Value Creation
IN THE FOUR BUSINESS AREAS

EBITDA Margins[1]

18.8%	23.8%	16.9%	14.6%
Care Chemicals	Catalysis	Natural Resources	Plastics & Coatings

[1] before exceptional items

The world is changing, and economic, social, and environmental transformation impact every sphere of life. Clariant's Business Areas constantly create value by translating customer and consumer needs into innovative solutions for the urgent questions of tomorrow.

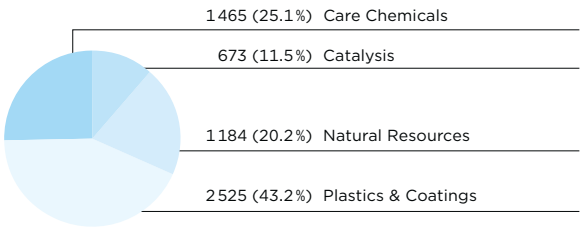
Addressing global trends in four areas for value creation

Clariant's four Business Areas are organized internally into seven Business Units. The Business Area **Care Chemicals** supports customers in improving the characteristics of products in areas such as personal care or crop protection. 90 % of all chemical processes require catalysts, and the Business Area **Catalysis** offers a broad portfolio of catalysts that enable more efficient production and the use of biomass or other alternative raw materials. The Business Area **Natural Resources** supports oil and mining companies in step change innovation and provides products and solutions for industrial manufacturing and purification. The Business Area **Plastics & Coatings** develops products for customers in packaging, electronics, and paint and coatings, among many other industries.

The four Business Areas address major global trends, such as resource conservation, mobility, energy efficiency, and increasing urbanization, and contribute to achieving corporate goals.

SALES BY BUSINESS AREA in CHF m

Group sales: 5847



»Questions are increasing about how we can live more sustainably.«

BINTAN TITISARI
Textile Designer
Bandung, Indonesia

Not only do industry solutions matter to the Business Area Care Chemicals, but the products are devoted to consumer needs as well. Whether it be in personal care, cleaning supplies, or food, consumer desire for a sustainable lifestyle is gaining speed. And this is a global development. To illustrate, the Discover Value story provides an exemplary look into Indonesia, one of the most densely populated countries. More than just textile exporters, Indonesians themselves are demanding, fashion-conscious consumers, also concerned about sustainability: How are textiles produced? Which raw materials were used? How can I save energy and water during washing? Gone is the era in which the consumer doesn't think about the effect of his consumption. This market shift means that relevant industries require a quick and satisfying response.

reports.clariant.com/v03
Watch the TexCare® movie

GABI OHLENDORF
Technical Application Manager
Business Unit Industrial & Consumer Specialties

Interview

Detergents that preserve textiles

Daily every household around the globe is doing laundry. Consumers increasingly desire a more gentle detergent. Gentle not only on their clothes, but also on the environment. A multi-functional detergent additive like TexCare® can handle these demands. Gabi Ohlendorf, Technical Application Manager at the Clariant Innovation Center in Frankfurt, explains how TexCare® works.

How do people in Europe do their washing?
GABI OHLENDORF European children love to eat chocolate and spaghetti with tomato sauce. Around the Mediterranean Sea, red pepper and olive oil are very popular and known to be hard to remove. Very tough stains found in all countries are sebum and sweat. In Germany, almost everyone uses front-loader washing machines and the washing temperature is usually 40°C. However, lower temperatures are being promoted in order to save energy and money. Both liquid and powder detergents are commonly used. In some parts of the Middle East and Africa, hand washing also plays a significant role. Soap bars are the common tool for this method of washing.

What does this mean for your daily work?
In our laundry lab, we adapt our tests to the different needs of our regional customers. We can modify the water hardness and perform our tests on different fabrics soiled with various standardized stains. To make the results most meaningful for our customers, we aim to simulate official test setups.

Can you actually prove that a product works?
Soil Release Polymers form a protecting film on the fibers. This can be proven by using special microscopy techniques. For the effect on detergency, we use both visual and photometric assessment of the stains after washing. The physical assessment for sure is more precise. However, in the end we are aiming for an effect that can be seen by the consumer. That's why it's important to combine both evaluation methods. The Soil Release effect tested with dirty motor oil is especially impressive and you don't need to be an expert to see the benefit of TexCare®.

What are the benefits to the consumer?
Soil Release Polymers protect the fabrics from graying and therefore consumers benefit from an increased lifetime of their clothes. Protection from stains, as well as soil-lifting activity, have a positive effect on the washing result. This increased washing power is something the consumers can directly see and enjoy.

Less energy
Due to a more powerful soil-release effect, TexCare® allows the consumer to wash clothes at lower temperatures, resulting in saving both energy and the planet.

Less wear & tear
TexCare® forms a protective layer that allows for lower temperatures and gentler washing. This helps your favorite clothes last longer.

ECOTAIN®

Performance guarantee
TexCare® allows for more sustainable living with no compromise in performance.

Did you know?

What does a t-shirt have to withstand?

Frequent washing gradually damages clothes. Everything starts with stains. Fabric stains are dirty marks comprised of fat, protein, starch, and dyes. Usually, these components penetrate deeply, making them difficult to remove. Then the dirt floats in the washing water, penetrates the other fabrics and dazzlingly white t-shirts gradually turn gray. And finally, why do fabrics shrink in the washing machine after every first washing? The answer surprisingly is relaxation: New textiles are stretched before selling. When they are washed in hot water, the fibers relax.

Business Area

How Care Chemicals creates value

By developing environmentally compatible products in response to lifestyle-driven megatrends, Care Chemicals has strengthened Clariant's market position and corporate image. Comprised of Industrial & Consumer Specialties, New Business Development, and the industrial Biotechnology business, Care Chemicals focuses on highly attractive, high-margin, and low-cyclicality segments.

Shaping today and tomorrow

Market insights, cutting-edge technologies, and a forward-looking approach to business comprise the core of Care Chemicals. The Business Unit Industrial & Consumer Specialties is one of the largest providers of specialty chemicals and application solutions for consumer care and industrial markets.

New Business Development explores business opportunities beyond the current scope of the Business Units. New areas include for example conductive inks, electronic materials, and additives for the dairy, bakery, and meat industries. Group Biotechnology focuses on biobased processes and products from renewable resources. The sunliquid® process for the sustainable and economic conversion of lignocellulosic material to cellulosic ethanol or biobased chemicals is now fully developed and ready to launch in industrial plants with a production capacity of 50 000 to 150 000 tons of cellulosic ethanol per year. Its benefits are being demonstrated in the precommercial plant in Straubing, Germany.

Rising disposable incomes and sustainable buying behaviors as growth driver

Increasing urbanization, scarcer arable land, and the consequent need for increased agricultural productivity, emerging market growth, and rising disposable incomes are key growth drivers for Care Chemicals. The relevant market for the Business Area is growing by 4 to 5 % each year, which also represents the growth target for Care Chemicals. Since the average living standard in emerging market economies equalizes with living standards in developed economies, emerging markets offer rich opportunities for growth in all segments of Care Chemicals. Fast urbanization in emerging markets also creates a demand for more convenient and differentiated solutions that perform better at lower prices. In the home care market in China, for example, a switch from powder detergents to liquid detergents is underway.

ECOTAIN®

sunliquid® awarded EcoTain® label

reports.clariant.com/v04
Watch the sunliquid® movie

The low oil price in 2016 created pressure for oil derivatives such as surfactants, resulting in a window of opportunity for sugar-based, renewable chemicals such as glucamides. The use of renewable resources, sustainable production processes, and biotechnological innovations is rapidly increasing in importance as markets try to capture consumers that are focused on a healthy lifestyle and respect for natural resources. While a shift to bio-based solutions can already be observed in the Personal Care and Home Care markets, Clariant estimates that by 2030 approximately 20 % of chemical sales will be bio-based chemicals.

The 2016 acquisition of Vivimed and strategic investments in Beraca and BioSpectrum enhanced Care Chemicals' ability to provide natural and renewable ingredients for personal care. Furthermore, these portfolio additions enable Care Chemicals to offer customers a one-stop shop experience with access to the unique Asian and Brazilian cosmetics know-how.

Increased consumer focus on personal well-being and adoption of more sustainable consumption behaviors also impact the home care market. Sustainable building materials, including water-borne paints that are free of air pollutants, hazardous substances, and allergens, are increasingly prioritized. Since keeping track of potentially harmful substances is difficult, consumers rely on eco-labels in their buying decisions. With the company's label EcoTain®, which awards products with excellent full life cycle sustainability profiles, Clariant clearly signals its commitment to sustainable offerings. Market traction is underscored by the rapid growth of EcoTain® labelled products over others in the portfolio.

APPLICATIONS

Industrial & Consumer Specialties

	· Construction	· Heat transfer fluids	· Paints and coatings
· Automotive fluids	· Crop solutions	· Industrial & home care	· Personal care
· Aviation	· Gas treatment	· Industrial lubricants	· Special solvents

New Business Development

		·Food additives for the dairy, bakery, and meat industries
· Conductive inks	· Electronic materials	

Biotechnology

· Bioethanol and alternative fuels	· Biobased chemicals

Idea to Market

Focusing on sustainable solutions

reports.clariant.com/v05
Watch the PRELECT® TPS movie

ECOTAIN®

GlucoPure® SUN
The sunflower oil based surfactant is the ideal blend for mild hand dishwashing liquid detergents. Its main component has a renewable carbon index of 96 %.

VITIPURE®SR
VITIPURE®SR solutions enable customers to formulate healthier products by improving the nutritional profile while maintaining sensory characteristics.

To meet ambitious growth and profitability targets, close cooperation with customers, a high level of innovation, and dedicated evidence of sustainability are imperative. The use of renewable materials is a primary focus for Biotechnology research, as demand for environmentally compatible applications grows. Furthermore, since 2016, sustainability is the main focus of all opportunities pursued by New Business Development. At the Sustainability Trend Meeting, which is chaired by New Business Development and takes place two or three times a year, Clariant identifies sustainability challenges that can be developed into new innovation focus fields. In 2016, New Business Development launched the **PRELECT® TPS** Nano Silver Conductive Inks for printed electronics, opening up the sustainability and performance advantages of direct printing of high-conductivity electrical traces to new areas of the Electronics Manufacturing Industry. These nano silver formulations are cost-efficient, high-performance solutions for emerging printed electronics markets such as displays, photovoltaics, and touch screens.

Developing sustainable products from renewable resources without compromising – or even exceeding – performance has been a central innovation goal in 2016. Examples of the focus on high-performing, sustainable products include **GlucoPure® SUN**, an extension of the renewable glucamide surfactants line that provides superior cleaning performance in hand dishwashing detergents, and TexCare® SRN 260, a multi-functional polymer that allows the formulation of laundry detergents that deliver outstanding cleaning results even under unfavorable washing conditions.

Pressing customer needs are identified via structured customer workshops, particularly in Asia. These workshops help Clariant lay the groundwork for tailored regional and global innovation projects. The Business Unit Industrial & Consumer Specialties is moving global product development capabilities to regions such as Latin America and Asia/Pacific, where hair and skin care industries are setting worldwide trends. With global key customers, Clariant has entered a new phase of collaboration, namely co-location. By creating joint project teams on specific topics and utilizing the laboratory or office facilities of either Clariant or the customer, Clariant can better understand the way customers think, innovate, and operate.

Market to Customer

Effectively creating and capturing value

In the Business Area Care Chemicals, profound knowledge of market trends and customer and consumer needs is successfully combined with high-performance ingredients and formulation expertise to offer the best value. In addition to comprehensive customer needs analyses, leading market researchers are engaged and expert interviews are conducted to make sure a strong value proposition with clear market positioning is delivered. Value propositions are determined both in technical and marketing terms and include quantified benefits that demonstrate the additional value created by Clariant products. In this regard, Care Chemicals is taking a holistic approach, going beyond purely formulation-oriented advantages and including sensory and emotional benefits. With the **VITIPURE®** series, for example, Clariant has developed tailor-made solutions for the food and beverage industry that help succeed with a

»In our approach to solving the unmet performance needs of our customers with sustainable solutions, we overcome the notorious contradiction between ›green‹ and high-performing products.«

RALF ZERRER
Head of Strategic Marketing
Business Unit Industrial & Consumer Specialties

variety of challenges such as sugar reduction, coloring, juiciness, and texture, but also shelf life-extension, protein and fiber enrichment.

In the Personal Care segment in particular, Care Chemicals focuses on providing brandable concepts. For example, customers have greatly appreciated the **BeautyForward®** platform, which identifies early consumer trends and matches them with products and formulations they can use and customize. Although home care is a mature market, Care Chemicals has succeeded in 2016 by creating and capturing value through carefully pricing innovations. For example, by using the NanoCon® technology, a team in Latin America created a liquid emulsion of Carnauba Wax – used in furniture polishes – that allows the customer to produce in a continuous process instead of the traditional batch-to-batch process. By using the Clariant product – Hostapur® CP – customers were able to reduce production time, save energy, and generate more consistent quality. These benefits were captured in the price point.

BeautyForward®
This new inspirational guide decodes current trends to help drive innovation in the Personal Care segment.

Ethoxylates
Ethoxylated products including Polyethylene Glycols (PEGs) are a cornerstone of the growth strategy in the Americas.

Customer to Cash

Securing supply chains to compete effectively

A vital aspect of commercial success is ensuring that the product is available where it is needed, in the required quality, at the right time. For that reason, Care Chemicals collaborates closely not only with customers, but also with its suppliers. Trusted relationships ensure more secure supply chains and create added value across the value chains. Regarding sustainability in particular, value chain transparency is a key differentiating factor. Sourcing sustainable palm oil is of particular importance to Care Chemicals since it is the most widely used renewable material. In 2016, Clariant achieved mass balance certification by the Roundtable for Sustainable Palm Oil (RSPO) for all production plants. A stringent process was implemented to identify single raw material supply situations and assess the associated operational and business risks in order to mitigate any issues. The initiative will become a fully-fledged supplier development process in 2017. The objective is to combine the sourcing and operations know-how to qualify new suppliers more quickly, increase competition, and avoid higher costs.

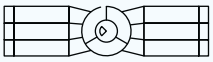
In order to ensure cost competitiveness, Care Chemicals is working on cost reductions in operations by improving productivity and offsetting inflation. Key measures include the application of asset-light backward integration models for raw materials, life cycle innovation projects for the existing product portfolio, and »fill the mill« task forces. Furthermore, a global inventory task force has been set up to optimize stocks in consideration of cash flow, global asset footprint, and lead times, as well as customer requirements.

Over the course of 2015 and 2016, investments in major growth regions in Asia and North America have been finalized. Besides new capacities in China and Indonesia, two production lines for **Ethoxylates** that almost double the capacity in the United States were started in North America. In all production sites, Care Chemicals emphasizes good manufacturing practices. To support the goal of continual safety and security improvements, tailor-made safety awareness workshops have been developed based on the analysis of the accident and incident reporting.

Targets

4 – 5 %
Growth potential per year

18 – 19 %
EBITDA target margin



Business model
Care Chemicals transforms capitals for additional value creation.

Performance

Input

3 %
R&D spend of sales

771
Raw material procured in CHF m

80
Active innovation projects

Output

1 465
Sales in CHF m

5 %
Growth in local currencies

18.8 %
EBITDA margin before exceptional items

People

Input

30 326
Training hours

1 217
Raw material suppliers

Output

2 574
Staff in FTE at year end (2015: 2 321)

91 %
Customers want to continue doing business

84 %
Customers plan to intensify business relationship

Planet

Input

12
Production sites (in scope of current performance reporting)

3 317
Number of raw materials procured

745
Energy consumption in m kWh

Output

0.95
Production volume in m t

209
Greenhouse gas emissions in kg/t production

26.8
Waste in thousand t

Financial capital · Human capital · Manufactured capital
Intellectual capital · Relationship capital · Natural capital

»To meet societal needs, energy and emissions footprints will grow unless significant innovation occurs.«

ED RIGHTOR
Chemist, Dow Chemicals
Saginaw, Michigan, USA

The products and solutions of Business Area Catalysis guarantee efficient use of the raw materials and energy needed for the production of industry chemicals, plastics and fuels. Approximately 80 % of the chemical reactions in these supply chains implement catalysts. So, these little helpers are part of an answer to a big question: Where is our future energy going to come from to sustain the technology that increasingly interconnects our lives? This calls for creative problem solving on multiple levels. We don't just need new energy sources, but also brilliant ideas to manage our current resources more economically. Every individual habit and each industrial process is on trial. For even a tiny adjustment can tip the scale toward serious energy efficiency.

WOLF SPAETHER
Head of Market Segment Styrene/MTP
Business Unit Catalysts

Interview

Catalyzing energy efficiency

For a chemical reaction to work as desired, an external energy supply is often necessary. This is especially true for the petrochemical industry. Tires, CD cases, electronics housings, and plastics for toys all require the substance styrene. To produce it, a thermal energy of 800°C steam is necessary. Wolf Spaether, Head of Market Segment Styrene/MTP, BU Catalysts talks about the development of StyroMax® UL3, an innovative styrene catalyst.

Which challenges do the industries face that StyroMax® UL3 serves?

WOLF SPAETHER Our customers are producers of styrene monomer (SM), which, in terms of volume, is the fourth-largest plastics building block in the petrochemical industry. Some of the major industry challenges are the volatile selling prices and the pressure on margins. The catalyst is decisive for optimizing production costs. It substantially determines SM yields and the amount of energy needed.

Previous generations of catalysts either showed good activity or good selectivity, but not both at the same time. Why hasn't this been possible so far?

With a higher activity, the customer can produce a larger product volume at the same operating temperature. A higher selectivity means, more of the desired product (styrene monomer) is produced and less of undesired by-products, such as benzene or toluene. Formulation adjustments in favor of higher activity normally entail losses in selectivity. Therefore, our R&D team in Toyama, Japan (with support from our high-throughput laboratory in Palo Alto, CA) tested a large number of formulation variants in parallel mode, and then transferred the most successful formulation to our catalyst plants. The result is our StyroMax® UL3 catalyst, which exhibits a unique combination of high activity and high selectivity in ultra low steam-to-oil (S/O) ratio operation conditions.

What can you say about the collaboration with Grand Pacific Petrochemical Corporation (GPPC)?

GPPC Taiwan is a fully integrated styrene player with two styrene monomer plants. Since the mid-1980s, Clariant has worked closely with GPPC. As a result of this collaboration, GPPC has successfully implemented different generations of our styrene catalysts. The trust between Clariant and GPPC was key to the first commercial implementation of StyroMax® UL3 and it has performed extremely well. After loading the catalyst, the plant reached full output very quickly. The reactor temperature could be decreased and selectivity was raised. As a result, less of the raw material is necessary and the energy consumption is lowered.

Less energy
Using ultra low steam-to-oil (S/O) ratio conditions in the styrene production process means considerably less steam needs to be generated, allowing for significant energy savings.

High performance
StyroMax® UL3 promotes the production of styrene monomer more efficiently than other catalysts due to its high activity and selectivity at ultra low steam-to-oil (S/O) ratio conditions.

Lower costs
StyroMax® UL3 reduces operational costs significantly with higher activity and selectivity and a reduced steam-to-oil (S/O) ratio.

Did you know?

What are »ultra-low steam-to-oil ratio« conditions?

The dehydrogenation of ethylbenzene to styrene monomer is an endothermic reaction, which means a large amount of energy is consumed. This energy is added primarily through overheated process steam, i.e., steam with a temperature of about 800°C. The ratio of process steam to ethylbenzene input material is called the steam-to-oil (S/O) ratio. An ultra-low S/O ratio of 1.0 means: Styrene monomer is produced in a very energy-efficient way, and, in turn, less fuel is needed to produce this energy.

Business Area

How Catalysis creates value

The Business Area Catalysis is a market and technology leader, delivering solutions that add value for customers in the petrochemical, chemicals, plastics, and refining industries. Although Clariant's smallest Business Area in terms of sales, Catalysis is one of the company's most profitable with high growth rates.

Global approach with a local focus

The Business Area Catalysis, consisting of the Business Unit Catalysts, is a leading global catalyst supplier with a long history of innovation and expertise. Creating Performance Technology® is at the heart of the Business Area's mission, together with the core values of Performance, People, Planet. Innovative catalysts and adsorbents deliver significant and sustainable value to customers by enabling higher production throughput, while lowering energy consumption and reducing hazardous emissions from industrial processes and combustion engines. Clariant's catalysts and technologies also enable the use of alternative feedstock, such as natural gas, coal, and biomass, as raw materials for chemical and fuel production.

Catalysis operates globally but with a local focus, providing solutions that are driven by regional trends, requirements, and needs. The Business Area runs a global network of twelve production sites, with approximately 1548 employees serving customers across all regional markets.

To ensure above industry growth, the strategy of Catalysts focuses on leading in innovation, close partnership with process technology licensors, executive customized strategy and continuous efficiency improvement. In addition, Catalysis are in the forefront of new market and technology trends such as sustainability and digitalization.

Catalysis encountered challenging market conditions due to slow down in the Chinese economy, low commodity prices, postponement of new petrochemical and chemical projects due to low oil price and more. This has adversely affected both the replacement business and first fill sales, which led to a lower sales volume for the entire industry.

AmoMax® 10
saves energy and money in ammonia synthesis, used in fertilizer production for example.

Read more:
Chapter »A Strong Engine for Value Creation«
page 34

Global challenges as drivers for sustainable growth

Key global trends such as population growth, increased purchasing power, and rising wealth in emerging countries are driving demand for resources such as energy, nutrition, and land. At the same time, environmental issues such as climate change, loss of biodiversity, water supply challenges, and waste production are becoming more evident. Mastering those global challenges requires the support and advances of the chemical industry, particularly the catalyst business. By improving chemical process efficiency, enabling the use of alternative feedstocks, and developing environmentally compatible catalytic solutions, the Business Area Catalysis directly addresses the global challenges of raw material scarcity, energy efficiency, and environmental degradation. While growth in the catalyst industry primarily reflects GDP growth, but at a slightly higher level, environmental regulations and the need for resource conservation also drive growth even further, particularly with regard to environmental catalysts. The Business Area's solutions help customers reduce energy consumption and greenhouse gas emissions even when increasing chemical production.

Worldwide, the demand from customers, partners, and governments for sustainable products and solutions is increasing. Key drivers are mandated emission reductions, increasing waste volume and disposal costs, and adjusted waste classifications. **AmoMax® 10** catalyst is a great example of innovation and sustainability as it significantly reduces energy consumption in the production of nitrogen-based fertilizers. Fertilizer is needed to make arable land more productive, but its manufacturing requires high energy inputs and generates substantial CO_2 emissions. AmoMax® 10 is a highly active catalyst that, to date, has helped customers avoid the release of 500 000 tons of CO_2 and save approximately 1 000 gigawatt hours of energy annually – the energy need of an 80 000-household city.

APPLICATIONS

- Ammonia
- Custom Catalysts
- Ethylene and derivatives
- Fischer-Tropsch
- Fuel cell
- Fuel upgrading
- Gasoline desulfurization
- Gas processing
- Hydrogenation
- Methanol
- Off-gas treatment for chemical plants and stationary engines
- Oxidation
- Polypropylene and on-purpose propylene
- Refinery hydrogen
- Refinery stream purification
- Sour gas shift
- Steam cracker/ Olefin purification
- Styrene and BTX, MTP
- Synthetic natural gas
- Zeolite powders

Idea to Market

Strong commitment to R&D

The Business Area Catalysis is a leading global developer and producer of catalysts and adsorbents for industrial processes. For Catalysis, leading in innovation requires a three-fold approach: focus – define, review, and prioritize key applications; speed – accelerate time-to-market; and expertise – nominate expert teams, implement a process technology organization, and protect intellectual property. With Catalysis' strong commitment to innovation comes a significant investment in R&D. Globally, more than 300 R&D experts work in eleven R&D and Technical Centers. To further strengthen its leading position in innovation, the Business Area is committed to developing cutting-edge solutions that maximize customer value creation. Catalysis systematically observes, evaluates, and implements breakthrough technological innovations that open up new markets and applications. Additionally, the Business Area continuously improves the performance of existing products and processes in order to defend the leading market positions. With more than 100 ongoing projects for about 40 applications, the Business Area ensures that both money and time are used efficiently and in the most attractive fields.

In order to ensure that R&D activities provide the best service to customers and meet market demands, every innovation starts with asking what customers really need. The Business Area collaborates with approximately 20 academic institutions globally that are undertaking advanced research in catalysis. In 2016, customization activities in China were scaled up in order to deliver tailored products and solutions to Chinese customers.

Furthermore, in order to maintain the leading market position, accelerating time-to-market is a key success factor. In-house, pilot-scale facilities enable the verification of results at concept stage prior to full scale-up in a plant. The Business Area runs a lab in Palo Alto, California, that focuses entirely on high-throughput research and is fully integrated into Clariant's Idea to Market process. The lab provides a headstart for Clariant's catalyst R&D, reducing the discovery phase significantly, and is considered a time-to-market booster as it can save around three to four years of research time.

Market to Customer

Engineering services delivered by leading experts

The Business Area Catalysis attaches great importance to service orientation. In order to ensure safe, reliable and cost-effective plant operations, highly experienced technical service engineers assist customers and end-users in a variety of process catalyst operations. Engineering services provide a range from routine catalysts performance evaluation and monitoring to troubleshooting with – if requested – on site service and software provisioning as well as training and knowledge exchange.

A market leader in N_2O abatement technologies
The recently launched EnviCat® N_2O-S not only reduces N_2O emissions but also increases nitric acid yields.

Carbon2Chem
Clariant provides methanol catalysts and application know-how to this cross-industry project, sponsored by the German Federal Ministry of Education and Research.

Read more:
Sustainability Report
page 31

»I'm confident that with our innovative portfolio and the talents we have around the world, we have a positive impact on our global environment and we can significantly contribute to Clariant's future success.«

STEFAN HEUSER
Head of Business Unit Catalysts

Louisville
The addition of a polypropylene catalyst facility further strengthens Louisville as Business Unit's Catalyst most important North American site.

To remain a market and technology leader, the Business Area also partners with leading technology licensors. Strong and successful partnerships with engineering companies, for example, enable the Business Area to further develop existing technical and catalytic solutions and to extend participation in new large-scale projects. Such partnerships contribute significantly to the development of products and solutions tailored to the needs of specific markets or key customers. On this front, Catalysis will be extending its cooperation with Chinese engineering companies, design institutes, and universities to capitalize on the opportunities offered in the Greater China region.

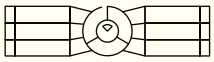
Clariant Catalysts believes in a global set-up with local focus: while functions like R&D and Engineering Services are global in their structure, the Business Unit also has a strong regional presence to cater to client needs, as these may be different from country to country. Overall, Clariant Catalysts has twelve production sites and eleven R&D and Technical Centers around the world. The Business Unit boasts an extensive network of offices in all regional markets.

Customer to Cash

State-of-the-art production sites and procurement

In 2016, the Business Area Catalysis inaugurated a new polypropylene catalyst plant in **Louisville**, KY, USA. This project is part of Clariant's long-term strategic partnership with CB&I's Novolen Technology business. The addition of the polypropylene catalyst plant further strengthens Louisville as the most important site for Clariant's Business Unit Catalysts in North America. The innovative catalysts produced in Louisville will help to ensure that raw materials and energy are used efficiently in polypropylene production worldwide.

In 2016, Clariant also launched the Procurement Excellence Program (CPX) for the Business Unit Catalysts, analyzing the supply markets for metals and catalyst carriers. In this program, methods to strengthen the Business Unit's commercial position for buying raw materials and for reducing operational expenses were developed. Group Procurement Services and the BU Catalysts jointly developed an implementation plan that covers a 24-month period. By the end of 2016, the first commercial improvement levers had been achieved.



Business model
Catalysis transforms capitals for additional value creation.

Targets

6 – 7%
Growth potential per year

24 – 26%
EBITDA target margin

	Input			Output		
Performance	**>6.5%** R&D spend of sales	**218** Raw materials procured in CHF m	**90** Active innovation projects	**673** Sales in CHF m	**– 8%** Growth in local currencies	**23.8%** EBITDA margin before exceptional items
People	**29 520** Training hours	**433** Raw material suppliers		**1 548** Staff in FTE at year end (2015: 1 748)	**90%** Customers want to continue doing business	**78%** Customers plan to intensify business relationship
Planet	**12** Production sites (50:50 or minority joint ventures not included)	**1 070** Number of raw materials procured	**389** Energy consumption in m kWh	**0.04** Production volume in m t	**2 819** Greenhouse gas emissions in kg/t production	**7.8** Waste in thousand t

Financial capital · Human capital · Manufactured capital
Intellectual capital · Relationship capital · Natural capital

»How can we best restore and protect our planet without inhibiting modernization?«

FATMA YILDIZ
Art Historian
Istanbul, Turkey

reports.clariant.com/v06
Watch the INVOQUE™ movie

The products and solutions of Business Area Natural Resources aim at the efficient and careful use of Earth's raw materials, which is especially crucial when close to a dense population. The Discover Value story takes place in Istanbul where contrasting worlds meet each other: the European and Asian as well as the Ancient and Modern. But hanging over this melting pot of ages and cultures is a challenge: How can modernization harmonize with Istanbul to help it flourish for another 1 000 years? Presently 150 ships pass through the Bosporus each day. In the future, not only will this number increase, but so will the ship sizes. Construction projects on the harbor and waterways are unavoidable. So the development of new technologies is needed to protect Istanbul's people, heritage, and environment.

HANS HARTAN
Hydrochemistry consultant

Interview
Experimentation with mud

Industrial activity causes silt materials to collect in staggering volumes in our rivers, waterways and harbors. At a rate reaching into the hundreds of millions of tons globally, this sediment requires effective dewatering. Complex treatment is needed in order to accomplish complete recycling of the sediment both economically and with minimal damage to the environment. Hydrochemistry expert Hans Hartan introduces INVOQUE™, a more environmentally compatible dewatering alternative.

How did you get the idea for purifying mud?
HANS HARTAN My area of expertise lies in hydrochemistry. I was determined to find a method of purifying and preparing sewage sludge and sapropel created in treatment plants, without having contaminated water afterwards. The primary focus of my work has always been developing environmentally compatible processes. So one day, I went to my hobby lab and got to work.

You really discovered it at home?
Yes. I've been retired for a few years now. But in my hobby lab, I have all the equipment I need. For example, I could conduct several experiments, aimed at measuring dewatering speed or regulating water clarity. Having my lab at home was also a way for me to relax.

How did you end up making the breakthrough?
Omya, an international manufacturer of industrial materials, developed a dispersant mineral for the paper industry with large surface area, but one that they had no use for. When I learned of that, I immediately thought it would be useful for dewatering sludge. So, I manufactured synthetic wastewater and then added the mineral. It worked! After just a few minutes, I had crystal clear water and I knew that I had discovered something big. I presented the technique in several places. In the end it was Clariant that recognized the potential and then in cooperation with Omya developed INVOQUE™.

The efficacy of INVOQUE™ is not just a matter of the right chemistry, correct? What else is decisive?
A good dewatering system hinges on numerous parameters. Depending on the type of sediment and its organic components, mixing speed, accurate dosing and desired filtration speed are essential. Therefore, it wasn't just chemists that worked on the development of INVOQUE™. Rather, it included process engineers, engineers and physicists.

Reduced regulatory pressure
Thanks to the improved environmental profile of INVOQUE™, we are able to reduce potential regulatory obstacles regarding the reuse of water and sediments.

ECOTAIN®

Environmental protection
INVOQUE™ performance dewatering eliminates potentially harmful chemicals with no additional burden on the environment.

Did you know?
How much sediment requires dewatering?

Increasing human activity has dramatically raised both the rate of sedimentation and the total volume of sediments globally. Coastal and riverine dredging, mining and tunneling are typical areas of application. As silt materials are often contaminated by heavy metals and other substances, dewatering and reusing sediments is necessary and a challenging and costly process. Dealing with these sediments responsibly is not only a commitment to stakeholders, but a promise to minimize the impact on the environment.

Business Area

How Natural Resources creates value

Natural Resources is comprised of businesses that are based on the use of minerals and support efficient extraction of minerals, oil, and gas. Typically characterized by high growth, low cyclicality, and a strong orientation toward promising industry trends, overall economic trends and developments in oil, gas, and mineral ore prices are key drivers for this business area.

A business based on minerals, oil, and gas

With Functional Minerals and Oil & Mining Services, Natural Resources brings two complementary Business Units under one roof. Functional minerals supplies customers with specialty products based on bentonite. This minerals family is comprised of clays that enhance a wide range of products and services. Its unique trait has a high surface area with strong absorption capacity allowing it to bond well with heavy metals and toxic substances. The strategic strength of Functional Minerals, which serves a broad range of industries, comes from a fully integrated value chain, from exploration to bentonite mine operation to processing the material for industrial and customized solutions.

Oil & Mining Services provides innovative chemistry, technology, and service solutions that meet customer needs safely and in compliance with environmental regulations. Oil Services is a world leader in the development, manufacturing, application, and supply of specialty chemicals and services across the whole value chain of oil production. Refinery Services is a leading provider of cold-flow additive applications for middle distillates including diesel, home heating oil, and biofuels. Mining Services is a leading provider of chemicals for flotation, pelletizing, anti-caking/anti-dusting, and filter aids, as well as emulsifiers for explosives used in mining worldwide.

Growth opportunities despite uneven economic development

As Functional Minerals serves customers in a broad range of industries from food to foundry, the overall economic development is its most relevant external driver. While the economic situation in Europe is stable albeit showing little growth, other regions demonstrate more change. Southeast Asia and both Americas are experiencing dynamic growth in contrast to North East Asia's moderate projections.

Purification products
Due to the high demand for bleaching earths we support that issue by capacity expansion. This year we will open our new plant in Surabaya in Indonesia and offer more bleaching earth quantities in Turkey based on a new, dedicated milling unit.

ECOTAIN®

Anti-scaling applications
The anti-scaling product platform based on environmentally compatible polyaspartates has been awarded the EcoTain® label.

In Europe, the partial recovery of the automotive industry, the growing demand for purification products, and the need for innovative solutions in the detergent segment have generated new opportunities for Functional Minerals. In Southeast Asia, continued growth in palm oil production is predicted to trigger higher demand for **purification products**. Especially sediment processing and feed additives are expected to enhance Clariant's steady global growth. The areas of metal casting and edible oil refining are also seeing additional growth in emerging markets.

Low but recovering oil and ore prices, and upsides from regulation

For Oil & Mining, fluctuations in oil and mineral ore prices are critically important. Due to sustained low oil prices, the number of drilling rigs around the globe has decreased, particularly in North America. Fewer drill rigs means decreased demand for drilling-related technologies and chemicals. The drop in oil price has also impacted business with refinery customers, and low global mineral pricing presents challenges for our mining solutions business line. There are signals that there may be recovery ahead, however, markets will remain challenging through 2017 with the current forecast that the majority of improvement will be seen in the latter half of the year. Cost control and improved efficiency initiatives coupled with innovation will continue to be key drivers in 2017.

Regulatory developments are also presenting business opportunities. The environmental regulations for chemical additives demand strict environmental control. Oil Services has developed a range of chemical technologies that fulfill these regulatory requirements. For **anti-scaling applications** in the North Sea region, a special environmental product platform has been developed based on polyaspartates, a raw material that is derived from renewables, which produces enzymatically and biodegrades efficiently. These products have been awarded the EcoTain® label, as they display outstanding sustainability advantages and are best-in-class.

APPLICATIONS

Functional Minerals			
· Additives for animal feed · Additives for paper and detergent	· Edible oil refining · Metal casting · Sediment management	· Special civil engineering and tunneling	· Stabilizers for the plastics industry
Oil & Mining Services			
· Additive applications for refinery companies	· Process chemicals for the mining industry	· Specialty chemicals and services, including intelligent chemical management for the oil and gas industry	

Idea to Market

Information leads to innovation

High-performance bleaching earths
Acidic activation of bentonite creates an enlarged surface area that binds with undesired substances and impurities in oil.

By engaging in direct, daily business interactions as well as custom-designed surveys tailored to specific market segments, Clariant can focus innovation on meeting the most pressing customer demands. These efforts include developments in digitization and automation, designed to improve customer service through efficiency improvement and cost reduction (page 28).

Functional Minerals also conducted major innovation activities in 2016, including the continued market introduction of INVOQUE™ products and solutions for sediment management and the ECOSIL® LE (low emission) technology to reduce foundry emissions from traditional carbon-based lustrous carbon generators in the green sand system. Other areas of R&D focus include **high-performance bleaching earths** to treat oils with high levels of chlorophyll and carotene for sustainable food production and to purify waste oil for green diesel production.

Laundroclin™
detergent additives are free-flowing, non-sticky granules of non-ionic surfactants that help formulators avoid risks of gel formation, reactions with other ingredients, or investment in processing capacity.

Market to Customer

Innovation leads to customer satisfaction

Across the Business Area Natural Resources, Clariant engages in regular dialogs with customers to determine their current and future needs, and translates this knowledge into specific customer projects. For example, in Functional Minerals, customer satisfaction surveys confirmed the appreciation of customers and also indicated areas for improvement such as response times. In Oil & Mining Services, the global key account management team was developed and complemented by regional sales and business development teams. This includes the continued investment in processes to improve customer engagement, which has resulted in the successful development of Master Service Agreements with leading oil and gas operating and service companies.

Clariant is committed to enhancing customer benefits while also capitalizing on value-based pricing. In Functional Minerals, for example, simplifying powder detergent formulations with the use of **Laundroclin™**, a liquid detergent ingredient reformulated as a solid, streamlines the production processes of detergent manufacturers by eliminating at least one processing step. The ECOSIL® LE system for high-efficiency and eco-compatible mold binders not only significantly reduces emissions of aromatic hydrocarbons but in many cases also improves the bottom line for the customer. In Oil & Mining Services, the Clariant Commercial Excellence (CCE) approach to defining market segments with greatest opportunities for profitable growth and increased market share, led to the acquisition of KelTech and X-Chem – two US-based suppliers of specialty chemicals products for land and offshore oilfield operators – to better serve customers in the North American oil and gas market.

»Creativity is a matter of culture and practice – being open to solutions that are not obvious, daring to think differently. Trying again and again to come up with other, better ideas – and once you have the ideas, bringing them to fruition with a stringently implemented, structured approach.«

SVEN SCHULTHEIS
Head of Business Unit
Functional Minerals

Customer to Cash

Customer satisfaction leads to cash

CPX for Base Chemicals
Procurement Excellence (CPX) for Base Chemicals in the BU Oil & Mining Services improves procurement effectiveness and category spend, and creates added value with suppliers through joint actions on innovation, growth, and sustainability.

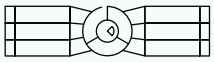
An effective supply chain and a high-quality process for customer interactions are »must haves« in today's markets. In 2016, value chain improvements at Functional Minerals included the optimization of railcar fleet movements from Mexico to the US and Canada to avoid expensive emergency shipments by road truck, the change of the process lead system that automatically controls the production of activated earth at Moosburg, Germany, and the shift of customer service from local teams to Global Business Services (GBS). In future, the Integrated Planning Landscape project in Europe should lead to lower inventory levels without compromising fulfilment of customer needs on-time, in-full.

Similarly, Oil & Mining used Clariant Supply Chain Excellence to support the business and customers alike to reduce costs and increase efficiencies resulting in substantial benefits in 2016. For example, forecasting customer demand and addressing potential capacity constraints has improved due to applying two important processes, end-to-end Sales & Operational Planning and Demand & Inventory Planning. This, in turn, has improved the on-time delivery to customers to achieving over 95% performance.

Targets

6 – 7%
Growth potential per year

15 – 17%
EBITDA target margin



Business model
Natural Resources transforms capitals for additional value creation.

Performance

Input

> 2%
R&D spend of sales

347
Raw materials procured in CHF m

80
Active innovation projects

Output

1184
Sales in CHF m

2%
Growth in local currencies

16.9%
EBITDA margin before exceptional items

People

Input

30284
Training hours

1145
Raw material suppliers

Output

3235
Staff in FTE at year end (2015: 2931)

90%
Customers want to continue doing business

81%
Customers plan to intensify business relationship

Planet

Input

31
Production sites (in scope of current performance reporting)

875
Number of raw materials procured

853
Energy consumption in m kWh

Output

2.77
Production volume in m t

102
Greenhouse gas emissions in kg/t production

68
Waste in thousand t

Financial capital · Human capital · Manufactured capital
Intellectual capital · Relationship capital · Natural capital

»Every detail matters if you want a safe environment.«

NICOLAUS ROGGE
Carpenter
Schönhorst, Germany

Along with their innovations for industrial applications, the Business Area Plastics & Coatings brings their solutions also into the home. Therefore, health and safety are of utmost importance. The Discover Value story describes how many crucial details are necessary for the inhabitants of a home to feel safe with respect to house construction. Humans have a natural desire to create safe shelter for themselves and their loved ones. The feeling of safety and comfort is what transforms a house into a home. However, as the world's population grows, this deep human need is intensifying the demand for innovative and sustainable materials that harmonize with the increasing demands for safety. After all, the house protects its inhabitants, but what protects the house?

reports.clariant.com/v07
Watch the Sustainable Additives movie

WOLFGANG DIEGRITZ
Head of Marketing & Business Development
Nilit Plastics Europe

Interview

Tiny helper makes the difference in saving lives

Flame retardants are found throughout the house wherever fire could cause significant damage – from fuse boxes in the cellar to upholstery in the living room to insulation in the attic. Wolfgang Diegritz, Head of Marketing & Business Development at Nilit Plastics, explains how flame retardants work and whether non-halogenated products adequately do their job.

What are the most common causes of fire?
WOLFGANG DIEGRITZ In newspapers and other media, we surprisingly often read reports about fire accidents and combustion processes. From my perspective the main reasons for the break-out of fires are technical defects in electrical and electronic devices (e.g., short circuits) or industrial devices (e.g., malfunction of machinery) as well as human failure and inadvertence (e.g., burning candles).

How do flame retardants reduce the impact of fires on people, property and the environment?
In an early stage of the ignition process, flame retardants can substantially contribute to extinguishing a smoldering fire (e.g., overheated electric device). At a later stage of fire – or when the fire is spreading too strongly or quickly – the flame retardants cannot stop the flashover of a fire anymore. However, they can limit the impact and damage (e.g., flame retardant curtains not catching fire rapidly). And, providing a very important benefit, they can save human lives by increasing the time available for people to escape the fire (e.g., flame retardant-equipped plastics in public transportation).

What are the advantages of halogen-free flame retardants over halogenated alternatives?
Conventional halogenated flame retardants do their job. It's clear. But the »Achilles heel« of these chemicals are their toxicity and their side effects: On the one hand, some of these additives are listed as Substances of Very High Concern according to the EU regulatory framework. On the other hand, a fire can release many toxic substances from halogenated flame retardants, like brominated dioxins and furans. Halogen-free flame retardants have been developed to lower the smoke toxicity and to prevent the migration of the additives. Furthermore, there is no compromise in flame retardancy and little impact on technical parameters of the final application. In the meantime, rethinking leads to a significant variety of halogen-free flame retardants, most often tailor-made for individual polymers and applications.

No health hazard
Clariant is the pioneer in non-halogenated technologies. With this exclusive know-how, flame retardants have a significantly lower smoke toxicity.

Fire safety
Long-term, reliable products pass demanding fire safety standards and minimize secondary fire damages, all with multiple uses, from thick to thin-walled applications.

Environmental protection
The product portfolio consists of highly efficient, non-halogenated flame retardants with preferable environmental profiles.

Did you know?

How did humanity get from cave to smart home?

The house has seen many shapes and forms in its evolution – each adding to its functionality, comfort, and aesthetics. The first insulated homes were pit houses, constructed using mammoth bones and animal hides. 3 000 years ago, humans started to use wood as material. It was the birth of the yurt: round, self-supporting structures with poles arranged into a lattice. In the 1950s, balloon-frame houses with their simplified construction method were popular throughout the United States. Homes today are wired for the future. Household electronics, such as light switches, devices, and appliances, are connected via a central grid to form an independent interface and logic.

Business Area

How Plastics & Coatings creates value

Plastics & Coatings is comprised of sector-leading businesses that serve markets ranging from packaging, consumer goods, medical, and textile to transportation and agriculture. It serves both multinational and local customers. With such a broad scope, the overall growth potential of Plastics & Coatings is strongly linked to global gross domestic product growth.

Differentiated management to unlock value creation

Although Plastics & Coatings is Clariant's largest business area, it operates primarily in saturated markets and thus requires a differentiated management approach from other parts of the Group to meet the needs of customers and shareholders. In order to take full advantage of the business area's value creation potential, absolute profit and cash generation, rather than margin, need to be in focus here. By legally separating Plastics & Coatings into separate subsidiaries on 1 January 2016, while still maintaining the existing structures of its Business Units Additives, Masterbatches, and Pigments, Clariant has supported this **differentiated steering**. Corresponding benefits of recapturing and expanding business were already felt during this first year.

Additives offers solutions with functional effects for example for plastics, coatings and printing inks, adhesives, and textiles and fibers. Its products include a large variety of waxes and polymer additives that improve heat, light, and weather resistance, among other benefits. This Business Unit also offers innovative products, such as non-halogenated flame retardants providing environmental benefits, also for electrical and electronic equipment. Masterbatches, which includes the Healthcare Packaging business line, offers color and additive concentrates and small lot color compounding for engineering and high temperature resins, whilst the business line healthcare packaging offers moisture and oxygen protection solutions for the pharma industry. Pigments supplies organic pigments, pigment preparations, and dyes that meet the high standards for colors in industrial, decorative and automotive coatings. It also provides solutions for the plastics industry and special applications such as personal care, aluminum, fertilizer and seed treatment, stationery, etc. Solutions for traditional printing as well as inkjet and toner applications complete the strong portfolio of Pigments.

Increasing customer demands and challenges create opportunities

At its press conference at the K 2016 trade show for the plastics and rubber industry, Clariant focused on the global trends influencing the plastics industry, demonstrating how the company is bringing true value to its customers based on their real needs. For example, nutrition bottlenecks caused by population growth and urbanization are leading to growth in packaging needs in the agricultural sector, while lifestyle and mobility trends are driving the demand for miniaturized and lightweight solutions in transport technologies and environmental and energy applications. At the same time, in a global environment of increased emissions regulations and an intensified focus by customers on sustainability, such solutions must be developed in an ecologically compatible manner. These dual mandates present not just challenges, but rich opportunities for business growth.

Differentiated steering
Since 2016, Plastics & Coatings is successfully steered towards higher absolute profitability and cash generation.

In 2016, the business environment remained challenging, with limited, albeit stable economic growth. Each Business Unit assesses economic opportunities through the lens of its specific market environment. Additives sees growth options in Asia, especially China, and the United States. Masterbatches expects only marginal growth in Europe and North America, but more significant growth in Asia, particularly China and India where it continued to invest in new assets and leverages emerging opportunities. Pigments sees Chinese and Indian market players responding to an environment of increasing commoditization and become even more aggressive on pricing to keep and extend market position. It also witnessed oil countries in the Middle East refocusing their economic drivers to invest in industry and construction, and anticipates market opportunities in 2017 as a result.

APPLICATIONS

Additives			
· Flexible packaging films reducing waste and increasing recyclability	· Light and heat stabilization, flow properties improvements	· Light and thermal control of agricultural films for improved crop yield	· Waxes, flame retardants and polymer additives with functional effects in plastics, coatings and printing inks, adhesives, textiles and fibers and other applications
Masterbatches			
· Color and additive concentrate solutions for plastics processing	· Concentrates for functional packaging, medical devices & pharma packaging	· Protection against moisture and oxygen in drug packaging	· Small lot color plastic compounds for the use in automotive, electrical and electronics markets
Pigments			
· Applications for conventional printing inks, inkjet inks, and electrophotographic toners	· Coloration of plastic applications	· Decorative, industrial, and automotive coatings	· Special applications

Idea to Market

Systematic and deliberate approach to innovation

Clariant uses market deep-dives, customer innovation workshops, joint development agreements, and collaboration with its clients' customers to constantly fill the global innovation pipeline. One result of these efforts was Additives' commercialization of **Hostavin® NOW** – a light stabilizer and non-halogenated flame retardant for polyolefin fibers and films, which was awarded the EcoTain® label for its sustainability benefits. With optimum shielding properties, chemical resistance as well as retardancy effect, Hostavin® NOW brings agro films to a higher level of performance.

In addition to its regional innovation activities, Clariant made excellent progress on major innovation projects at the Project House facility, the first R&D facility of its kind for the Masterbatches industry. These projects all use Clariant Innovation Excellence methods to help manage and accelerate ideas to market, and are run by dedicated and trained Innovation Black Belts.

Initiatives in 2016 also included the implementation of a new Innovation Strategy by Pigments. This initiative highlighted cost leadership, game changers, and growth projects, focusing particularly on Preparations as well as on customer needs in the Indian and Chinese markets. Innovation projects included the Sanolin® Lave Liquid colorant range for brilliant color shades for liquid fabric and home care cleaning products. These non-staining colorants can easily be rinsed off textiles or skin or surfaces and are suitable even for children's paints.

ECOTAIN®

Hostavin® NOW
The light stabilizer and flame retardant is an easy-to-handle granular product with improved processing and fiber-spinning properties without fiber discoloration.

ECOTAIN®

Exolit® OP 1400
When plastic containing Exolit® OP burns, it releases gases that cause the plastic to foam and rapidly form a protective layer of noncombustible foamed char.

Market to Customer

Strong customer focus and benefits of differentiated steering

Plastics & Coatings fosters tight customer interaction, joint project work, and collaboration as essential aspects of creating value. To enhance customer-centricity, Additives strengthened its sales and marketing network, particularly in Asia and the United States. Masterbatches focused its efforts on growth in all regions, particularly focusing on strategic market segments and product lines, while Pigments' initatives succeeded in significant market expansion in India, Greater China, and intensifying the production footprint in Mexico.

Differentiated steering is a powerful tool for net business expansion and has enabled Masterbatches to recapture previously lost business. With this lever as part of the strategy, Masterbatches has returned to a solid growth trajectory and is also able to increase the utilization rate of its assets, again contributing to improved performance. In a similar manner, by focusing on absolute earnings rather than just relative margin, and by matching pricing more closely to customer requirements, Pigments has regained position in a very competitive environment and is going after business that was previously difficult to secure. In addition, Pigments was a source of growth through dedicated projects with specific customers and an enhanced focus on product groups of strength, such as Pigment Preparations.

Other examples of increased customer focus include Additives' marketing excellence project on **Exolit® OP,** our patented halogen-free flame retardant for engineering plastics, which involved more than 50 customer interviews around the globe. These interviews allowed

»A specially formulated masterbatch for backing films used in photovoltaic panels makes clean, solar energy more affordable.«

MARCO CENISIO
Head of Business Unit
Masterbatches

Plastiward®
Incorporated into plastic products, a covert taggant additive is detectable with a platform available through Clariant's partnership with SICPA, a secured information provider.

Agrocer™
With Agrocer™, Clariant offers a dedicated range of pigment powders and pigment preparations for seed coloration. Every product meets strict U.S. EPA regulations covering inert ingredients.

Clariant to better understand unmet customer needs and to improve customers' understanding of Clariant's value proposition. Masterbatches collaborated with industry-leading machine manufacturer Brückner to co-develop Cesa®-Solar, a novel Masterbatch product providing a hydrolytically stable PET film for solar panels back sheets application, overcoming problems in conventional backing film technology and supporting the viability of clean energy for the needs of our planet's growing population. Masterbatches also formed a partnership with the industry leading security ink solution provider SICPA to provide **Plastiward®**, an in-plastic anti-counterfeit solution for the pharmaceutical packaging and medical devices markets. Pigments has been working with global and regional agricultural companies to support the growing demand for attractive and regulation-compliant seed colorations. Such colorations are mandated in many countries for safety reasons and support the seed industry in branding and marketing. Clariant's dedicated range of **Agrocer™** products, launched in the United States in 2016, meets international seed testing standard requirements and broadens the choice of colors for the customer.

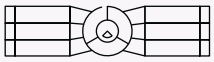
Customer to Cash

Streamlining the value chain and eliminating bottlenecks

A key element of optimizing reliability throughout the value chain and ultimately benefiting the clients is the Integrated Planning Landscape (IPL). IPL is a multidimensional project that streamlines and harmonizes the planning processes to handle planning complexity and enhance capabilities in a new governance model for supply chain management. Introduced in 2016 in the Business Units Additives and Pigments, IPL supports Clariant's goals to improve supply reliability to the client.

Since raw materials sourcing accounts for a large portion of formulation cost, Masterbatches worked with the Clariant Procurement Excellence (CPX) initiative to harmonize and optimize sourcing. Additives also worked with CPX to optimize procurement by reducing overseas logistics costs, designing a leaner process, and participating in the Together for Sustainability (TfS) program for prudent supplier audits.

To ensure a reliable supply of scarce products for demanding markets, Additives has invested in overcoming capacity bottlenecks in key plants, and expects to make further investments in Asia in 2017. Safety enhancements also led to a record zero lost time accident rate (LTAR) in Additives' plants. As China is today the largest market for plastics, Masterbatches have invested in building capacity and capability not only for concentrates but also in small lot color compounding for engineering and high-temperature resins to address the growing market needs. In addition, further strategic investments in capacity were made in North America and the Middle East. Pigments expanded its preparations plant in Santa Clara, Mexico, to increase efficiency and on-time, in-full delivery to the client.



Business model
Plastics & Coatings transforms capitals for additional value creation.

Targets

≙ global GDP

Growth potential per year

steered for absolute EBITDA and cash flow generation

Performance

Input

~1.5 %	**875**	**70**
R&D spend of sales	Raw materials procured in CHF m	Active innovation projects

Output

2 525	**4 %**	**14.6 %**
Sales in CHF m	Growth in local currencies	EBITDA margin before exceptional items

People

Input

52153	**3 410**
Training hours	Raw material suppliers

Output

6 737	**92 %**	**81 %**
Staff in FTE at year end (2015: 6 878)	Customers want to continue doing business	Customers plan to intensify business relationship

Planet

Input

21	**9 729**	**879**
Production sites (in scope of current performance reporting)	Number of raw materials procured	Energy consumption in m kWh

Output

0.33	**764**	**42**
Production volume in m t	Greenhouse gas emissions in kg/t production	Waste in thousand t

Financial capital · Human capital · Manufactured capital
Intellectual capital · Relationship capital · Natural capital

Regional Perspectives
A SPOTLIGHT ON EUROPE

Key Figures Europe

2 004
Sales in CHF m

34 %
of Group sales

2 %
Sales growth in LC[1]

38
Production sites

7 645
Employees

[1] LC = local currencies

To highlight Clariant's global activities, the report features one business region each year. This year, the focus is on Europe. Oliver Kinkel, Head of Region Europe, discusses the role Europe plays for Clariant today and in the future. The photo essay One Clariant shows how one of Clariant's European employees is driving change and creating value.

Interview

»Clariant is well positioned in Europe«

While growth expectations for the region are moderate, Europe is Clariant's backbone with 34 % of global sales, 44 % of the global workforce, and a decisive contribution to Clariant's global research and development.

Mr. Kinkel, how do you see the European business environment today and tomorrow? What does that mean for Clariant?

OLIVER KINKEL Clariant in Europe achieved record sales of CHF 2 billion with a local currency growth of 2 % in 2016. With this growth we were able to outperform the market. On the back of an overall solid global economic environment we are carefully optimistic also for 2017. However, there is no tailwind pushing toward strong growth of the region's chemical industry. Furthermore, in 2017 we will have elections in several European countries which might impact the macroeconomic environment. That said, effects from the UK decision to leave the European Union can hardly be assessed at this point. Nevertheless, Clariant is well positioned in Europe to successfully serve the industries and markets in Europe. Additionally, we continue to grow our export business. With 38 sites, Europe is the region with the highest number of production sites. 44 % of all employees are based here. Equally important, we host the Center for R&D and Innovation. More than 80 % of Clariant's R&D investments are spent in Europe.

Is this similar across sectors and product groups, or are there significant differences?

When we ask our Country Heads and Business Unit leaders for major trends influencing the chemical industry in Europe, there is one single headline in common: sustainability! European consumers and legislators are really pushing hard toward higher ecological standards to improve the overall environmental situation as well as to safeguard their family's health in daily life. To be specific, people value the quality of their personal environment. Home care products ensuring that health and personal care products deliver convenience

»On the back of continued productivity improvements and innovation with a clear focus on the development of sustainable products and solutions, we will further grow our business in the region. Our employees in Europe are very well prepared and our most important asset to achieve our ambitious goals.«

OLIVER KINKEL
Head of Region Europe

and a new sensory experience are more sought after than ever before. With products such as GlucoTain® and others, we are benefitting from this change in mind-set. The same is true for our industrial solutions in the field of purification for the automotive industry or our new sustainable dewatering technology INVOQUE™ for sediment management. The most prominent example is our sunliquid® technology, producing cellulosic ethanol from agricultural residues. A pilot plant in Straubing, Bavaria, is proving its benefits such as a 95 % reduction of CO_2 emissions compared to gasoline, an energy self-sufficient process, and most importantly, is putting an end to the food versus fuel debate.

Wherever we can showcase that Clariant's products are part of the solution and are contributing to a sustainable future, economic success will follow.

Europe has some of the strictest environmental and social regulations in the world. How does that impact Clariant?
European legislators see themselves as forerunners in environmental protection and sustainability, which is a challenge for our industry as it creates an unfavorable cost position compared to other regions. The same is true for social regulations. But both areas also have a positive flipside. Standards set here force us to develop technologies that are globally state of the art. This provides us with a competitive edge when these standards are adopted in other regions. For our Business Unit Catalysts, Europe might no longer be the biggest market, but it still is the region where we develop technologies for demanding customers and partners, meeting standards that put us in the lead in emerging markets.

Social legislation and strong social partnerships create costs and complicated sequences. However, they have created social stability and predictability for decades. Investing in chemical production requires a long-term, stable framework. Europe's stable social and political system therefore is a strong magnet for our industry.

This leads me to the only drop of bitterness concerning our legislation. Short-term politics, for example in the field of energy legislation, have created a situation where, for example in Germany, we cannot project this important cost factor more than two to three years into the future.