Preparing the chemicals industry for 'the day after' the COVID-19 pandemic

Discussion document

April 2020
There is now a new urgency to accelerate responsible investments and turn this crisis into something positive for society at large and for generations to come.
The chemicals industry faces a dual impact from demand and oil price collapses as COVID-19 ripples across the globe.

Total confirmed cases of COVID-19 (as of 17th April 2020)
Worldwide: 2 Mn cases

Impact on chemicals industry

Macroeconomic impact
Gross Value Add (2020, % vs. pre-COVID scenario)

- Chemicals: -7% to -10% (#5 hardest hit)
- Nutrition
- Construction
- Pharma & Life Sciences
- Consumer Goods
- Agriculture
- Automotive

Collapsing oil prices and feedstock impact
Brent Crude Daily Price (USD/barrel - 2020)

Select containment measures

- Suspension of intl. flights and border closures
- Lock-downs and social distancing measures
- Closure of schools, offices, and factories
- Measures to combat essential goods scarcity

Size of bubble = number of infected people

COVID-19 impact on chemicals
Strategy &

1) Chemicals industry and selected key end-markets for chemicals
Sources: WHO as of 17 April 2020, Bloomberg, Strategy& analysis

April 22, 2020
Chemicals is the #5 hardest hit industry and faces a sharp immediate decline and highly uncertain recovery path.

Macroeconomic impact scenarios of COVID-19 crisis

**Estimated impact on chemicals**

- **V-Scenario (Mild)**
  - Shock impact on the economy, followed by swift recovery
  - Reduction limited to one full year
  - Postponement of investment and consumption

- **U-Scenario (Severe)**
  - Sustained recession
  - Performance of at least two full years affected
  - Postponement investment and consumption

- **L-Scenario (Critical)**
  - Drastic impact on economic performance and prolonged recession
  - Return to the level of total output before COVID-19 not foreseeable
  - Deep restrictions on investment/consumption

COVID-19 impact on chemicals 1) Based on Strategy& analysis: Companies included in analysis: basis chemical manufacturing (incl. petrochemical manufacturing), pesticides, fertilizers, agricultural chemicals, paint, soap and other chemical product and preparation manufacturing. Source: Strategy& analysis

April 22, 2020
Pre-COVID-19 challenges remain and the chemicals industry needs to remain focused on achieving sustainability goals

SDGs in 2019 Company Reports

<table>
<thead>
<tr>
<th>%</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>72%</td>
<td>Mentioned the SDGs in their reporting</td>
</tr>
<tr>
<td>65%</td>
<td>Referred to specific SDGs</td>
</tr>
<tr>
<td>25%</td>
<td>Included the SDGs in their published business strategy</td>
</tr>
<tr>
<td>23%</td>
<td>Disclosed meaningful Key Performance Indicators related to the SDGs</td>
</tr>
<tr>
<td>21%</td>
<td>Include reference to the SDGs in their CEO or Chair statement</td>
</tr>
<tr>
<td>14%</td>
<td>Included specific SDG targets</td>
</tr>
</tbody>
</table>

Top 5 most mentioned SDGs 2017-2019 and chemicals impact

1. **Decent Work and Economic Growth**
   - 2017: 76%
   - 2019: 86%
   - **Protect labor rights** and promote safe and secure working environments for all workers
   - **Take measures to eradicate forced labor**, modern slavery and human trafficking

2. **Responsible Consumption and Production**
   - 2017: 65%
   - 2019: 80%
   - **Substantially reduce waste** generation through prevention, reduction, recycling and reuse
   - **Achieve sustainable production** and efficient use of resources *(chemicals touch nearly all products we use)*

3. **Climate Action**
   - 2017: 79%
   - 2019: 73%
   - **Strengthen adaptive capacity and resilience to climate-related hazards** and natural disasters in all countries *(chemicals is the largest user of oil & gas)*

4. **Industry, Innovation and Infrastructure**
   - 2017: 55%
   - 2019: 64%
   - **Develop reliable, sustainable and resilient infrastructure** to support human wellbeing and economic development

5. **Good Health and Well-being**
   - 2017: 57%
   - 2019: 64%
   - **Promoting mental health and wellbeing** and achieving **universal health coverage**, including financial risk protection and access to quality essential healthcare services.

COVID-19 impact on chemicals

**Strategy & SDG Reporting Challenge 2017 & 2019 (cross industry perspective)**

April 22, 2020
Despite an immediate positive effect on the environment it will be more difficult to realize long-term goals as the recession hits.

Potential impact of COVID-19 on sustainability

Short term effect of COVID-19

- 20-60% reduction of pollution
- Himalaya visible from 200km for first time in 30 years

Global GHG emissions

- Upward trend of GHG emissions (rebound after crises), while challenge to reduce GHG emissions becomes larger – chemical industry plays a pivotal role as large emitter

- Reduction required to meet 1.5°C UN goal

Global plastic production

- “Chemicals players already struggle to justify investments in responsible innovations and technology and will be left with less capital to invest post-COVID-19”

COVID-19 impact on chemicals

1) Extrapolation based on 7.6% YoY reduction between 2020 and 2030

Sources: PBL, UNEP, Geyer et al. (2017), Ourworlddata.org, ICCA website, Strategy& analysis

April 22, 2020
As new reality has emerged virtually overnight, the chemicals industry needs now to respond to seven key consequences

**Key consequences of the COVID-19 crisis**

1. **Abrupt oversupply** and imbalances from supply chain disruptions and demand shocks

2. **New competitive world order** as oil price collapse shift regional feedstock cost advantages

3. Accelerated **deglobalization of supply chains** and renewed trade-off between resilience vs. cost

4. **Restructuring need** and **bold moves** as **new winners and losers emerge** from tumbling markets

5. Unanticipated **boost** for **deal making** and **consolidation** in a market which could have stagnated

6. **Catalyst for innovation** and technology and digital enabled **new business models acceleration**

7. **Urgency to put purpose at the heart of the recovery plan** and **invest in green technology**
Demand destruction has accelerated the industry into an oversupply situation with sharp shocks across end-markets

Pre-COVID demand and capacity outlook
Global PE/PP demand & capacity (Mt/year)\(^1\)

Supply was already outpacing demand pre-COVID (17% petrochemicals price decline in 2019) and oversupply will be exacerbated by global economy contraction (~3% in 2020 based on IMF) whilst demand was projected to grow by 4% per year\(^1\)

Demand impact across chemicals end-markets

<table>
<thead>
<tr>
<th>End-market</th>
<th>Example chemical products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition</td>
<td>• Vitamins</td>
</tr>
<tr>
<td></td>
<td>• Aminoacids</td>
</tr>
<tr>
<td>Pharma</td>
<td>• Pharma excipients</td>
</tr>
<tr>
<td></td>
<td>• Active ingredients</td>
</tr>
<tr>
<td>Hygiene</td>
<td>• Emollients</td>
</tr>
<tr>
<td></td>
<td>• Active ingredients</td>
</tr>
<tr>
<td>Packaging</td>
<td>• Pigments</td>
</tr>
<tr>
<td></td>
<td>• Polymers</td>
</tr>
<tr>
<td>Agriculture</td>
<td>• Surfactants</td>
</tr>
<tr>
<td></td>
<td>• Crop protection</td>
</tr>
<tr>
<td>Energy</td>
<td>• Polysilicon/ silicon</td>
</tr>
<tr>
<td></td>
<td>• Epoxy</td>
</tr>
<tr>
<td>Construction</td>
<td>• Pigments</td>
</tr>
<tr>
<td></td>
<td>• Solvents</td>
</tr>
<tr>
<td>Automotive</td>
<td>• Polymers</td>
</tr>
<tr>
<td></td>
<td>• Fuel additives</td>
</tr>
<tr>
<td>Consumer</td>
<td>• Dyes</td>
</tr>
<tr>
<td></td>
<td>• Polymers</td>
</tr>
</tbody>
</table>

Market for end segments such as automotive are down by almost 30% due to factory closures - US chemical player

Companies serving food, medical, pharmaceuticals are experiencing record outbound volumes from their warehouses – Industry expert

Customers in sectors such as construction stockpile supplies to prevent future shortages and we expect a delayed effect in Q3/Q4 – EU chemical player

1) Excluding Latin America and Africa
Source: Bloomberg, Nexant, IHS, IMF, ICIS, Strategy& analysis

April 22, 2020
Asia is set to extend its leading position in chemicals as it comes out of the crisis first and benefits from low oil prices.

Global chemical industry landscape

**Production of Polypropylene and Polyethylene per region**

**Mt/year**

**North America**
- U.S. has been a net exporter of oil since 2011 and the largest oil producer since 2018 – break-even for shale oil is around $50/barrel

**Europe**
- Broadest specialty portfolio and with Naphtha based feedstock – losing ground vs. other regions

**Middle East**
- Government subsidized chemicals feedstocks are gradually being lifted (KSA) – ambitions to move downstream

**Asia**
- In 2009, China became the world’s largest chemicals producer for the first time – imports 75% of oil usage

**Recovery after 2008 global crisis**

- Asia and ME are gearing-up to expand their chemicals industries and recover quickly as they did post 2008 global crisis

**Source:** Nexant, IEA, Bloomberg, Strategy & analysis

April 22, 2020
Chemicals are vital to combat COVID-19 and production is localized for emergency relief and to reduce import dependence

**Imports of intermediate manufacturing products**

Share of imports from China

- “Chemical Industries will be highly impacted due to shortage and non-availabilities of raw materials from China, finding an alternative to China now is next to impossible” – Ex-chairman of Chemexcil
- Sanofi to spin-out and launch European API manufacturer. Sanofi positions the manufacturer as a means to balance the industry’s heavy reliance on API source from the Asian region
- “BASF expects China supply chain issues in next few weeks due to Corona” – CEO of BASF
- “The impact is being felt acutely in pharmaceuticals, as companies struggle to get raw ingredients from Chinese drug makers weighed down by a locked down country, closed factories and transport bans” – Sanjay Kumar
- Indian government sets aside $1.2bn for pharma industry to enable local production and reduce the country’s reliance on 35+ active pharmaceutical ingredients (APIs) away from China

**Chemical companies relief to combat COVID-19 (examples)**

- The chemical industry plays a critical role in provisioning the products we use daily and to combat COVID-19
- Chemicals companies across the globe provide emergency relief to supply essential goods, e.g.:
  - **Active pharmaceutical ingredients** for medicines
  - **Fabrics, advanced materials** for protective/medical equipment
  - **Chemicals** for hygiene and cleaning products

- **Dow** repurposed existing facilities to produce hand sanitizer which it does not typically produce

- **Evonik** teams with EOS, 3D Systems and HP, donating polyamide 12 powder for 3D printing of medical devices

- **DSM** stood-up production of disinfectant gel (which it never produced before) and provides high-quality filter materials for masks.

- **Covestro** donates protective eyewear, thermometers, pillows and face masks to healthcare facilities

*Source: Corporate and governmental websites, Strategy& analysis*
Stock prices have taken substantial hits and players should restructure, reposition, seize opportunities to recover stronger COVID impact on stock price of chemical players (Avg. stock decline – Feb/ Mar 2020 vs Jan 2020)

<table>
<thead>
<tr>
<th>Company focus</th>
<th>Company examples</th>
<th>Revenues</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small &lt;€0.5B</td>
<td>Medium</td>
<td>Large &gt;€5B</td>
</tr>
<tr>
<td>Specialty</td>
<td>DSM, Clariant, Huntsman, Ashland</td>
<td>-27% (7)</td>
<td>-14% (28)</td>
</tr>
<tr>
<td>Commodity</td>
<td>BASF, LyondellBasell, SABIC</td>
<td>-19% (6)</td>
<td>-17% (10)</td>
</tr>
<tr>
<td>Total</td>
<td>-23% (13)</td>
<td>-15% (38)</td>
<td>-14% (30)</td>
</tr>
</tbody>
</table>

COVID-19 impact vs. financial strength
- Act countercyclically to seize opportunities and boost competitive advantage
- React, restructure and optimize portfolio swiftly to not come out weakened

Strategic responses
1. Leverage financial position to consolidate and expand into adjacencies, invest in differentiated capabilities and technology, and look for M&A to boost value creation
2. Capture value from demand uplift to improve financial position, protect market position and invest in differentiated capabilities and technology
3. Take immediate restructuring actions, support customers with healthy fundamentals, seize opportunities to consolidate and diversify and leverage M&A for value creation
4. Take immediate restructuring actions to improve financial resilience and protect against consolidation, sell non-core assets and team-up

Source: Bloomberg, Morningstar “Scapa Group Shares Plunge After Warning On Annual Profit” & "Versarien Unaware Of Material Reason Behind Share Price Fall" Feb ‘20; Sharesmagazine “Zotefoams warns of lower profit due to FX hit, fall in polyolefin sales” Jan ‘20; Strategy& Analysis
Typical M&A drivers remain relevant, yet COVID-19 provides an unanticipated boost and new opportunities for value creation.

Outlook on Chemicals M&A by driver

<table>
<thead>
<tr>
<th>Driver</th>
<th>2000-2009</th>
<th>2010-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to feedstock and technology</td>
<td>6%</td>
<td>10%</td>
</tr>
<tr>
<td>Financial investment</td>
<td>10%</td>
<td>9%</td>
</tr>
<tr>
<td>Portfolio diversification</td>
<td>11%</td>
<td>7%</td>
</tr>
<tr>
<td>Segment consolidation</td>
<td>10%</td>
<td>13%</td>
</tr>
<tr>
<td>Adjacency and ecosystem</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Inbound geographic expansion (from emerging into developed markets)</td>
<td>31%</td>
<td>27%</td>
</tr>
<tr>
<td>Outbound geographic expansion (from developed into emerging markets)</td>
<td>30%</td>
<td>27%</td>
</tr>
</tbody>
</table>

Source of value for bold moves

- **Invest in green R&D portfolio and technology**: Invest in (emerging) technology and R&D for long-term advantage (e.g., circular concepts, bio-sciences, etc.).
- **Accelerate investments in digital technologies**: Acquire a technology player to broaden digital capabilities and integrate end-to-end with end-customers and suppliers.
- **Expand or upgrade critical infrastructure**: Now that assets are standing still, it is the time to upgrade idle assets and prepare them for the pick-up phase.
- **Capitalize on new opportunities to buy low**: Capture opportunities to buy low and sell high as valuations and feedstock have fallen tremendously.
- **Accelerate market consolidation**: Acquire competitors and adjacent players to consolidate the market and strengthen competitive position.
- **Build digital eco-system to scale innovation**: Acquire, commercialize players close to end-markets to scale-innovation across fragmented customers/applications.

Accelerated decline as Europe and NA recover more slowly.
Short-term opportunities arise from distress situations and industry reconfiguration remains the source for long-term plays

M&A opportunities – not DSM specific

**Short-term Chemicals M&A opportunities**

- Chemical companies highly exposed to automotive and other sectors heavily impacted by COVID-19
- Small/mid sized specialty chemicals firms with niche portfolio and immediate/near term liquidity needs
- Mid-sized oil and gas companies with chemical assets in portfolio and immediate /near term liquidity needs

**Medium/long-term Chemicals M&A opportunities**

- Boost competitive advantage (bio-based, circular technology, digital, and adjacencies)
- Capture opportunities from (forced) divestment of non-core assets (companies seeking greater focus or cash)
- Pursue public to private transactions of large undervalued/undermanaged chemical companies
- Consider family owned companies looking for new owners and/or equity to finance recovery and growth

Source: Strategy& analysis

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**Historic value creation and company focus**

- Opportunities for public to private transactions and carve-outs of non-core assets (e.g., Clariant Pigments, Lonza Specialties)
- Invested capital 5yr CAGR

COVID-19 impact on chemicals

Strategy&

Source: Strategy& analysis

April 22, 2020
There is now a unique opportunity for innovation, create new digital/technology enabled business models and redefine value

**Innovation landscape in chemicals industry**

<table>
<thead>
<tr>
<th>Pre-COVID: Ceiling of innovation</th>
<th>Post-COVID: Unique climate for innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Most players struggle to redefine and capture value from sustainability and new digital/ttech enabled business models&quot;</td>
<td><strong>1</strong> External shock brings unique dynamic for innovation with lockdown derived new experiences, behaviors and needs enabling new categories of businesses</td>
</tr>
<tr>
<td>&quot;Value from optimizing and improving existing processes, products and services – no chemistry breakthroughs&quot;</td>
<td><strong>2</strong> Recession forces companies to reduce cost, come up with new ideas and innovate new business models</td>
</tr>
<tr>
<td></td>
<td><strong>3</strong> New art of the possible for value chain reconfiguration from demonstrated manufacturing agility for emergency relief</td>
</tr>
<tr>
<td></td>
<td><strong>4</strong> Unexpected alliances and collaborations emerge as institutions team up to solve society wide problems</td>
</tr>
<tr>
<td></td>
<td><strong>5</strong> New sense of purpose and community sets new priorities as the crisis unfolds and the most vulnerable are exposed</td>
</tr>
</tbody>
</table>

- Mass adoption of digital tech, driven by remote working and education, online shopping
- New business models for typical offline products and services delivery
- Airbnb and Uber emerged as winners from the previous global crisis, resetting cost levels for leisure stays and taxi rides globally
- Dow repurposed existing facilities to produce hand sanitizer
- DSM stood-up production of disinfectant gel
- Google and Apple team up to develop tracking technology
- Allianace of DSM, AFPRO and Auping for the production of protective medical equipment
- Many communal initiatives to help each other and support the most vulnerable in society
- Increased reflection on what matters in our lives

COVID-19 impact on chemicals

Strategy&

Sources: Divante, Strategy& analysis

April 22, 2020
Sustainability creates value in four ways for Chemicals and should be at the heart of the purpose and the response plan.

58% of Chemicals CEOs are prioritizing investments in sustainability in the upcoming year.

More Trust
Societal expectation to be aware of impact and to openly report
- Employee rights
- Employee well-being
- Big data and privacy

More Growth
Capture emerging opportunities and reposition in new ecosystems
- Enabling sustainable solutions
- Circular economy plays
- Technology innovation

Lower Risk
Keep license to operate and control investment risk
- Compliance
- Responsible supply chains
- Integrity

Lower Cost
Sustainable companies outperform their market
- Favorable access to capital
- GHG emission reductions
- Talent acquisition

Sustainable Impact – Made real
CHEMICALS
Strategy

1) Source: PwC, 23rd Annual Global CEO Survey © 2019 PricewaterhouseCoopers LLP, All rights reserved.
Q: Which of the following opportunities in the Chemicals industry will you be prioritizing and/or investing in over the next 12 months?
Governments play a pivotal role to sustain the economy and should link stimulus packages to long-term sustainability goals.

**Governmental actions to support bounce back**

- **Reiterate global focus on sustainability** and collaborate on a national and international level to ensure concerted drive towards greener economy.
- Allocate **resources for the chemical sector** or **create chemical specific initiatives**, as part of the economic stimulus deployed globally for COVID-19 crisis.
- **Incentivize investments** in innovations to meet ‘green’ targets (e.g. biofuels, hydrogen production, plastic recycling) via effective subsidy or funding schemes.
- Incorporate **risks from physical systemic economic shocks** (for e.g. climate change, pandemic, natural disasters) into chemical infrastructure planning and funding.
- Enable companies to **build resilience into chemical value chain by creating cooperative models** and **drive digitization initiatives through incentive schemes**.
To prepare for the recovery, chemicals and life sciences players should focus their actions on three key pillars and time horizons.

**What should chemical companies do?**

**Time**

- **STABILIZE** to ensure business continuity
- **REPOSITION** to accelerate growth and differentiation
- **TRANSFORM** to gain structural competitive advantage

1. **React swiftly with a focus on cost and restructuring, portfolio optimization and stimulus packages with ‘shovel ready projects’**

2. **Leverage financial position to strengthen market position, reconfigure supply chains and expand into adjacencies**

3. **Disrupt the market with new innovative, sustainable and digital enabled new business models and ecosystems**

**Enablers to accelerate this journey**

- Use governmental stimulus packages
- Boost capabilities with M&A
- Collaborate for innovation
- Create strategic alliances

April 22, 2020