

# Macro and industry trends

## Macro and industry trends impact Novozymes and emphasize the need for innovation and strong positioning of our solutions.

In 2016, the world market for industrial enzymes expanded by 1.7% to an estimated DKK 25.4 billion. Novozymes remained the market leader with an estimated 48% market share, followed by DuPont with an estimated 19%.

In the growing market for microorganisms, which is particularly influenced by trends in the agricultural industry, improving yields and complementing traditional chemistry and fertilizers remain priorities. This industry continues to attract increased attention from established agricultural chemical companies. In 2016, a consolidation wave swept the industry, with mergers announced by Bayer–Monsanto, Syngenta–ChemChina and Dow–DuPont, among others.

### The world around us

To ensure long-term success, Novozymes needs to understand how developments in the external world translate into specific macro and industry trends with the potential to drive or hinder growth in each of our end markets. While some trends are specific to one industry, Novozymes has also identified five macro trends that are globally relevant, impact multiple sectors or represent a fundamental shift in business as usual. These trends emphasize the need for new and transformative innovation as well as strong positioning of Novozymes' solutions.

## Global macro trends

By 2030, global demand for water will outstrip supply by 40%, largely driven by the agricultural and manufacturing sectors. Unlike climate change, water is a local issue that is already affecting the well-being of some communities. Several regions around the world are experiencing severe water crises in the form of floods, polluted waterways or droughts.



The availability of water is subject to growing government regulation, which is driving demand for solutions that reduce water consumption and improve wastewater quality.

To ensure global food security, the world needs to increase agricultural productivity significantly. The need to produce more from less is driven by a number of factors, such as increasing population, consumer pressure and climate change-related supply chain disruptions.



In response, there has been an increase in the use of big data, sensors and digital farm management, microbial solutions and plant genetics.

# Global macro trends

Crude oil prices have plunged since mid-2014, hovering between USD 30 and USD 50 per barrel. The market expects low oil prices to persist in the short to medium term. Low oil prices create ripple effects throughout the economy, as they push down the price of gasoline and other conventional fuels as well as the petrochemical derivatives that serve as inputs in many manufacturing industries.

The main impact of low oil prices on the uptake of renewables has been seen in the transport and heating sectors, which are still heavily reliant on fossil fuels.

The increase in digital interconnections between people, things and organizations is reshaping the nature of business.

Digitalization enables companies to outsource or automate a number of back-office functions. It has also led to the rise of new manufacturing technologies (e.g. 3D printing) and impacts the way we communicate with customers, investors and other stakeholders. In addition, digitalization facilitates greater corporate transparency, and the use of big data and analytics is driving greater production efficiencies by enabling companies to analyze large data sets in real time, and R&D teams can create solutions tailored to specific customer needs. As an example, Novozymes' biofuel customers send data about their plant processes, outputs and operations to Novozymes' Biofuel Technical Service.

The team analyzes the information to solve production problems and help the plant realize the full benefits of Novozymes' solutions.

The digital transformation is also changing the nature of work. Estimates forecast that new technologies such as robotics and machine learning could affect nearly half of all current occupations by 2020 and potentially exacerbate global unemployment.

## Energy transition



## Shifting demographics and urbanization



## Digitalization of the global economy



Changes in global consumption patterns are largely driven by shifting demographics and rapid urbanization. Each year, close to 70 million people move from rural areas to cities. By 2030, 81% of global consumption will come from consumers in large cities. Although urbanization in itself can be a positive force, poorly planned cities, urban sprawl and associated infrastructure result in high levels of air, water and soil pollution, and significant public health challenges. The most significant demographic trend is the growing middle class in emerging economies. Estimates show that the global middle class will increase to 4.9 billion by 2030, of which 64% will live in Asia while only 22% will live in Europe and North America. Another key shift is the aging of the global population due to falling birth rates and longer life expectancy.

# Household Care

	Current trends	Growth drivers	Growth barriers	Our management approach
Macro trends	<b>Shifting demographics and urbanization</b>	<ul style="list-style-type: none"> <li>Demand for better-performing products in emerging markets</li> <li>Growing demand for antibacterial and hygiene solutions for laundry</li> </ul>	<ul style="list-style-type: none"> <li>Middle-class consumers' ability to differentiate brand performance</li> <li>Competition putting pressure on detergent prices</li> </ul>	 Lead innovation  Focus on opportunities
	<b>Energy transition</b>	<ul style="list-style-type: none"> <li>Growing demand for energy-efficient solutions (washing at low temperatures and with low environmental footprint)</li> </ul>	<ul style="list-style-type: none"> <li>Sustained low surfactant prices reducing adoption of high-performance enzymes</li> </ul>	 Focus on opportunities  Rally for change
	<b>Water scarcity</b>	<ul style="list-style-type: none"> <li>Demand to clean more with less water</li> </ul>	<ul style="list-style-type: none"> <li>Low price of water</li> </ul>	 Focus on opportunities
Industry trends	<b>Stronger consumer preference for convenience and cleanliness</b>	<ul style="list-style-type: none"> <li>Opportunity to work on new solutions and formats (liquids, unit dose compaction, hygiene, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Technology development in liquids and new formats needed to address rapid shifts in consumer preferences</li> <li>Initial customer perception that compaction and washing at low temperatures are less effective</li> </ul>	 Lead innovation
	<b>Customer consolidation</b>	<ul style="list-style-type: none"> <li>Stronger partners with greater reach providing potential for increased sales of Novozymes' solutions</li> </ul>	<ul style="list-style-type: none"> <li>Stronger partners potentially having more bargaining power</li> </ul>	 Focus on opportunities
	<b>Commodity price volatility driving cost-based optimization of detergent formulations</b>	<ul style="list-style-type: none"> <li>Growing customer focus on ensuring supply chains and sourcing raw materials from renewable sources</li> </ul>	<ul style="list-style-type: none"> <li>Focus on cost optimization potentially making certain customers opt for lower enzyme levels, resulting in reduced wash performance</li> </ul>	 Focus on opportunities

 [Read more about our strategic focus areas in the Strategy section](#)

# Food & Beverages

	Current trends	Growth drivers	Growth barriers	Our management approach
Macro trends	<b>Shifting demographics and urbanization</b>	<ul style="list-style-type: none"> <li>• Growing demand for better and more convenient foods</li> <li>• Improved processing and optimization of raw materials</li> <li>• Growing demand for substitutes for animal protein</li> </ul>	<ul style="list-style-type: none"> <li>• Consumer preference for traditional foods</li> <li>• Fragmented local markets and dietary habits</li> <li>• Fragmented regulation in local markets slowing market entry</li> <li>• Demand for rapid innovation in regional markets</li> </ul>	<ul style="list-style-type: none"> <li> Lead innovation</li> <li> Focus on opportunities</li> </ul>
	<b>Digitalization of the global economy</b>	<ul style="list-style-type: none"> <li>• Customers using data analytics to validate efficiency gains achieved</li> </ul>		<ul style="list-style-type: none"> <li> Rally for change</li> <li> Grow people</li> </ul>
Industry trends	<b>Consumer focus on health, wellness and natural products</b>	<ul style="list-style-type: none"> <li>• Increased awareness about food safety</li> <li>• Demand for “naturally healthy” products</li> <li>• Growth in market for “food intolerance” products, such as lactose-free dairy</li> </ul>	<ul style="list-style-type: none"> <li>• Consumer skepticism about technology in food &amp; beverage production</li> <li>• Conservative industries</li> </ul>	<ul style="list-style-type: none"> <li> Lead innovation</li> <li> Focus on opportunities</li> <li> Rally for change</li> </ul>
	<b>Increased cost of raw materials</b>	<ul style="list-style-type: none"> <li>• Demand for optimization in raw materials and production processes</li> <li>• Price and yield stability of enzymes</li> </ul>	<ul style="list-style-type: none"> <li>• Customer inertia in changing formulations and adopting new technologies</li> <li>• Low raw material prices disincentivizing customers from adopting enzymatic solutions</li> </ul>	<ul style="list-style-type: none"> <li> Lead innovation</li> </ul>
	<b>Customers consolidating operations but diversifying brands to cater to hyperlocal consumer preferences</b>	<ul style="list-style-type: none"> <li>• Customer focus on cost optimization, processing aids and brand building</li> <li>• Stronger partners with greater reach</li> </ul>	<ul style="list-style-type: none"> <li>• Fragmented local markets and dietary habits</li> <li>• Demand for rapid innovation in regional markets</li> </ul>	<ul style="list-style-type: none"> <li> Lead innovation</li> <li> Focus on opportunities</li> </ul>

# Bioenergy

	Current trends	Growth drivers	Growth barriers	Our management approach
Macro trends	<b>Energy transition</b>	<ul style="list-style-type: none"> <li>Industry consolidation and focus on process economics driving demand for enzymatic solutions that enhance yield and reduce chemical costs</li> <li>Growth of low-carbon fuel standards driving demand for Novozymes' solutions for cellulosic ethanol</li> </ul>	<ul style="list-style-type: none"> <li>Reduced demand for premium enzymes as ethanol producers optimize costs</li> <li>Majority of renewable investments going to the power sector (solar, wind, etc.), while the transport sector continues to rely heavily on fossil fuels</li> <li>Lack of political support outside of the US for starch-based ethanol</li> <li>General lack of willingness to invest in cellulosic ethanol</li> </ul>	<ul style="list-style-type: none"> <li> Lead innovation</li> <li> Focus on opportunities</li> <li> Rally for change</li> </ul>
	<b>Digitalization of the global economy</b>	<ul style="list-style-type: none"> <li>Modern and automated ethanol facilities using data analytics to monitor performance and potential for optimization gains, driving demand for high-tier enzymes</li> </ul>		<ul style="list-style-type: none"> <li> Focus on opportunities</li> </ul>
	<b>US corn ethanol industry affected by low corn prices</b>	<ul style="list-style-type: none"> <li>Continued stable and coherent political mandate driving adoption of biofuels</li> </ul>	<ul style="list-style-type: none"> <li>Lack of political commitment to expanding blending mandates</li> <li>Resistance to exceeding 10% blend</li> </ul>	<ul style="list-style-type: none"> <li> Rally for change</li> <li> Focus on opportunities</li> </ul>
Industry trends	<b>Waning public support for biofuels</b>	<ul style="list-style-type: none"> <li>Growing calls for CO<sub>2</sub> reductions in transportation sector driving demand for ethanol, if positioned as the best low-impact alternative on the market</li> </ul>	<ul style="list-style-type: none"> <li>Competition with other transportation technologies such as electric vehicles to be the “best way” of reducing CO<sub>2</sub> emissions</li> </ul>	<ul style="list-style-type: none"> <li> Rally for change</li> </ul>
	<b>Volatile commodity prices squeezing customer margins</b>	<ul style="list-style-type: none"> <li>Price and yield stability of low-tier enzymes</li> <li>Demand for enzymes with optimization potential</li> </ul>	<ul style="list-style-type: none"> <li>Low ethanol prices increasing fight for share</li> <li>Fluctuating value of co-products reducing demand for Novozymes' yield enhancement solutions</li> </ul>	<ul style="list-style-type: none"> <li> Lead innovation</li> <li> Focus on opportunities</li> </ul>

# Agriculture & Feed

	Current trends	Growth drivers	Growth barriers	Our management approach
Macro trends	<b>Transition to sustainable agriculture</b>	<ul style="list-style-type: none"> <li>Favorable regulatory requirements benefiting sustainable farming practices</li> <li>Pressure on available farmable land increasing focus on getting more output from existing land</li> <li>Demand for more efficient animal feed solutions to increase production with less grain input</li> </ul>	<ul style="list-style-type: none"> <li>Customer skepticism and lack of understanding of biologicals</li> <li>Fragmented and complicated regulation in local markets</li> <li>Limited scientific proof for biologicals</li> </ul>	<ul style="list-style-type: none"> <li> Lead innovation</li> <li> Focus on opportunities</li> <li> Rally for change</li> <li> Grow people</li> </ul>
	<b>Shifting demographics and urbanization</b>	<ul style="list-style-type: none"> <li>Global growth in protein consumption due to changes in dietary habits</li> <li>Demand for more sustainable protein</li> <li>Governments in emerging economies (China, India, etc.) seeking solutions to increase agricultural productivity</li> </ul>	<ul style="list-style-type: none"> <li>Lack of understanding of the potential of biotechnology in agriculture and feed</li> </ul>	<ul style="list-style-type: none"> <li> Rally for change</li> </ul>
	<b>Digitalization of the global economy</b>	<ul style="list-style-type: none"> <li>Rise of precision agriculture validating yield improvements and enabling tailoring of microbial solutions to farmers' specific soil conditions</li> </ul>		<ul style="list-style-type: none"> <li> Lead innovation</li> </ul>
Industry trends	<b>Consumer focus on health, wellness and natural products</b>	<ul style="list-style-type: none"> <li>Growing calls for reduced use of antibiotics in farm animals, and focus on animal welfare</li> <li>Growing demand for natural weed solutions that are not resistance forming or harmful to biodiversity</li> <li>Growing demand for biocontrol solutions to replace chemicals</li> </ul>	<ul style="list-style-type: none"> <li>Low pricing of traditional fertilizers and pesticides competing with more sustainable solutions</li> <li>Fragmented and complicated regulation in local markets</li> </ul>	<ul style="list-style-type: none"> <li> Lead innovation</li> <li> Rally for change</li> </ul>
	<b>Farmers sensitive to fluctuations in commodity prices</b>	<ul style="list-style-type: none"> <li>High input costs for farmers driving demand for yield-enhancing and sustainable solutions</li> <li>Attractive return on investment from feed enzymes and biologicals</li> </ul>	<ul style="list-style-type: none"> <li>Low commodity prices forcing farmers to cut back on seed treatments</li> <li>Limited scientific proof for biologicals</li> </ul>	<ul style="list-style-type: none"> <li> Lead innovation</li> <li> Focus on opportunities</li> </ul>

# Technical

Industry trends Macro trends

Current trends	Growth drivers	Growth barriers	Our management approach
<b>Water scarcity</b>	<ul style="list-style-type: none"> <li>Increasing demand for wastewater solutions due to increasing water quality/pollution cleanup regulations</li> </ul>	<ul style="list-style-type: none"> <li>Water prices potentially so low that there is no incentive to invest in water-saving solutions</li> </ul>	 Lead innovation
<b>Shifting demographics and urbanization</b>	<ul style="list-style-type: none"> <li>Consumer demand in emerging markets for improved textile quality and longevity</li> </ul>	<ul style="list-style-type: none"> <li>Demand for low-quality textiles and raw materials</li> </ul>	 Focus on opportunities  Grow people
<b>Continuous optimization in textile industry</b>	<ul style="list-style-type: none"> <li>Enzymatic solutions potentially optimizing processes and lowering costs</li> </ul>	<ul style="list-style-type: none"> <li>Preference for lower-cost, chemical solutions to enable market growth</li> </ul>	 Rally for change

## Identifying global macro trends

Novozymes has conducted an analysis of global macro trends to inform its long-term strategy development and sharpen its integrated reporting.

One of the starting points for the analysis was to better understand how the global challenges articulated in the UN Sustainable Development Goals translate into specific drivers of and barriers to business growth for Novozymes.

The analysis also included information from diverse sources, such as reports on global risks and opportunities, peer benchmarks and Novozymes' enterprise risks. Internal stakeholders prioritized trends according to relevance to Novozymes' business and importance to stakeholders. The top macro trends were validated through a series of dialogues with Novozymes' senior management and consultations with selected investors and customers.

 [See full description of Novozymes' integrated materiality assessment](#)

