Solvay Vision of the Soda Ash Industry

Striving for Security of Supply and Sustainability

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Solvay Soda Ash & Derivatives
IHS Markit World Soda Ash Conference Cannes | September 26th 2019
CHALLENGES OF THE SODA ASH INDUSTRY
THE STAKEHOLDERS OF THE SODA ASH INDUSTRY SET OUR CHALLENGES

Solvay way

PLANET

customers

SUPPLIERS

INVESTORS

COMMUNITIES

EMPLOYEES

Stakeholders Expectations

- Safety
- Sustainability
- Security of Supply
- Value Creation along the whole value chain
STRIVING FOR SECURITY OF SUPPLY
China growth expected to slow down
RoW expected to grow faster with APAC, LATAM and MEA being main growth drivers

Soda Ash demand expected to increase by +10,2 Mt over 2018-30 excluding China

2018-2023
+4,4 Mt (CAGR 2,4%)

2024-2030
+5,8 Mt (CAGR 2%)
TIMELY INVESTMENTS SHOULD BE ENSURED TO PROVIDE SECURITY OF SUPPLY

SOLVAY DEVELOPS 1.4 MT CAPACITY TO MEET CUSTOMER NEEDS

2019-2021
+500 kt
Through excellence programs & digitalization

End 2021
+600 kt
Through capacity expansion in Green River

2019-2021
+100 kt
Through excellence programs & digitalization

2020
+200 kt
Through capacity expansion in Devnya

+1,1 Mt Soda Ash

+300 kt Sodium Bicarbonate

RETURN ON INVESTMENTS SHOULD BE DELIVERED TO ENSURE CONTINUOUS VALUE CREATION FOR ALL STAKEHOLDERS

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GROWING GEOPOLITICAL UNCERTAINTIES IMPACT GLOBAL TRADE AND PRICE VOLATILITY

**Currency exchange**
EUR/USD

**Chinese net exports**
Soda Ash Volumes (MT)

**Freight**
Baltic Handy size index

**Energy**
API2 index

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FOR 156 YEARS, SOLVAY HAS BUILT A UNIQUE & BALANCED GLOBAL FOOTPRINT TO SECURE THE STRATEGIC SUPPLY OF ITS CUSTOMERS WORLDWIDE

- Offering both natural and synthetic (dense and light) soda ash
- Providing safety of supply through our global network of plants and sales offices
- Having a unique global reach thanks to our logistics networks
AND KEEPS FOCUSING ON COST-COMPETITIVENESS

2018 directional worldwide industry cost curve ($/t)¹

Supply
Soda Ash aggregated capacities

Demand
over capacity

SOLVAY
World-Class Assets

SOLVAY Europe
SOLVAY US

SOLVAY Local Assets

Natural Synthetic
Freight to FOB
Cash Cost

(1) Excluding Domestic China. Directional schematic representation of the global soda ash industry “cost curve”. Each bar represents the aggregated capacity (x-axis) and average production and freight-to-FOB costs (y-axis) of plants sharing a similar cost profile. Relative competitiveness may vary locally.

Source: Solvay estimates based on public information.
STRIVING FOR SUSTAINABILITY
MAIN ENVIRONMENTAL CHALLENGES OF THE SODA ASH INDUSTRY

VALUE CHAIN OF SODA ASH

- RAW MATERIALS
- PRODUCTION
  - CO₂ (Energy, Limekilns)
- TRANSPORT
  - Shipping emissions (SOx, particles)
- USE
  - CO₂ (Energy)
WITH 60 MT SODA ASH PRODUCED PER YEAR, THE INDUSTRY EMITS 58 MT OF CO₂

<table>
<thead>
<tr>
<th>Process</th>
<th>Natural</th>
<th>Synthentic</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA Production</td>
<td>~4 Mt</td>
<td>~12 Mt</td>
</tr>
<tr>
<td>per Process</td>
<td>Soda Ash</td>
<td>Soda Ash</td>
</tr>
<tr>
<td>In million tons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO₂ Emissions</td>
<td>0.45 t CO₂ / t Soda Ash</td>
<td>1.05 t CO₂ / t Soda Ash</td>
</tr>
<tr>
<td>Factor</td>
<td></td>
<td></td>
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<tr>
<td>(t CO₂ / t SA)</td>
<td></td>
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<tr>
<td>Solution Mining</td>
<td></td>
<td>Solvay Process</td>
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<td>Trona Mining</td>
<td></td>
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<td>Hou process</td>
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</table>

Natural Soda Ash is less CO₂ intensive and fulfills 30% of the demand.

Synthetic Soda Ash is needed and must reduce its CO₂ footprint.

Source: Solvay internal estimate, ESAPA.
CO₂ IS NOW A TANGIBLE PART OF SODA ASH COST STRUCTURE

CO₂ regulation and markets are emerging and developing in multiple regions of the world.

In European Union, CO₂ cost has increased from 5 €/t in 2017 to 25 €/t in 2019.

Beyond CO₂, other environmental challenges need to be answered (SOx, etc).

EMISSIONS TRADING WORLDWIDE
The state of play of cap-and-trade in 2019

Source: ICAP 2019

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SOLVAY REDUCES ITS CO₂ FOOTPRINT
ENERGY TRANSITION IS OUR TOP PRIORITY

- COAL PHASE-OUT
  Green River (2021)

- SOLAR PANELS
  Carrières Les Petons

- BIOMASS FOR CO-FIRING
  with coal in Rheinberg & Dombasle

- BIOMASS BOILER
  implementation in Rheinberg

- MODERNIZATION OF COGENERATION
  Bernburg

- NEW ENERGY-EFFICIENT GAS TURBINE
  Rosignano

Solvay’s Climate Strategy
-1 Mt CO₂ over 2017-2025 at constant scope

Decoupling CO₂ emissions from expected growth

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12 MT OF SODA ASH SHIPPED ON VESSELS YEARLY

- **4.8 Mt** NORTH AMERICA
  - Capacity: 12.8
  - Demand: 7.3

- **3.6 Mt** TURKEY
  - Capacity: 4.7
  - Demand: 1.1

- **1.7 Mt** EUROPE (incl. Russia)
  - Capacity: 12.6
  - Demand: 11.2

- **1.4 Mt** CHINA
  - Capacity: 29.7
  - Demand: 25.4

20% Soda Ash globally traded in 2018

Global Trade: 20%

Local Supply: 80%

Source: Solvay internal estimate and GTA statistics
ENVIRONMENTAL STANDARDS ARE MORE AND MORE STRINGENT ON SEA FREIGHT

New IMO* 2020 regulation to reduce Sulphur oxides (SO$_x$) emissions from ships

- Vessels operating within ECAs will be required to use fuel oil with a maximum sulfur content of 0.1%.
- All vessels that operate outside Emission Control Areas (ECAs) will be required to use fuel oil with a maximum sulfur content of 0.5% (3.5% today)

Solutions available to clean up shipping emissions

- Use low Sulphur bunkers that are expected to cost 50% more than current high Sulphur bunkers
- Install exhaust gas cleaning systems
- Use LNG. Only new vessels can be equipped.

Expect 15% increase of shipping cost

(*) IMO (International Maritime Organization) is the United Nations specialized agency with responsibility for the safety and security of shipping, including the prevention of marine and atmospheric pollution by ships
Source: Solvay internal estimate
SOLVAY DEVELOPS SUSTAINABLE SOLUTIONS FOR THE MARINE INDUSTRY TO HELP COMPLY WITH NEW ENVIRONMENTAL REGULATIONS

Dry exhaust gas treatment system for SOx and particles removal

300 satisfied customers on land benefit from 30 years SOLVAir® experience

SOLVAir® and ANDRITZ developed a sodium-based solution and a filter system to clean exhaust gases from vessels running on High Sulphur Heavy fuel Oil (HFO) diesel engines

99% of Particles are captured

NO WASTE WATER is released back to the sea

More information on https://www.solvairsolutions.com/en
From April 2019, SOLVAir® Marine solution is tested on the Piana, La Méridionale’s flagship. The trial campaign, in collaboration with ANDRITZ, is successful.
KEY TAKE-AWAYS

SODA ASH DEMAND IS EXPECTED TO GROW BY 16 MT OVER 2018-2030.
To reply to customer needs and avoid product shortage, TIMELY INVESTMENTS are needed.

AS A STRATEGIC PARTNER, SOLVAY COMMITS TO SERVE ITS SODA ASH AND BICAR CUSTOMERS BY:
- Developing 1.4 Mt capacity to meet customers needs worldwide
- Focusing on cost competitiveness to mitigate growing uncertainties
- Providing safety of supply through its unique network of plants

ENVIRONMENTAL IMPACT IS NOW A TANGIBLE PART OF THE SODA ASH COST STRUCTURE
Solvay decreases the CO₂ footprint of Soda Ash to fight climate change. Solvay develops new solutions to decrease maritime pollution and address IMO regulation.

RETURN ON INVESTMENTS SHOULD BE DELIVERED TO ENSURE SUSTAINABLE VALUE CREATION FOR ALL STAKEHOLDERS
People protection is an integral part of the way we conduct our business.

We are constantly reviewing our process and monitor it on a daily basis so that every person producing, delivering or using our products stay safe.

**SAFETY IS OUR VALUE**
**WE NEVER COMPROMISE ON SAFETY**

- Life Saving rules
  - Devnya
- Safety day
  - Rosignano
- Safety workshop
  - Dombasle

- Safety leadership courses for managers & supervisors
- Leaders safety visits (LSV)
- Clear and defined safety policy and rules
- Life Saving Rules
- Strong involvement of contractors in our safety culture

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SOLVAY SODA ASH PLANTS HAVE BUILT OVER THE YEARS STRONG RELATIONSHIPS WITH COMMUNITIES

SOCIETAL ACTIONS

Contributing to society is part of Solvay’s DNA. To develop strong relationships with communities around our sites, we are engaged in many societal actions that focus on Science, Youth, Employability & Education, Environment and Solidarity.

- Limestone quarry recovery with “SEO Birdlife” Torrelavega
- Fasten your Seatbelt on the Back Seat Devnya
- Christmas tree Project: Santa Claus for Children in Need Rheinberg
- Rayong Beaches cleaned by Solvay’s employees Map Ta Phut
- Solvay volunteers give students a look at the future Sao Paulo
- Youth First Aid Green River