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Pushing boundaries in innovation and technology

Conference presentation

WHY IS INNOVATION AND TECHNOLOGY LEADER- SHIP IMPORTANT?

Inventor and leader in high-tech material solutions



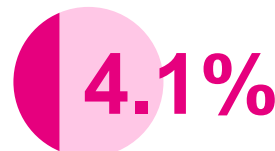
Covestro at a glance



Sales
2018



Global producer of PU
and its derivatives as
well as PC^(a)



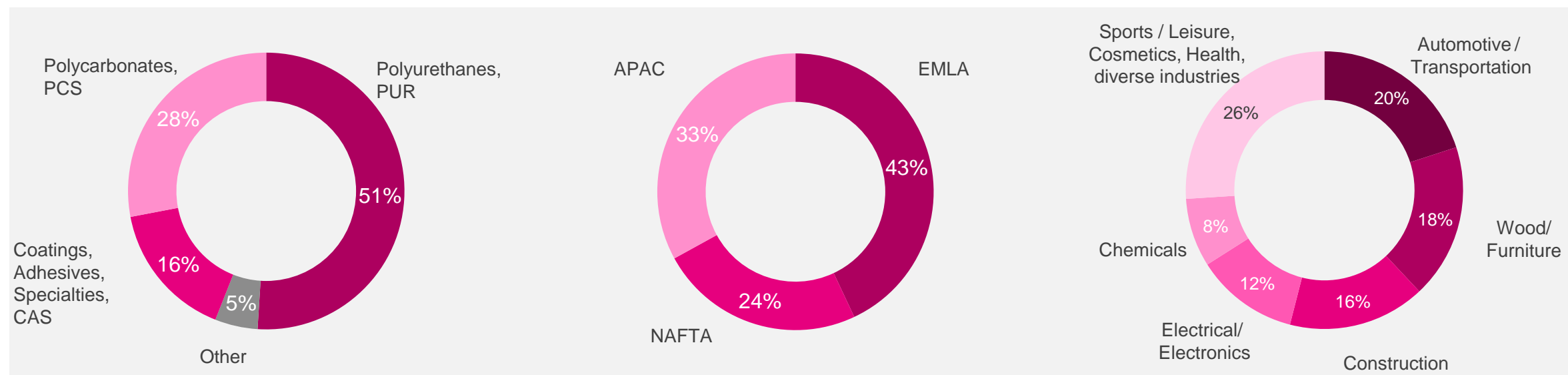
Core volume growth
CAGR 2015-2018



Employees
(in FTE) 2018



R&D expenses
2018



Materials and systems for rigid and flexible foams



Polyurethanes (PUR) at a glance

#1

Producer globally and inventor of PU^(a)



Cold chain
e.g. refrigerator

1,000

Polyols grades for differentiation



Construction
e.g. metal panel

3.8%

Core volume CAGR in 2015-2018^(b)



Cost leadership
e.g. process technology

€7.4bn

Sales 2018



Comfort
e.g. furniture upholstery

€1.0bn

FOCF 2018



Automotive
e.g. instrument panel



Sustainability
e.g. CO₂-based polyether polyols

Engineering thermoplastic with unique combination of properties



Polycarbonates (PCS) at a glance

#1

Producer globally and
inventor of PC^(a)



Mobility

e.g. exterior

1,000

PC grades for
broadest offering



Electronics

e.g. robot housing

6.1%

Core volume
CAGR in 2015-2018



Consumer electronics

e.g. adapter

€4.1bn

Sales
2018



Electrical

e.g. LED street
lamp

€468m

FOCF
2018



Healthcare

e.g. drug delivery

Performance materials for coatings, adhesives and specialties



Coatings, Adhesives, Specialties (CAS) at a glance

#1

Producer globally of aliphatic isocyanates and PU dispersions^(a)



Ingredients for
surface coatings

2,700+

Products based primarily on 6 monomers



3.3%

Core volume CAGR in 2015-2018^(b)



Ingredients for
adhesives and sealants

€2.4bn

Sales 2018



€203m

FOCF 2018



Ingredients for
specialties

Covestro set to outpace global growth

Structural growth drivers



Industries grow above global GDP

Structural growth drivers



UN SDGs^(a)

related to climate change:



related to increasing mobility:



related to growing population:



related to increasing urbanization:



Needs to be served

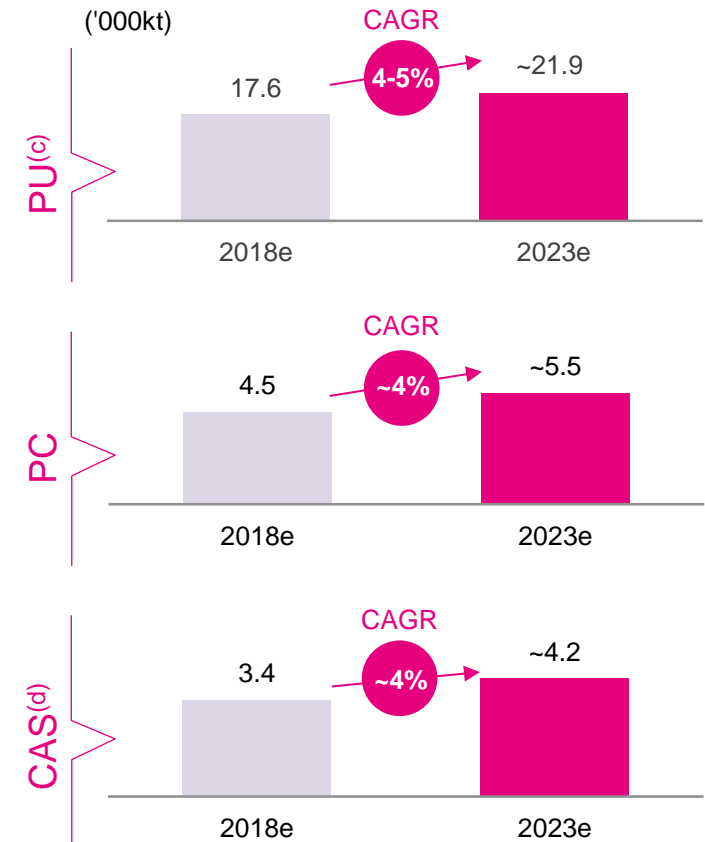
- Zero emission concepts
- Low-energy buildings

- Energy-efficient mobility
- Lightweight transportation
- E-mobility, autonomous driving

- Food preservation
- Low-cost durable goods
- Medical applications

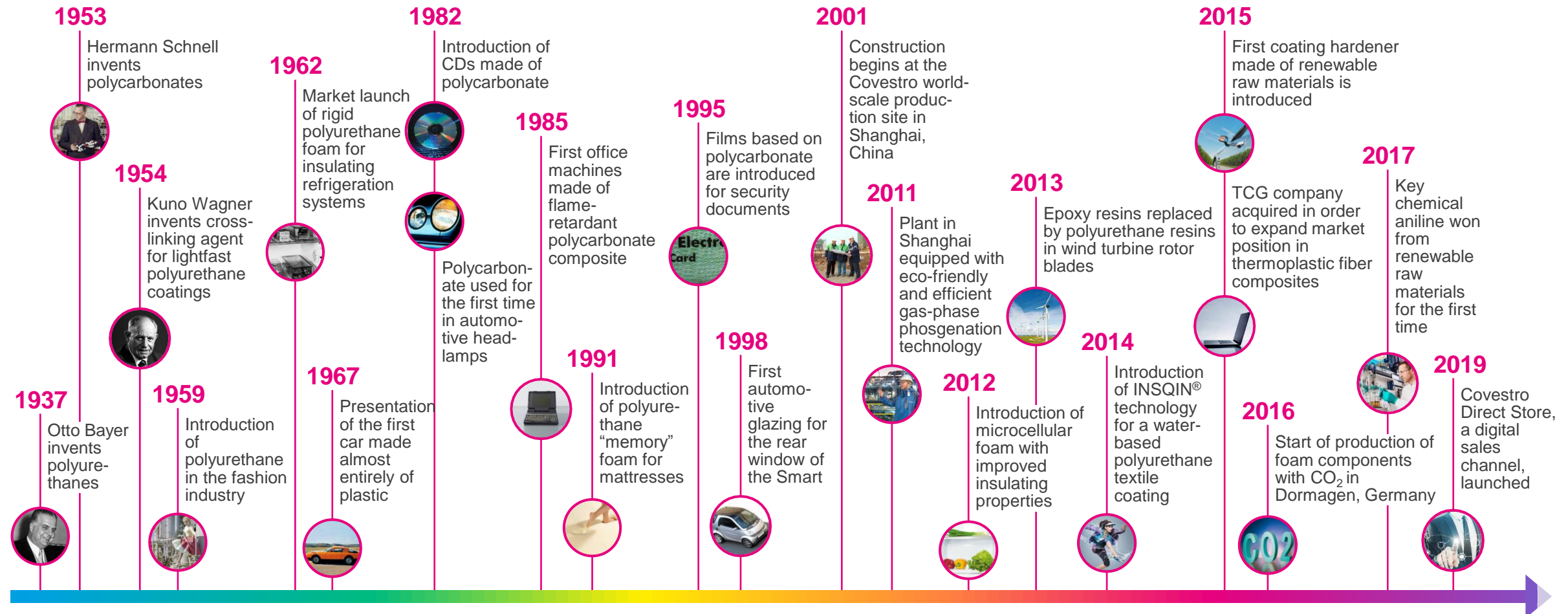
- Affordable housing
- Living comfort
- Public infrastructure

Industry demand outlook^(b) 2018e – 2023e



80 years of ideas and research

Inventions at Covestro



Innovation and technology leadership secure profitable growth



Covestro key investment highlights

1

Above GDP volume growth

driven by innovation and sustainability trends, also embodied by non-financial targets

2

Leading and defendable global industry positions

as innovation and cost leader

3

More than half of sales generated by resilient businesses

supporting value-creating base earnings

4

Management focus on driving efficiency

with streamlined structures to better adapt to market needs, focus on cost discipline and new incentive targets

5

Use of cash focused on shareholder value

with commitment to progressive dividend policy and focused capex for best value-creation

HOW DO WE INNOVATE AND CONTINUE TECHNOLOGY LEADERSHIP?



YOU CAN'T
FIGHT GLOBAL WARMING
WITH COOL CLOTHES.
WHY NOT?

#SustainableSolutions
#PushingBoundaries



Non-financial ambition supports growth strategy

Covestro non-financial targets 2025



1 Our R&D project portfolio is aligned with UN Sustainable Development Goals



2 100% of suppliers compliant with our sustainability requirements



3 Reduce specific greenhouse gas emissions by 50% by 2025



4 Ten million people in underserved markets benefit from our business solutions

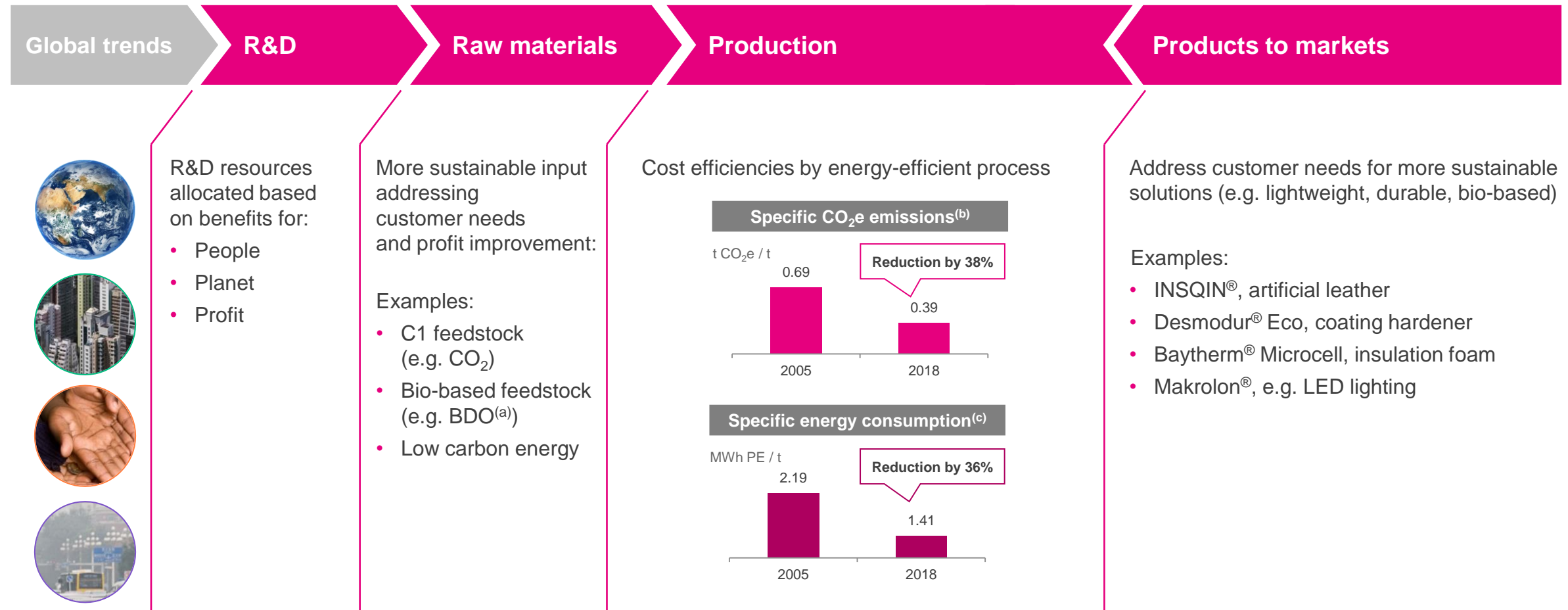


5 Getting the most out of carbon



Thinking in full life cycles

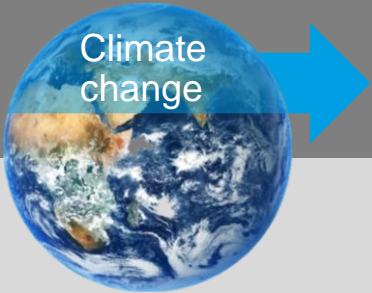

Sustainability along the value chain



Making wind power plants more efficient

Climate change: renewable energy






| Trend | Need | Market | Covestro contribution |
|---|--|--|---|
|  <p>Climate change</p> | <p>More durable and economical wind power plants</p>  | <p>Energy</p> <p>Energy consumption^(a) CAGR: ~3%</p> <p>Offshore wind energy^(b) CAGR: ~19%</p> | <p>Novel components for wind power plants</p> <ul style="list-style-type: none">• Rotor blades: Polyurethane resins for more stability and durability• Towers: Polyurethane materials for anti-corrosion coatings• Undersea cables: Elastomers for protection systems |

Lowering CO₂ footprint of furniture

Urbanization: sustainable living



| Trend | Need | Market | Covestro contribution |
|---|--|--|---|
|  <p>Urbanization</p> | <p>Eco-friendly produced furniture</p>  | <p>Furniture</p> <p>Coating industrial furniture market^(a) CAGR: ~3%</p> <p>Water-based industrial furniture market^(b) CAGR: ~5%</p> <p> Renewable feedstock share ~35%</p> | <p>Bio-based hardener for water-based, industrial furniture coatings</p> <ul style="list-style-type: none">• Bayhydrol® eco UV 2877 combines higher productivity with ecological advantage• Drying up to 50% faster than a high-performance standard product thanks to a multi-curing mechanism• Around 35% of the product is based on biomass, contributing to circular economy by helping to close the carbon loop.• LCA shows significant improvement in carbon footprint compared to standard waterborne UV curable dispersions. |

Replacing harmful by water-based ingredients

Population and prosperity growth: sustainable fashion





| Trend | Need | Market | Covestro contribution |
|---|---|--|---|
|  <p>Population & prosperity growth</p> | <p>Sustainable and functional fashion</p>  | <p>Textile industry</p> <p>Textile coating market^(a) CAGR: ~6%</p> <p>Covestro relevant textile coating market^(b) CAGR: ~11%</p> <p> Global warming potential^(c) -45%</p> | <p>Waterborne, solvent-free materials for functionalized textiles</p> <ul style="list-style-type: none">• INSQIN® helps customers to meet their sustainability goals, e.g. through a ~45% lower carbon footprint than that of solvent-based systems• Chemical and mechanical resistance at same excellent levels• INSQIN® technology also includes a waterborne PU dispersion that is biologically degradable by microorganisms at the end of the product life cycle• Enabling customers to offer biodegradable coatings and composite solutions for textile coating |

Enabling efficient E-mobility and autonomous driving



Increasing mobility

| Trend | Need | Market | Covestro contribution |
|---|---|--|---|
|  <p>A circular inset image showing a line of cars in traffic, with a blue arrow pointing to the right and the text "Increasing mobility" overlaid.</p> | <p>Reduced weight and new functionalities</p>  <p>A circular inset image of a futuristic, orange and black concept car with large wheels and a sleek design.</p> | <p>Automotive</p> <p>Global car production^(a) CAGR: ~3%</p> <p>Global hybrid and electrical car production^(a) CAGR: ~34%</p> | <p>Pioneering all-around material concept</p> <ul style="list-style-type: none">• Efficient thermal management to reduce energy demand• New lighting functions<ul style="list-style-type: none">• Integrated light and signal elements, sensors, antennas• Vehicle-to-environment communication• Entirely new possibilities in design• Surfaces with integrated features: Displays, touch screens for multiple styling options and brand differentiation• Most stringent weight reductions |



YOU CAN'T USE CO₂ TO ACHIEVE CLEANER PRODUCTION. WHY NOT?

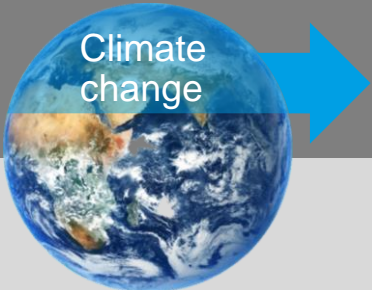


#PushingBoundaries
#CleanerProduction



Leading chlorine technology reduces energy consumption



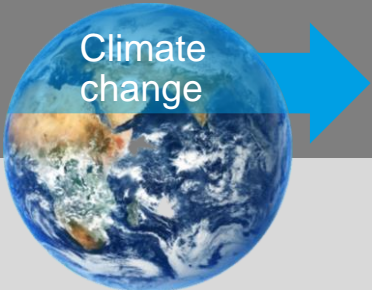



Use of energy-efficient process technology

| Trend | Need | Market | Covestro contribution |
|--|---|---|---|
|  A graphic showing a blue arrow pointing from a globe labeled "Climate change" towards the right, indicating a trend or pressure. | <p>Energy-saving processes</p>  A circular inset image showing a worker in a blue uniform and yellow hard hat inspecting a large industrial facility with many white pipes and yellow tanks. | <p>Chlorine</p>  A green circular icon with a white leaf symbol. <p>Reduced electricity consumption^(a) ~25%</p> | <p>NaCl electrolysis with ODC^(b)</p> <ul style="list-style-type: none">• Energy usually accounts for about one third of the production costs for chlorine• Covestro and ThyssenKrupp Uhde Chlorine Engineers developed proprietary technology• Use of an oxygen-depolarized cathode (ODC) consumes around 25% less energy than conventional electrolysis• Significant economic and ecological benefits vs conventional processes• World-scale ODC chlorine plant planned in Tarragona, Spain |

Gas-phase phosgenation reduces energy consumption



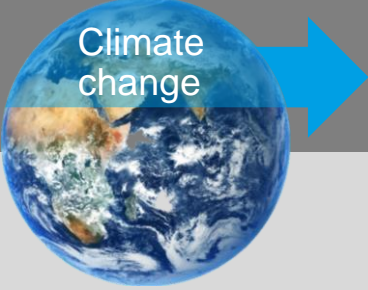


Use of energy-efficient process technology

| Trend | Need | Market | Covestro contribution |
|---|--|---|---|
|  A graphic showing a blue and white Earth globe with the text "Climate change" in white. A large blue arrow points from the globe towards the right, indicating a trend or impact. | <p>Energy-saving processes</p>  A circular inset image showing a low-angle view of an industrial facility with tall white towers and blue structural elements against a blue sky with white clouds. | <p>Isocyanates</p> <ul style="list-style-type: none"> Reduced consumption of electricity^(a) ~60% Reduced phosgene holdup^(a) ~40% | <p>TDI / HDI gas-phase phosgenation</p> <ul style="list-style-type: none">• Proprietary process technology significantly increases plant throughput• Reaction time for gas-phase phosgenation process is shorter than conventional process• Reduced capex by 20% as plant size for a given capacity is smaller• Reduced conversion cost due to lower energy demand and reduced solvent usage |

Using CO₂ to produce foam raw materials

Use of alternative raw materials



| Trend | Need | Market | Covestro contribution |
|--|--|--|---|
|  A graphic showing a blue arrow pointing from a globe labeled "Climate change" towards the right, indicating a trend. | <p data-bbox="517 484 1025 521">Substitutes for fossil feedstock</p>  A circular inset image showing a worker in a blue and black jacket and white hard hat operating industrial machinery with large silver tanks and pipes. | <p data-bbox="1308 484 1470 521">PU foams</p> <div data-bbox="1318 608 1610 754"><p data-bbox="1429 614 1610 754">CO₂ share of weight ≤20%</p></div> | <p data-bbox="1713 484 2442 521">Use industrial waste CO₂ to produce polyols</p> <ul data-bbox="1713 614 2467 1176" style="list-style-type: none">• CO₂ replaces up to 20% of crude oil-based feedstock of polyols• New production plant at Dormagen site and product brand cardyon® launched• Recticel promotes foam mattresses with more than one-seventh of oil content replaced by CO₂-based chemicals• Sports flooring producer Polytan installed first elastic subfloor using CO₂-based cardyon® as binder• More CO₂-based products in development for applications in sport, appliances, etc. |

Turning waste gas from steel factories into valuable plastics

CO₂ as alternative carbon source



Industry consortium **Carbon4PUR**

- Cross-sector project of 14 partners from seven countries, led by Covestro, funded by the European Union
- Goal to make more use of alternative carbon sources like CO₂ in order to close the carbon loop and save direct fossil resources such as crude oil
- Dedicated research how to use flue gas from the steel industry to replace oil-based raw materials – in a particularly efficient and sustainable way
- To date, the project has shown first promising results: Test quantities of polyol intermediates have been obtained both from CO and CO₂
- Industrial-scale testing: In future, carbon in form of mixed waste gases from the ArcelorMittal plant in Fos-sur-Mer, France, could undergo catalytic transformations in the nearby Covestro plant to become a chemical feedstock for polyols

Pan-European project partners



Academic and institutional partners





YOU CAN'T
TURN 80 YEARS OF
EXPERIENCE INTO A
FRESH PERSPECTIVE.
WHY NOT?



#PushingBoundaries #FreshPerspective

Enabling to seize new opportunities in multiple dimensions

Digitalization at Covestro



Digital operations



- Innovate how to do daily business cost efficiently and more safely
- Digitalize business operations
- Digital, fully integrated and data-based approach allows to work more safely and efficiently

Digital customer experience



- Innovate how to grow current business
- Digitalize the customer and supplier approach
- Reflecting needs of digital savvy customers and supporting their decision making across multiple digital touchpoints

Digital business model



- Innovate how to make business
- Develop new, digital business models
- Utilizing digital technologies to enhance customer and own benefits

Digitalization to increase operational efficiency



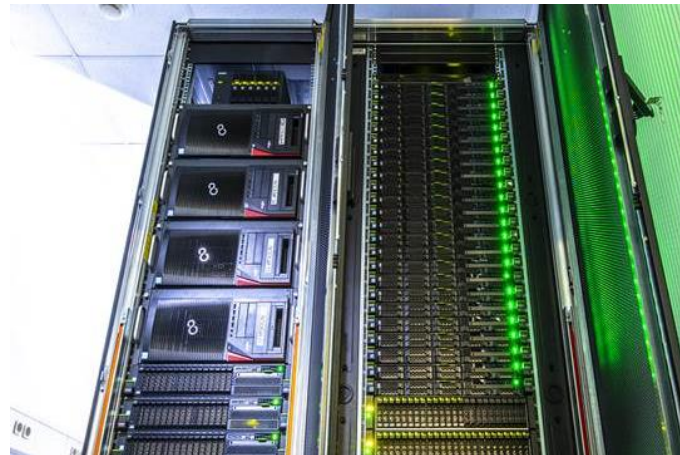
Dimension I – Digital operations

Predictive maintenance



- Consistent data model and workflows for fast deployment
- High degree of horizontal and vertical data integration
- Increased plant runtime, reduced maintenance costs as well as optimized replacement and service intervals

Computational chemistry



- High performance computing for efficient research and development processes
- First product developed with support of computational chemistry launched in appliance application
- Shortened time to market and reduced resources for experimental work

Digital twin



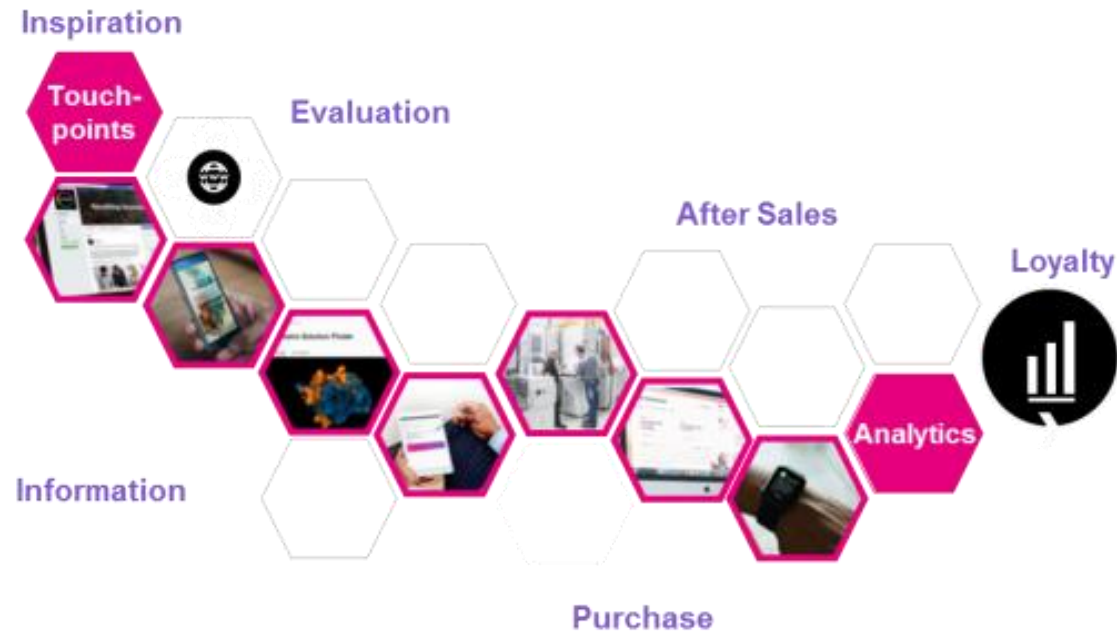
- iPEP (Integrated plant and engineering platform) to provide virtual image of existing plants, including all systems and processes
- One of 11 projects to enable more efficient planning, operation and maintenance of plants
- Pilot project planned in Caojing

Suitable touchpoints for every requirement

Dimension II – Digital customer experience



Digital customer journey



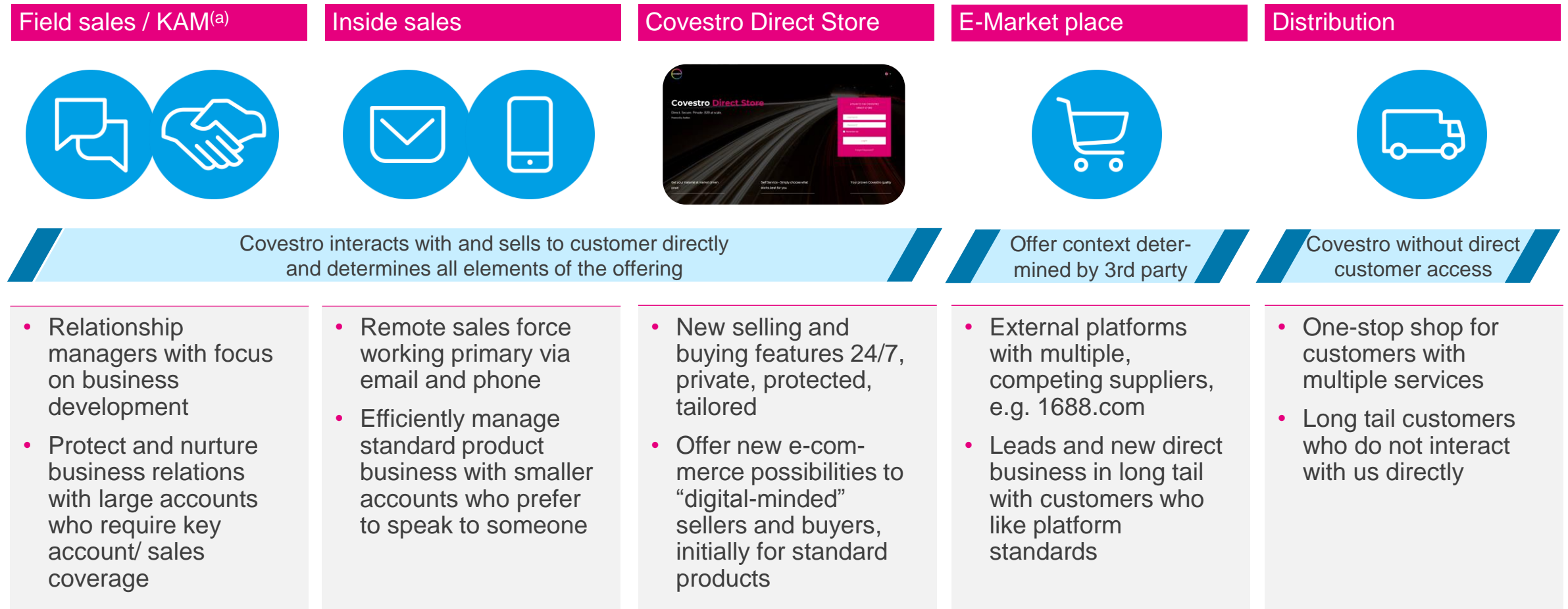
Highlights

- The online Customer Lounge combines all tools related to product search and ordering
- The online Product Finder can also be accessed via the Customer Lounge where customers can efficiently search for suitable products
- Revised global E-ordering platform "Order@Covestro" to place an order easily online
- Status of purchase order, time of delivery or invoice information can be accessed by customers at every time

Digital channel fills “24/7 direct and tailored” business gap



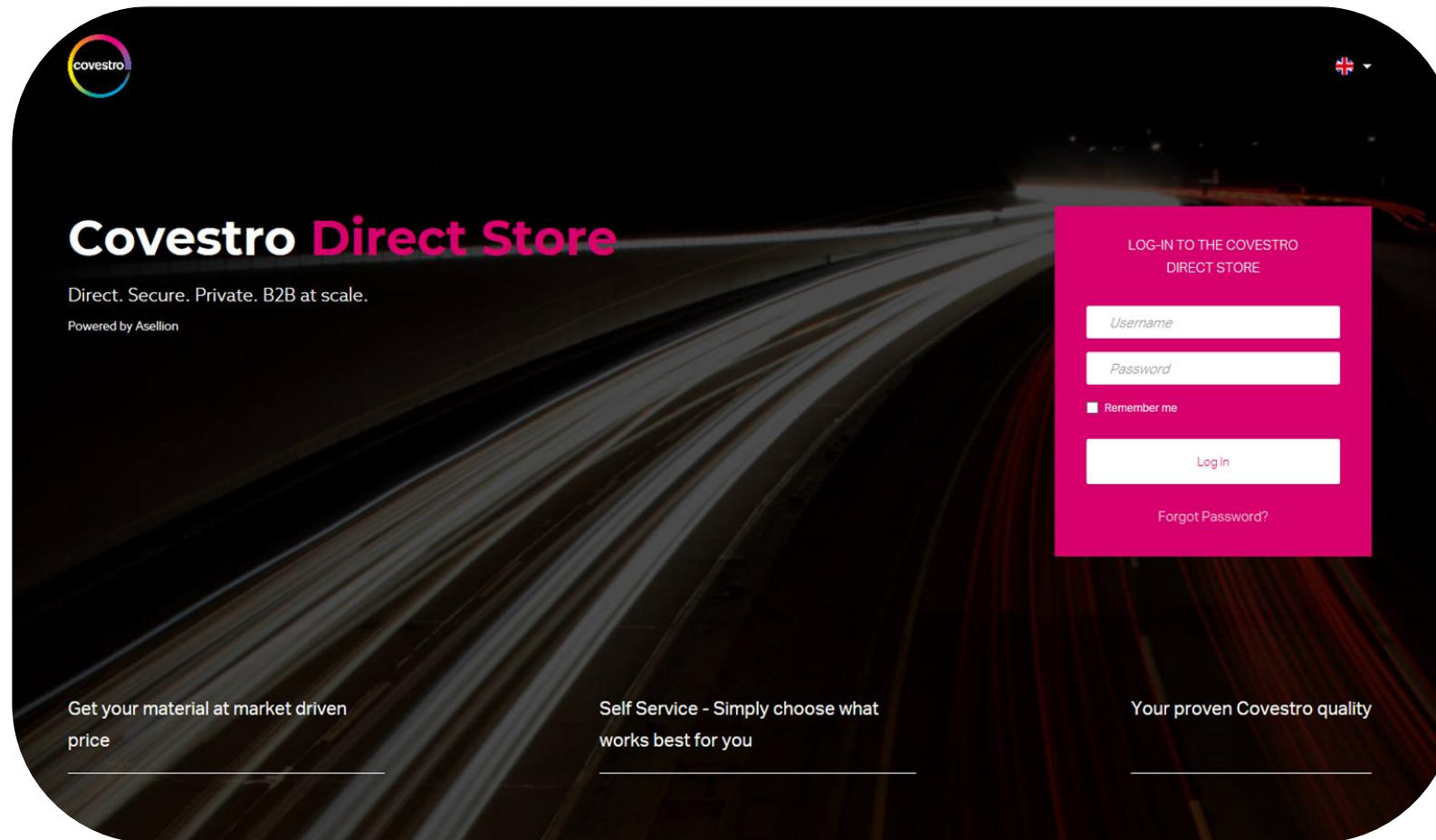
Covestro commercial channels



Digital sales channel expands e-commerce opportunities



Dimension III – Digital business models



Highlights

- Covestro Direct Store launched in March 2019, hosted on Asellion platform
- Customers to purchase chemical products conveniently, flexibly and securely at current market prices
- Adapted buying experience to changed customer requirements, offering new methods in addition to existing digital and analog sales channels
- Customers to receive regular personalized offers at clear real-time conditions
- Covestro to benefit from additional, personalized digital doorway to customers

Digital trading platform Asellion open to third parties



Dimension III – Digital business models

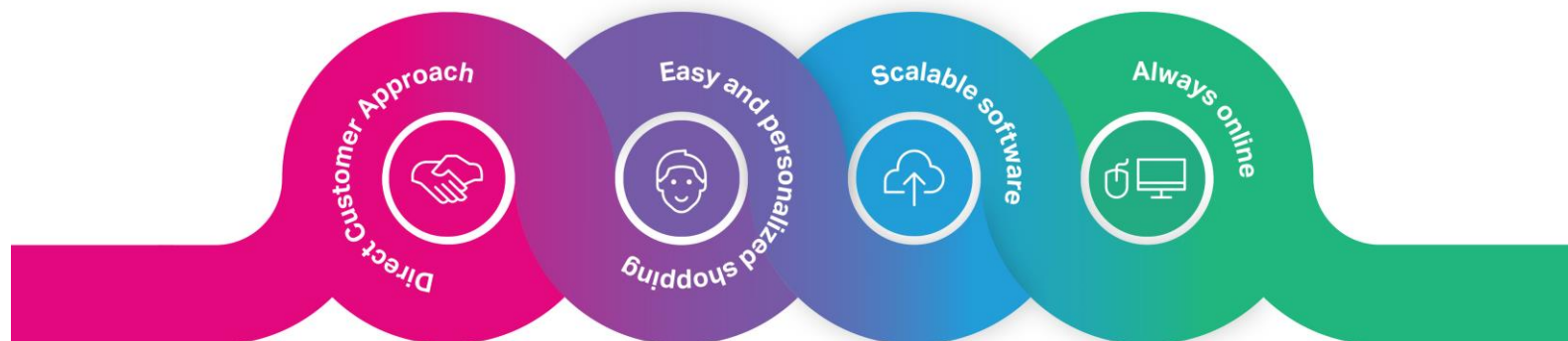
Scalable software solution for third party providers

The Covestro Direct Store powered by Asellion

Digital trading platform for chemicals complements existing sales and opens up new ways to customers.

Buyers receive individual offers and the service that suits them best at a glance.

Products available around the clock, anywhere and with just one click.



Sellers can present themselves in their own brand shop and satisfy individual customer needs.

Innovative and secure Software-as-a-Service (SaaS) solution for third party providers.

Highlights

- Covestro Direct Store as first supplier store on the Asellion platform
- Asellion platform technology designed as a scalable and secure software-as-a-service (SaaS) solution
- In future, third party providers and other manufacturers have option to host their own direct store powered by Asellion
- After ongoing test and development phase, platform to open for external providers during 2019
- Asellion is a wholly owned subsidiary of Covestro, based in Amsterdam

PUSHING BOUNDARIES IN INNOVATION AND TECHNOLOGY IS AT THE CORE OF COVESTRO

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