIN

Dear Sir/Madam,
Ref: Your SRF No:16F0006330
We are pleased to inform that we have registered your Firm as PERMANENT VENDOR with BHEL / Trichy for supply of following item(s): Your Supplier Code: 24025

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Item Description</th>
<th>Item Code</th>
<th>Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>De-NOx Systems -SNCR</td>
<td>SNDNX</td>
<td>PERMANENT</td>
</tr>
<tr>
<td>2</td>
<td>De-NOx Systems - SCR</td>
<td>SRDNX</td>
<td>PERMANENT</td>
</tr>
</tbody>
</table>
NTPC SNCR / SCR / HYBRID PILOT TESTING
Rihand Power Plant
DeNOx Technology
REFERENCE PROJECTS

Power Plants & Boilers

**Project Name:** EL-SEGUNDO  
**Client:** NEM / Siemens  
**Project location:** USA, California  
**Fuel:** Natural Gas  
**Application:** SCR in HRSG after Gas Turbine

**Project Name:** ŁAZISKA  
**Client:** TAURON Wytwarzanie S.A.  
**Project location:** Poland  
**Fuel:** Pulverized Coal  
**Application:** High Dust SCR Integrated in ECO

**Project Name:** Simmering  
**Client:** Wienstrom  
**Project location:** Austria  
**Fuel:** Heavy Fuel Oil & Natural Gas  
**Application:** High Dust SCR Integrated in ECO

**Project Name:** Voitsberg  
**Client:** ODK  
**Project location:** Austria  
**Fuel:** Lignite  
**Application:** High Dust SCR
## REFERENCE PROJECTS

**Industrial Boilers**

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Client</th>
<th>Project location</th>
<th>Fuel</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yan San</td>
<td>SINOPEC</td>
<td>China</td>
<td>Coal Slurry</td>
<td>High Dust SCR</td>
</tr>
<tr>
<td>Synthos</td>
<td>Chemoservies</td>
<td>Poland</td>
<td>Pulverized Coal</td>
<td>SNCR for PC firing</td>
</tr>
<tr>
<td>LP1 &amp; 2</td>
<td>FPG</td>
<td>Taiwan</td>
<td>Pulverized Coal</td>
<td>High Dust SCR</td>
</tr>
<tr>
<td>Shell GTL Plant</td>
<td>Aalborg</td>
<td>Qatar</td>
<td>Various gaseous fuels</td>
<td>SCR integrated in ECO</td>
</tr>
</tbody>
</table>
REFERENCE PROJECTS

Chemical Storage & Handling Systems

**Project Name:** Edwards  
**Scope:** Anhydrous Ammonia System for DeNOx application  
**Client:** Lurgi Lentjes North America  
**Project location:** USA

**Project Name:** Daxing Guanyinsi  
**Scope:** Urea to Ammonia system for DeNOx application  
**Client:** Tongfang Environmental Co.  
**Project location:** China

**Project Name:** Rabigh  
**Scope:** Anhydrous Ammonia System for SO₃ removal application  
**Client:** ALSTOM K.K.  
**Project location:** KSA

**Project Name:** Bialystok  
**Scope:** Ammoniawater (25 %wt.) for DeNOx application  
**Client:** ENEA Wytwarzanie S.A  
**Project location:** Poland
REFERENCE PROJECTS

Catalyst Rejuvenation

Project: Simmering
Client: Wienstrom
Country: Austria
Fuel: Heavy Fuel Oil
Catalyst Type: Honeycomb

Project: Bowen
Client: Southern Company
Country: USA
Fuel: Coal
Catalyst Type: Honeycomb

Project: Mucha
Client: Taipei City Government
Country: Taiwan
Fuel: Municipal Waste
Catalyst Type: Honeycomb

Project: Taichung
Client: Taiwan Power Company
Country: Taiwan
Fuel: Coal
Catalyst Type: Plate
ANHYDROUS AMMONIA SYSTEM
AMMONIAWATER EVAPORATION BY USING GAS/GAS HEATER TECHNOLOGY OF YARA
NOxCare® SNCR system

Storage Tank

Unloading pump

Process control
Reagent mixing & distribution

Combustion chamber / Boiler

PU

PMR

PMW

Reagent injection

PMR = Pump module for reagent
PMW = Pump module for water
NOxCare® Hybrid System

- **Storage Tank**
- **Process control**
  - Reagent mixing & distribution
- **Combustion chamber / Boiler**
  - Reagent injection
- **GAS MIXER module**
- **Cat. module**
- **Soot blowing module**
- Unloading pump
- PMR = Pump module for reagent
- PMW = Pump module for water
- PMR = Pump module for reagent injection
- PMW = Pump module for secondary reagent injection
- **Gas analyzers**
  - NOx
  - NH3

**Definitions:**
- PMR = Pump module for reagent
- PMW = Pump module for water
SCR Technology

Main Chemical Reaction for NOx Removal:

\[ \text{NOx} + \text{NH}_3 \rightarrow \text{N}_2 + \text{H}_2\text{O} \]

Honeycomb Type

Plate Type
CFD Design and Optimization

CFD Design and Optimization is performed for:

- Ammonia injection system
- Ammonia distribution
- Flue gas flow distribution
- Optimization of flow pattern and pressure drop
- Optimization of temperature distribution
- Optimization of fly ash distribution (prevent plugging)
Ammonia Injection Grid (AIG)

ADVANCED AIG DESIGN – NOZZLE / MIXER TYPE

YARA PATENT
REFERENCES PROJECTS

Marine & Engine Applications

**Application:**
- LNG Tanker
**Fuel:**
  - Diesel, HFO, MDO, Gas
**Technology:**
  - Wet Scrubber

**Application:**
- Seismic Vessel
**Fuel:**
  - HFO
**Technology:**
  - Wet Scrubber

**Application:**
- Cruise Liner
**Fuel:**
  - Natural Gas, MDO, HFO
**Technology:**
  - Wet Scrubber

**Project Name:**
- Island Power Plant
**Client:**
- BWSC
**Project Location:**
- Malta
**Application:**
- Land Engine
**Technology:**
- SCR
## Reference Projects

### Industrial Boilers

<table>
<thead>
<tr>
<th>Project Name:</th>
<th>Zhejiang</th>
<th>Project Name:</th>
<th>Luoyang Longyu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client:</td>
<td>Sinosteel</td>
<td>Power Scale:</td>
<td></td>
</tr>
<tr>
<td>Project location:</td>
<td>China</td>
<td>2x260t/h</td>
<td></td>
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<tr>
<td>Fuel:</td>
<td>Coal, Municipal Waste &amp; Sludge</td>
<td>Project location:</td>
<td>China</td>
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<tr>
<td>Application:</td>
<td>Semi-Dry Scrubber + Bag Filter</td>
<td>Fuel:</td>
<td>coal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Application:</td>
<td>FGD</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Project Name:</th>
<th>Durnrohr</th>
<th>Project Name:</th>
<th>Chengde Dongsheng</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client:</td>
<td>EVN</td>
<td>Power Scale:</td>
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<tr>
<td>Project location:</td>
<td>Austria</td>
<td>Project location:</td>
<td>China</td>
</tr>
<tr>
<td>Fuel:</td>
<td>Municipal Waste</td>
<td>Fuel:</td>
<td>coal</td>
</tr>
<tr>
<td>Application:</td>
<td>Wet Scrubber + Bag Filter</td>
<td>Application:</td>
<td>FGD</td>
</tr>
</tbody>
</table>
Reference Projects

Power Plants & Boilers

- **Datang Linfen**
  - **Power Scale:** 2x300MW
  - **Project location:** China
  - **Fuel:** coal
  - **Application:** FGD

- **Xinjiang Qiya**
  - **Power Scale:** 4x360MW
  - **Project location:** China
  - **Fuel:** coal
  - **Application:** FGD

- **Guo hua Jinjie**
  - **Power Scale:** 2x600MW
  - **Project location:** China
  - **Fuel:** coal
  - **Application:** FGD

- **DaTang Wangtan**
  - **Power Scale:** 2x600MW
  - **Project location:** China
  - **Fuel:** coal
  - **Application:** FGD
DESULPHURIZATION WITH HIGHLY EFFICIENT LOW ENERGY CONSUMPTION

Technical advantages

- Simple system, no rotating equipment, free maintenance, stable running
- Uniform Air-flow distribution to avoid bias flow and short circuit, gas-liquid collision frequency is enhanced
- Double cyclone to prevent slurry spraying uniform from gas-flow damage
- Flow gas is fast cooled, which provide appropriate temperature for reaction
- Gas-liquid ratio and energy consumption reduced, at least one circulating pump reduced
With the increasing of flow rate, spray desulfurization efficiency gradually reduce and gas-liquid coupler desulfurization efficiency increase, as a result the efficient is complemented. Desulfurizer equipped with the spray layer and gas-liquid coupler can realize the stability of desulfurization efficiency.

The change of desulfurization efficiency with the load
TECHNICAL PRINCIPLES OF CYCLONE DEDUSTING DEMISTER

Cyclone Dedusting Demister is composed of four cyclone units. Its working principle is that when the clean gas enters demister, it carries a lot droplet which is generated in Wet Desulfurization and is composed of slurry, condensate and dust. It is rotated by cyclone unit to form revolve and perturbation, because of the collision among particles, big droplets which are made of ultra-fines are born. In the same time, big droplets flow along the wall of the round pipe under pressure of centrifugation and are caught by liquid film, and high efficiency dedusting and demisting is realized.
HIGH EFFICIENT CYCLONE DEDUSTING

Technical advantages

- System resistance increased only 200Pa
- Droplet less-than 15mg/Nm³, dust less-than 5mg/Nm³
- Low energy consumption, no electricity, low operation fare
- Easy transformation, short period, low investment
- Simple system, easy operation and good reliability
- Polymer with higher corrosion and wear resistance, 30 years life
TECHNICAL PRINCIPLES OF CYCLONE DEDUSTING DEMISTER

Advantages of Cyclon Dedusting in engineering

- Reusing the demister position without structural change
- Reusing the washing system without auxiliary equipment
- Mechanical construction design, non-clog, free maintenance
- Short construction period, less than 15 days for a unit
- Polymer with corrosion, wear resistance, antiaging and fire retardant
- Low expansion, without leaks
- System resistance less than 400Pa
- Secondary blowing dust avoided
- 70% washing water of general demister
- Upper water flushing, easy overhaul
Customers
Reference Projects

Yara Marine Technologies has delivered more than 100 scrubber systems

Yara Marine Technologies has more than 500,000 running hours on their systems
we care about air
Reduce NO\textsubscript{x}

Control COST

Choose YARA