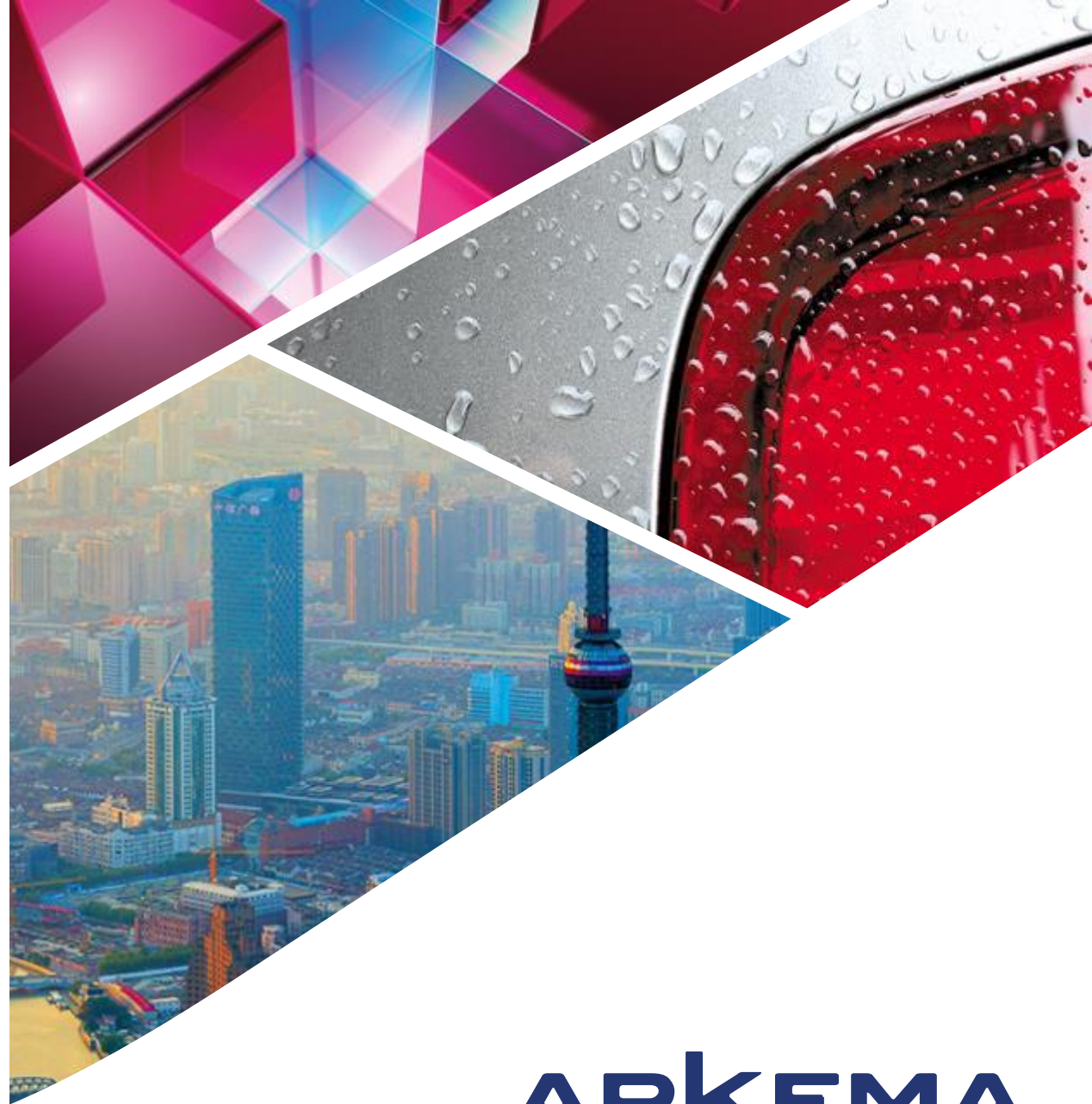


ARKEMA

ROADSHOW PRESENTATION

SEPTEMBER 2020



ARKEMA
INNOVATIVE CHEMISTRY

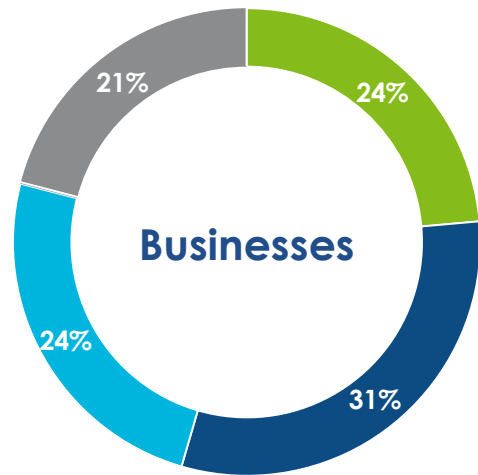


ARKEMA IN A SNAPSHOT

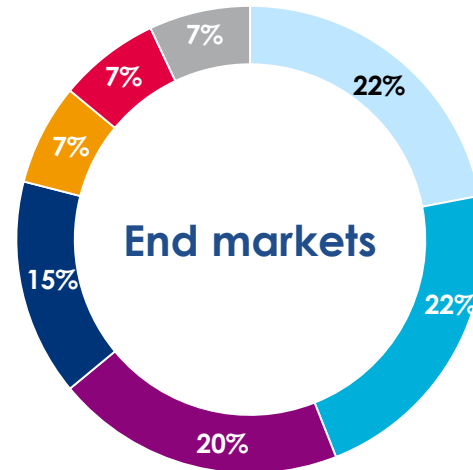
ARKEMA
INNOVATIVE CHEMISTRY

ARKEMA AT A GLANCE

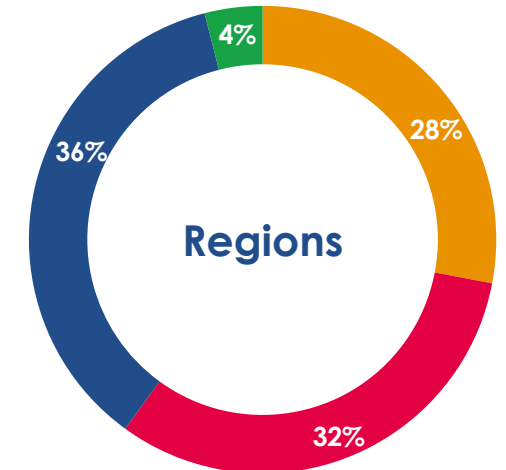
2019 SALES SPLIT



- Adhesive Solutions
- Advanced Materials
- Coating Solutions
- Intermediates



- General industry
- Consumer goods
- Electrics, electronics & energy
- Paints & Coatings
- Building & Construction
- Automotive & Transportation
- Nutrition & water



- Europe
- North-America
- Asia
- ROW



€8.7b
sales



20,500
employees



Present
in **55** countries

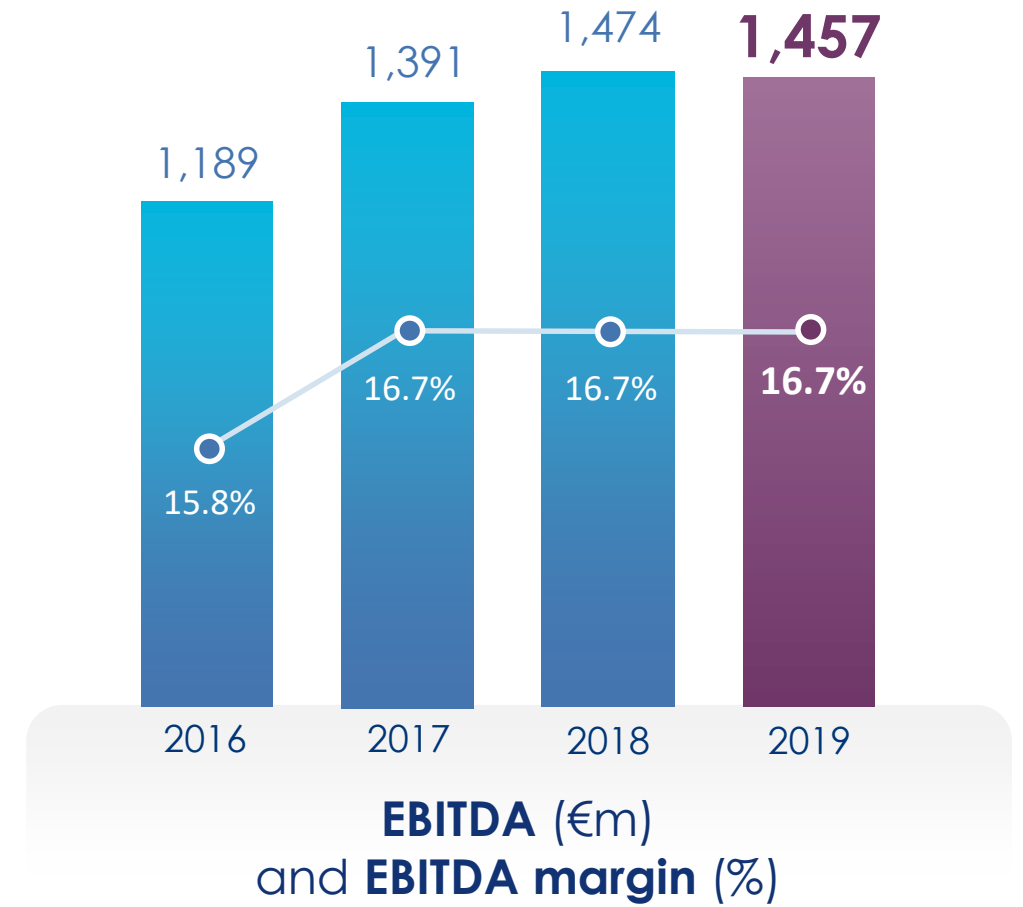
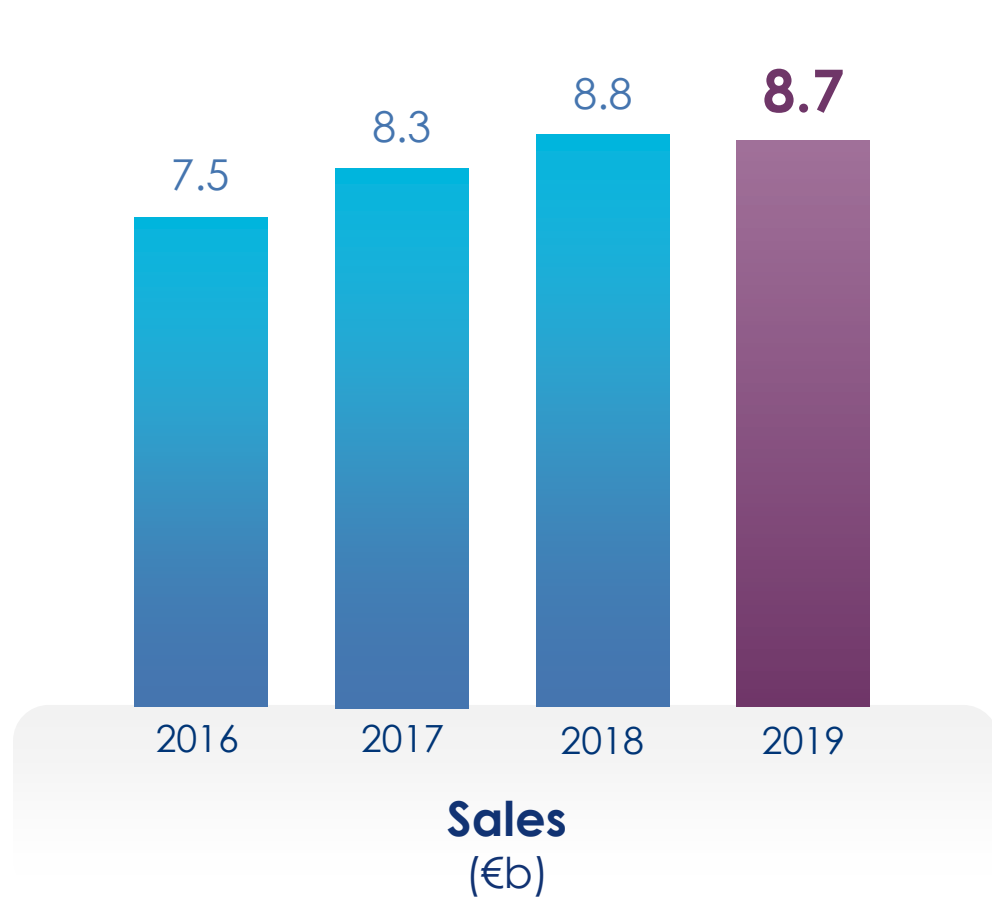


144 plants
operated

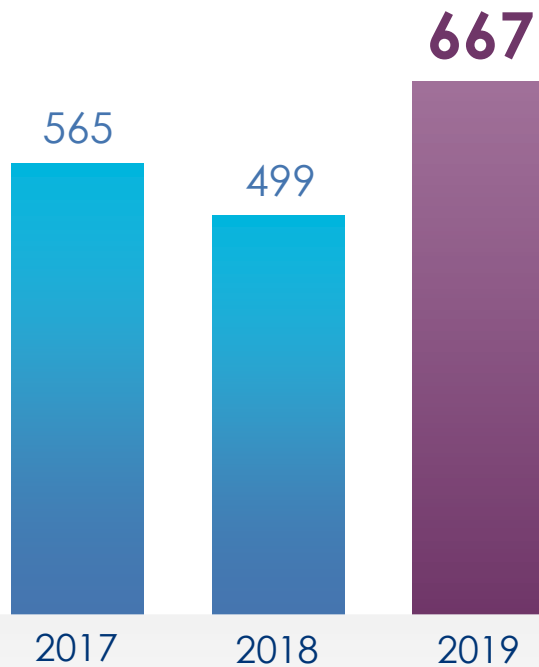


2.8% of revenues
invested in R&D

A HIGH-LEVEL FINANCIAL PERFORMANCE



RECORD CASH FLOW GENERATION IN 2019



Free cash flow (€m)

EBITDA to cash conversion rate

52%

above the target of 35%

Working capital (% of annual sales)

13.8%

close to the very good level of 2018

Recurring and exceptional capital expenditure

€607 m

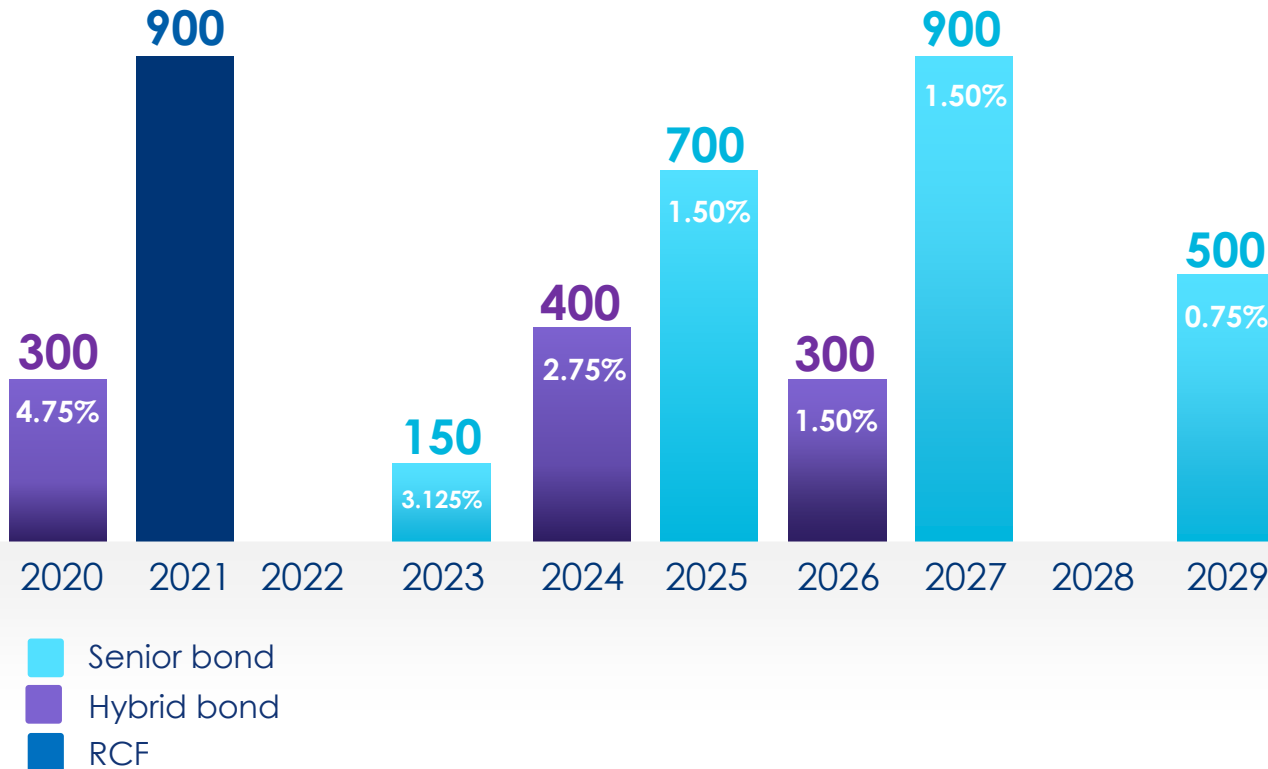
acceleration of major organic growth projects

Tax rate (as a % of REBIT)

19%

stable relative to 2018

A VERY SOLID BALANCE SHEET



Gearing

(net debt excluding hybrids divided by shareholders' equity)

31%

Net debt (excl. hybrids) / **EBITDA**

1.1x

Hybrid bonds

(booked as shareholders' equity)

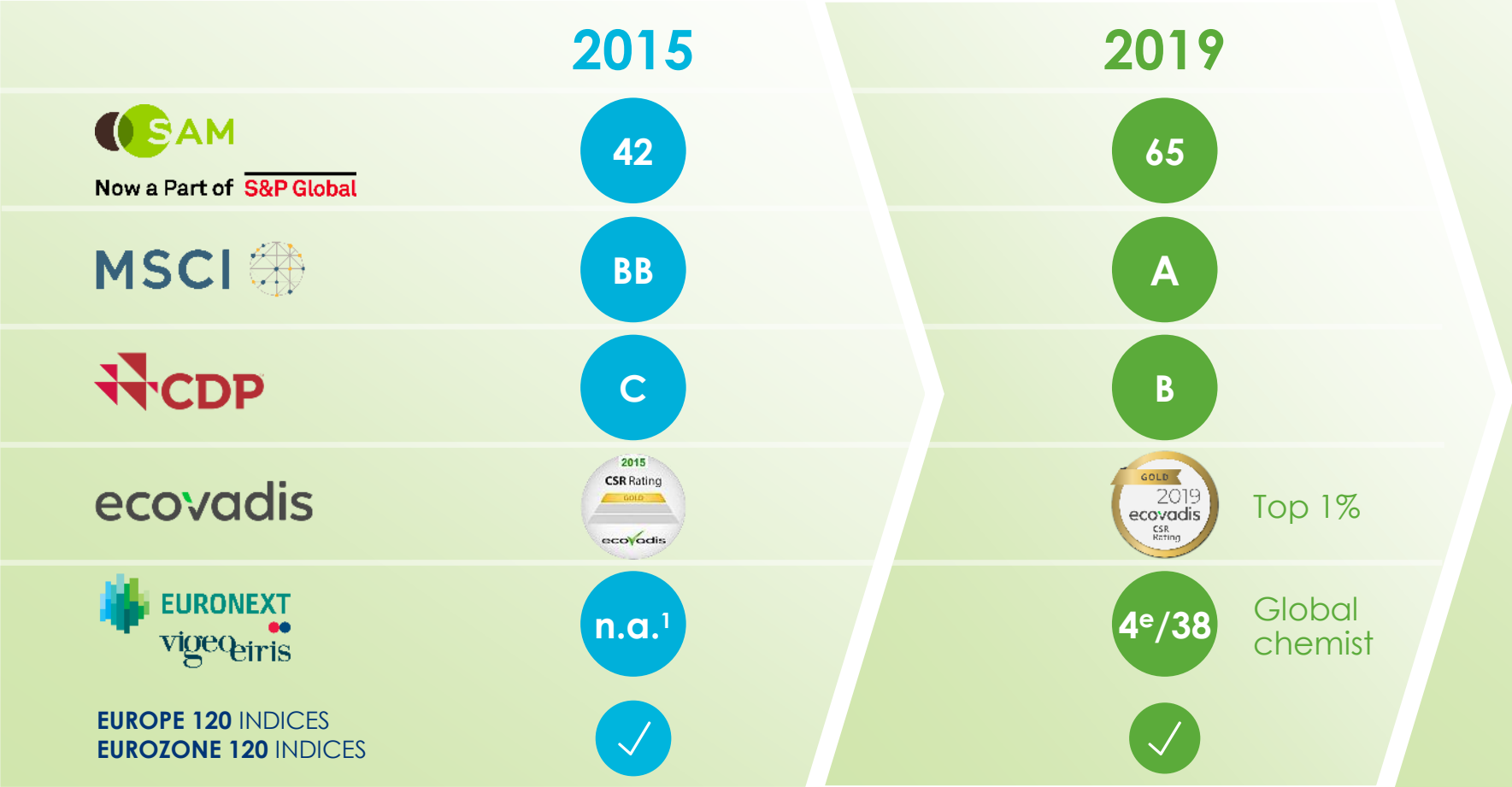
€1,000 m*

* €300m new hybrid bond in January 2020 with a first call option exercisable after 6 years giving Arkema the possibility to refinance the 2020 hybrid of €300m should the reimbursement option be exercised

STRONG CSR REQUIREMENTS

NON-FINANCIAL RATINGS

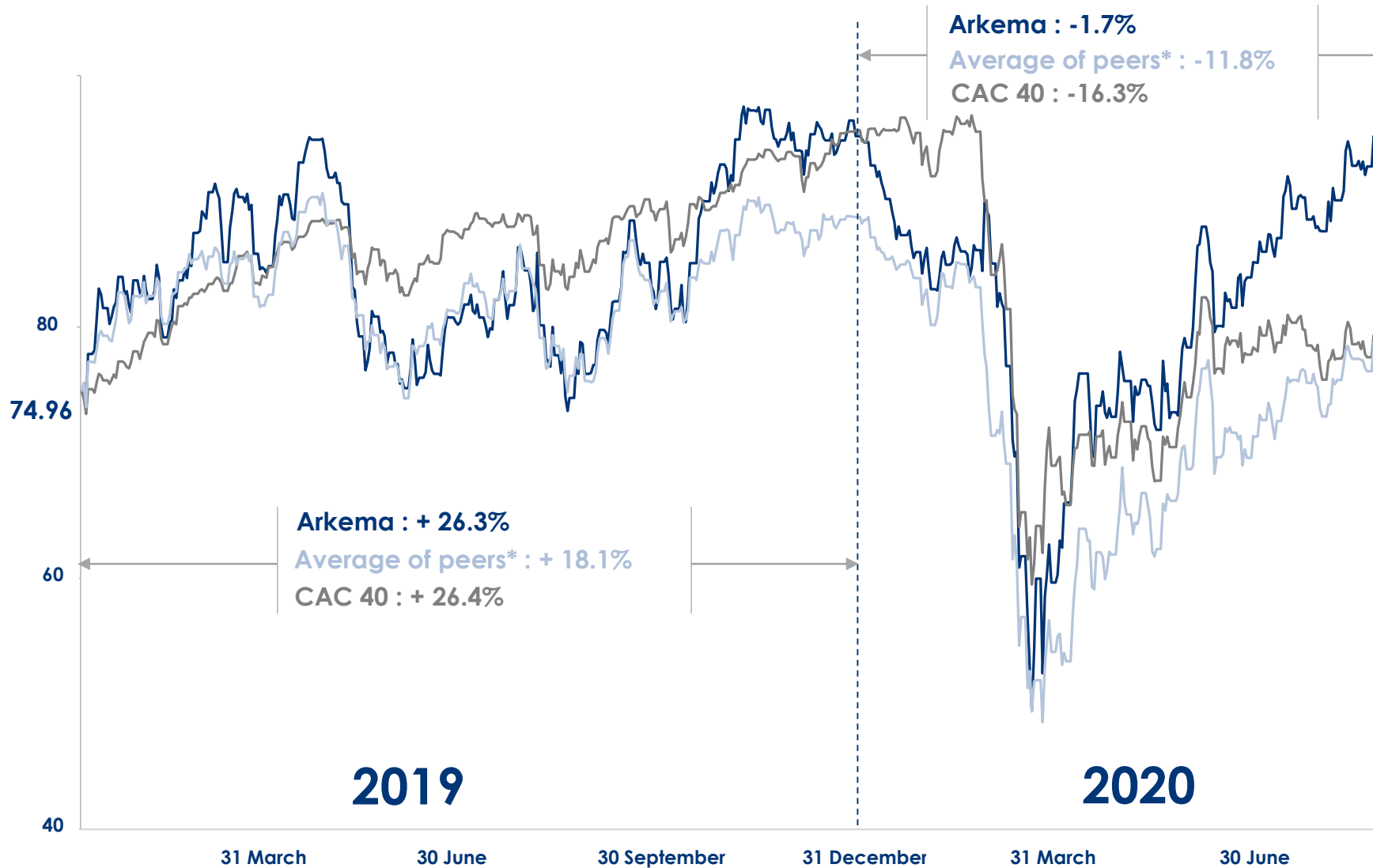
OUR AMBITION



- Rank among the best performing companies
- Inclusion in the **DJSI**

1. Not disclosed

EVOLUTION OF THE SHARE PRICE SINCE 1st JANUARY 2019



* The panel of chemicals peers includes Ashland, BASF, Celanese, Clariant, Dupont, Eastman, Evonik, HB Fuller, Lanxess, Solvay

TSR since May 2006 (with reintegrated dividends)

Arkema

more than

x4

Average of peers*

around

x2.5

CAC 40

around

x1.7



OUR LONG TERM AMBITION

ARKEMA
INNOVATIVE CHEMISTRY

OUR VISION



Be the **Specialty Materials leader** offering the most **innovative** and **sustainable solutions** to address our customers' current and future challenges

ARKEMA HAS UNIQUE MATERIALS CAPABILITIES TO ADDRESS THESE CHALLENGES

Structuring
materials



Bonding
materials



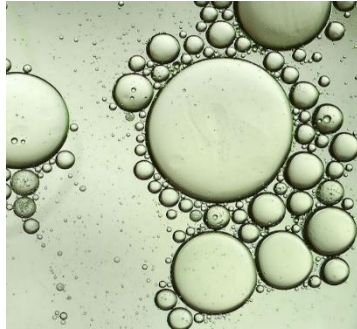
Protecting
surfaces



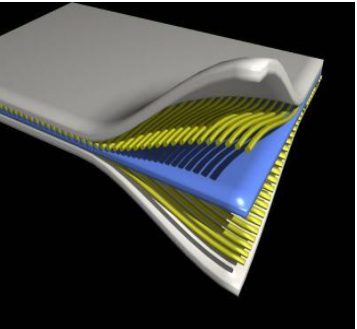
Additive
technology



Surface
science



Piezoelectric
materials



Composite
materials



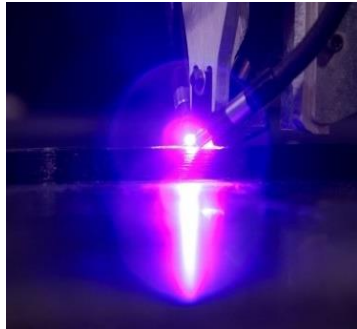
Recyclable
materials



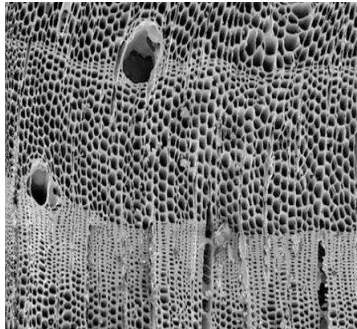
Bio-based
resources



Rheology
modifications



UV curing
technology



Nanoscience

THIS KNOW-HOW IS ORGANIZED INTO 3 SYNERGISTIC GROWTH PLATFORMS

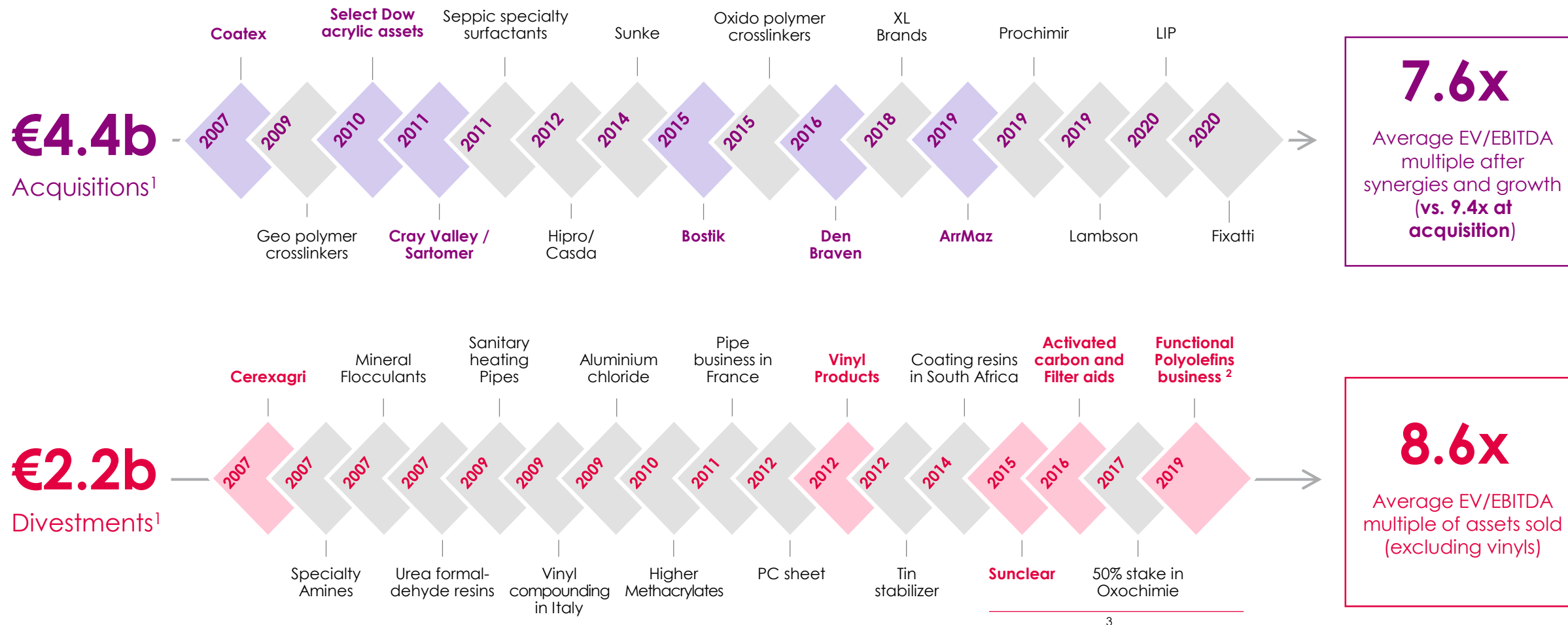


Key end markets



THESE 3 PLATFORMS ARE DEVELOPED SINCE 2005 THROUGH A PROFOUND PORTFOLIO SHIFT

Colored boxes represent the largest acquisitions and divestments over the period



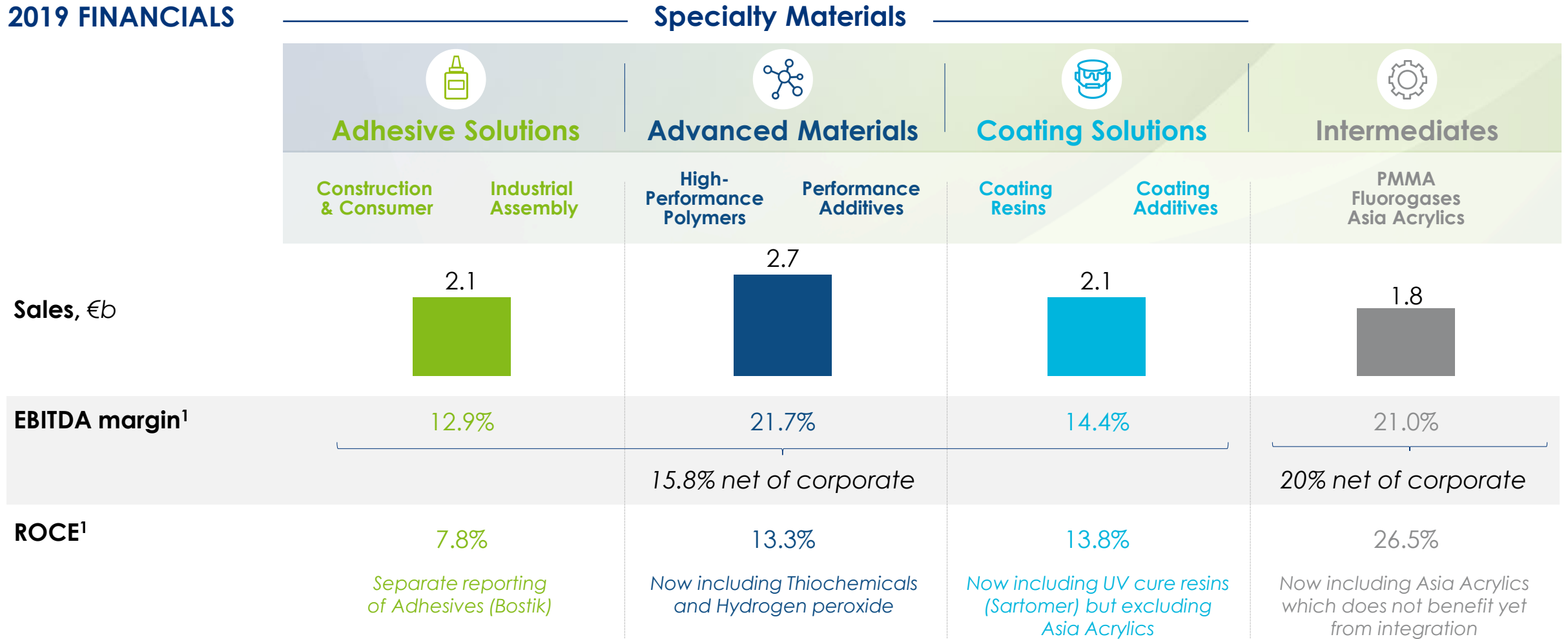
1. Sales acquired / divested over 2005-2019 (full year impact)

2. Finalized on 1 June 2020

3. Initial plan was ~€300m EV for € 700m sales but achieved ~€650m EV for €550m sales

WE HAVE ALIGNED OUR BUSINESS STRUCTURE WITH OUR VISION

2019 FINANCIALS



1. Excluding corporate, corresponding to ~1% of sales

OUR VISION IS TO BECOME A PURE SPECIALTY MATERIALS PLAYER

OUR 2024 AMBITION

- **€10-11b** sales
- **GDP+** organic growth
- High group **profitability of ~17% EBITDA margin**
- Strong **cashflow** generation
- Superior **resilience**



SPECIALTY MATERIALS



3-3.5% p.a. average annual organic revenue growth



M&A to more than **double organic growth**



Increase EBITDA margin from **15.8% to ~17%**¹



>40% cash generation²

INTERMEDIATES



Develop differentiated strategies across businesses

1. Net of corporate costs, corresponding to ~1% of sales 2. Free cash flow excluding exceptional CAPEX divided by EBITDA

EACH PLATFORM HAS SET GROWTH AND PROFITABILITY AMBITIONS



Adhesive Solutions

Be a consolidator of the market, focused on high performance bonding and construction solutions



Advanced Materials

Invest and innovate to support exponential needs for materials based on megatrends



Coating Solutions

Continue to enhance the value proposition and sustainable offering



While keeping strict financial discipline at group level: including a ROCE > 10% and normative CAPEX ~5.5% of sales

1. Excluding corporate, corresponding to ~1% of sales

ADHESIVE SOLUTIONS STRATEGY AT A GLANCE

2019 KEY FINANCIALS



€2.1b
sales



12.9%
EBITDA margin

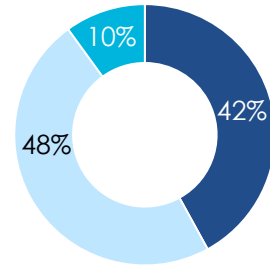


3%
CAPEX intensity¹

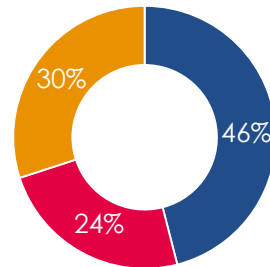


2.7%
R&D intensity¹

2019 REVENUE SPLIT



- Building & Construction
- Do-it-yourself³
- Industry³



- Europe
- North America
- Asia & Rest of the World

2024 AMBITION



High single-digit
Annual sales growth
incl. M&A²



+300 bps
EBITDA margin increase

Growth levers



Accelerate organic growth through **presence in Asia as well as key technologies** (high-performance adhesives for **industrial assembly** and **waterproofing & flooring** in construction)



Launch phase 2 of our **operational excellence** program



Grow through **bolt-on M&A** in a fragmented market

1. As % of sales 2. Organic growth of ~3% 3. Separate market definitions as used by Adhesive solutions

ADVANCED MATERIALS STRATEGY AT A GLANCE

2019 KEY FINANCIALS



€2.7b
sales



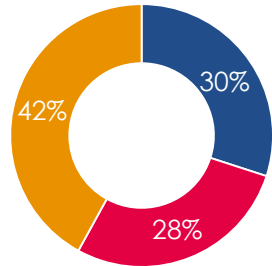
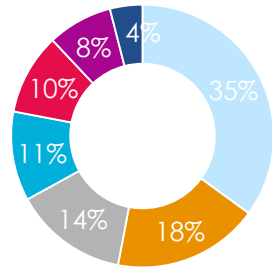
21.7%
EBITDA margin



7-8%
CAPEX intensity¹



3.4%
R&D intensity¹



2019 REVENUE SPLIT

- Building & Construction
- Consumer goods
- General industry
- Electrics, electronics & energy
- Automotive & Transportation
- Paint & coatings
- Nutrition & Water

- Europe
- North America
- Asia & Rest of the World



2024 AMBITION



4%
Annual organic sales growth



Stable at 22%
EBITDA margin

Growth levers



Support growth with **high-return expansion projects** (polyamides in Asia, PVDF globally, PEKK in US,...)



Innovate with a focus on **sustainability** (bio-sourced materials, new energy, lightweight,...)



Be the **preferred partner** to solve our customers materials challenges

¹. As % of sales

COATING SOLUTIONS STRATEGY AT A GLANCE

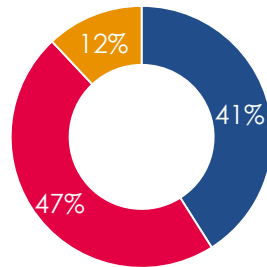
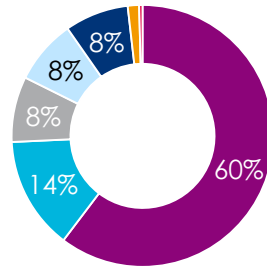
2019 KEY FINANCIALS

 **€2.1b**
sales

 **14.4%**
EBITDA margin

 **5-6%**
CAPEX intensity¹

 **2.3%**
R&D intensity¹



2019 REVENUE SPLIT

- Paint & coatings
- Consumer goods
- Nutrition & Water
- General industry
- Building & Construction
- Electrics, electronics & energy

- Europe
- North America
- Asia & Rest of the World

2024 AMBITION

 **3%**
Annual organic sales growth

 **+150bps**
EBITDA margin increase

Growth levers



Increase capacity in our existing platforms in **fast growing geographies** (e.g. photocurable resins in China, powder coatings India,...)



Optimize operating model incl. closer integration with other platforms and downstream acrylics



Further strengthen our **Sustainable technology** offering (Low-VOC formulations, bio-sourced, energy efficient products)

¹. As % of sales

INVESTIGATING DIFFERENTIATED STRATEGY ACROSS INTERMEDIATES BUSINESSES

... Sales 2019, €b

MMA/ PMMA



0.6¹

Explore **potential disposal** of MMA/ PMMA

FLUOROGASES



0.7

Focus on **specialty segment** (~€0.2b) high-value intermediates for fluoropolymers, as well as fluoroderivatives for electronics & batteries

Investigate **strategic alternatives** for emissive applications (air conditioning and refrigeration), including partnerships (~€0.5b)

ASIA ACRYLICS



0.3

Balance **acrylic monomer capacity** in Asia through upstream partnerships and downstream growth (organic or bolt-on acquisitions)

Once these strategies are executed these segments will be integrated in Specialty Materials

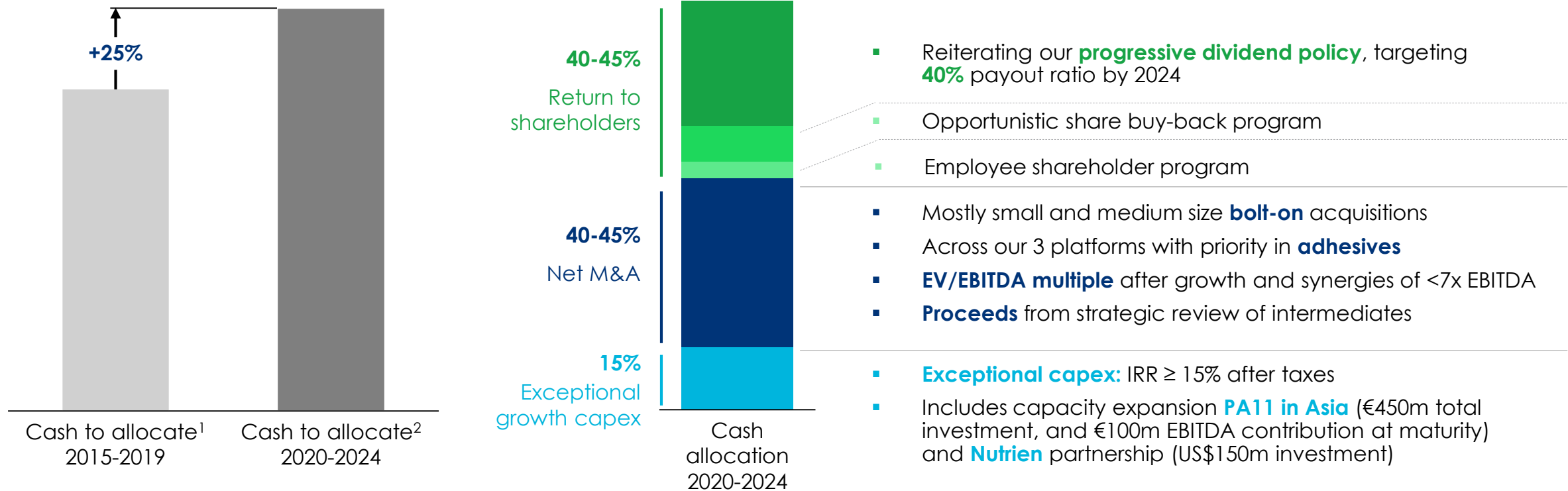
Strategic review in progress to assess the best path for each component – **pending appropriate market conditions**

1. Excludes €0.2b from Functional Polyolefins business – closing of disposal expected in Q2 2020

CASH ALLOCATION PRIORITIES

Estimated cash to allocate over the 5 year plan
 ~€3.5b at constant leverage ³ (~1.6x)

SUBJECT TO MARKET CONDITIONS



1. Cash from operations minus recurring CAPEX 2. Cash from operations minus recurring CAPEX plus additional net debt available at constant leverage 3. 1.6x net debt to EBITDA ratio incl. €700m hybrid bonds

MAINTAIN STRICT FINANCIAL DISCIPLINE



ROCE
>10%



Net debt to EBITDA ratio
<2x
Incl. hybrid bonds



Solid investment grade
rating



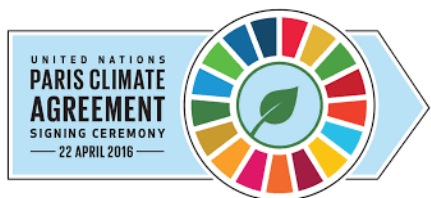
Recurring Capex
~5.5%
of sales



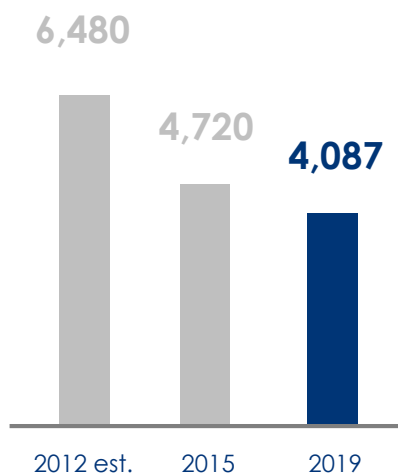
Controlled working capital
~14%
of sales

STRONG COMMITMENT ON CLIMATE AND ENVIRONMENT

CLIMATE



GHG EMISSIONS in kt eq. CO₂



CLIMATE PLAN

Commitment to Paris agreement and Science-Based Target trajectory **well below 2°C**



Greenhouse gas emissions (GHG) new target for 2030

≤ 2,950
kt eq. CO₂
(-38% vs 2015)

ENVIRONMENT

New targets for 2030

AIR



-65%
vs 2012

in volatile organic compounds (VOC) emissions intensity

WATER



-60%
vs 2012

in chemical oxygen demand (COD) intensity

ENERGY



-20%
vs 2012

in net energy purchases intensity

Performance 2019 (vs 2012)

-40%

-50%

-9%

INNOVATION TO SUPPORT SUSTAINABLE DEVELOPMENT



Industry leading range of **bio-based** specialty polyamides



Large range of **VOC-free** coating solutions



Lightweight composites to reduce GHG emissions



Circular economy initiatives (e.g. recyclable resins)



PORTFOLIO SUSTAINABILITY ASSESSMENT

44% of products portfolio assessed at end 2019, **46%** of which is significantly contributing to UN Sustainable Development Goals

Objective to achieve **100%** portfolio sustainability assessment

RESEARCH & INNOVATION

In 2019, **149** patent applications linked to sustainable development, representing **67%** of the total number of patent applications.

CULTIVATE AN OPEN DIALOGUE WITH OUR STAKEHOLDERS



EMPLOYEES

80%

are actively engaged



COMMON GROUND®

Nearly **1000** initiatives taken

**From 23% to 25%
in 2025**



women in senior management

DIVERSITY

Promotion of women and international talents in senior management



PHILANTHROPY

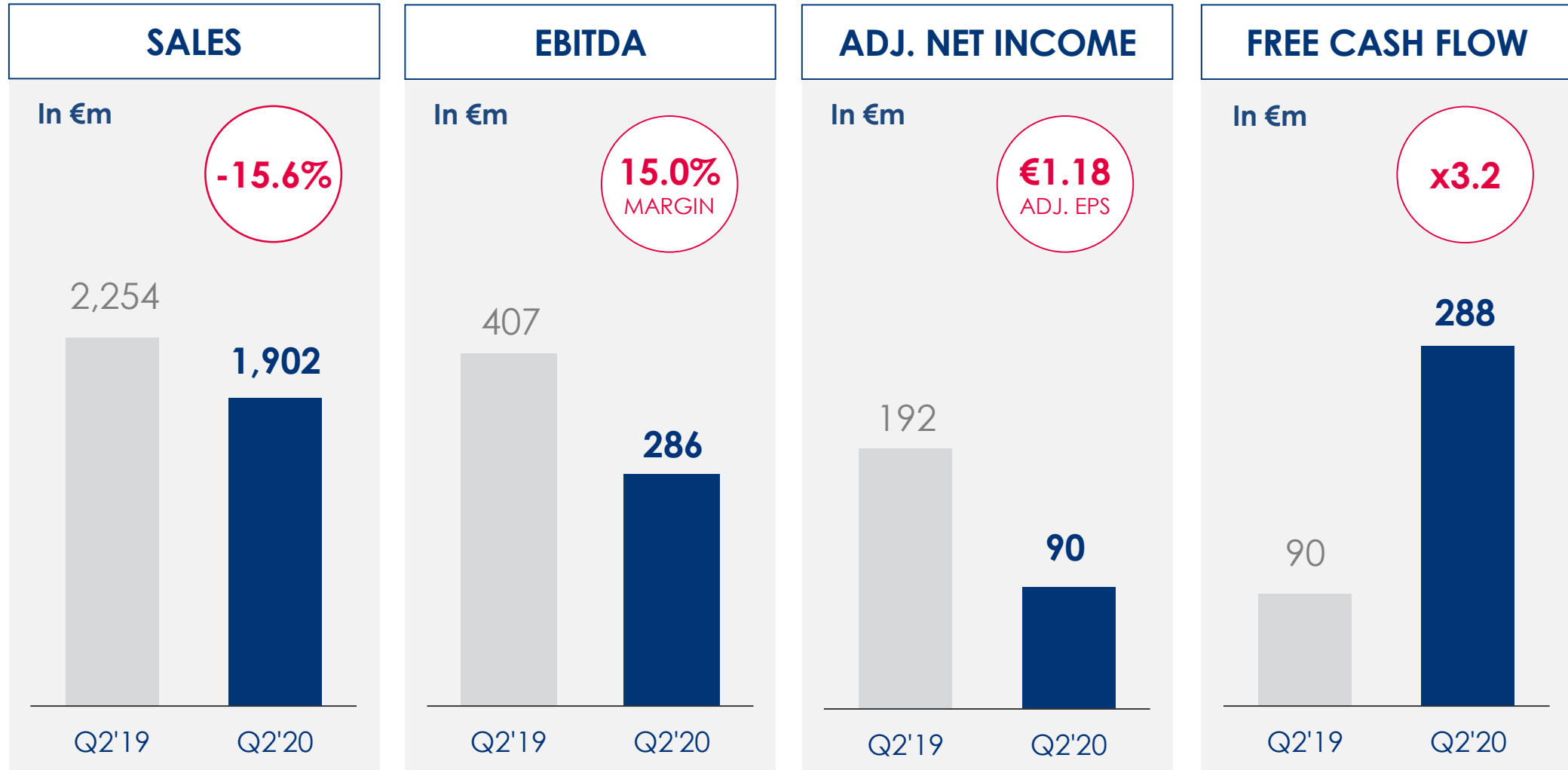
Funds for education, salary rounding, sponsoring



Q2 AND H1 2020 RESULTS

ARKEMA
INNOVATIVE CHEMISTRY

ROBUST Q2'20 PERFORMANCE IN THE CONTEXT OF COVID-19



OVERALL ROBUST Q2'20 PERFORMANCE IN THE EXCEPTIONAL COVID-19 CONTEXT

€1,902m sales

- ✦ Global economy strongly impacted by Covid-19 pandemic
- ✦ Down 15.6% YoY (-10.7% in H1 '20)
- ✦ Significant slowdown in the construction, transportation and industrial sectors
- ✦ Good demand in the nutrition, packaging and hygiene markets
- ✦ Sequential improvement in June, supported by the progress in the construction market

€286m EBITDA

15.0% EBITDA margin

- ✦ Resilient performance in view of the context
- ✦ Solid performance of Advanced Materials (20% EBITDA margin)
- ✦ Sharp rebound for Bostik in June
- ✦ Benefits of rapidly implemented interim fixed cost reduction initiatives

€90m adj. net income

- ✦ **€1.18** adjusted EPS

€288m free cash flow

- ✦ Excellent FCF for a second quarter (€90m in Q2'19)
- ✦ Strict management of working capital and capital expenditure

€2,134m net debt

(incl. €1 bn hybrid bonds)

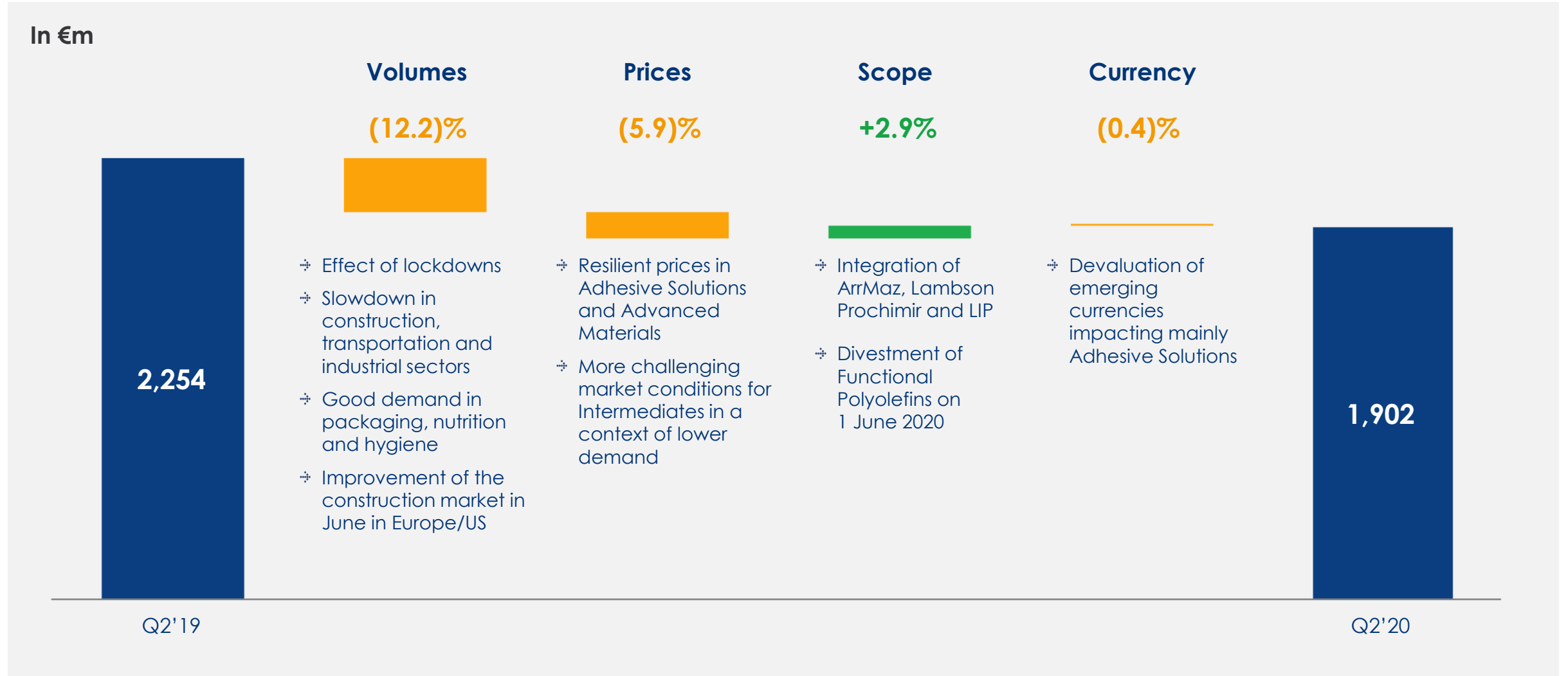
- ✦ Sharp decrease compared to 31 March 2020 (€2,481m)
- ✦ €168m dividend payment
- ✦ €246m net proceeds from Functional Polyolefins' divestment

Q2'20 KEY FIGURES

In €m	Q2'19	Q2'20	Change
Sales	2,254	1,902	(15.6)%
EBITDA	407	286	(29.7)%
Specialty Materials ¹	304	233	(23.4)%
Intermediates	127	66	(48.0)%
Corporate	-24	-13	
EBITDA margin	18.1%	15.0%	
Recurring operating income (REBIT)	278	144	(48.2)%
REBIT margin	12.3%	7.6%	
Adjusted net income	192	90	(53.1)%
Net debt (incl hybrid bonds) €2,331m as of 31/12/2019	2,008	2,134	

1. Specialty Materials include the three following segments: Adhesive Solutions, Advanced Materials and Coating Solutions

Q2'20 SALES BRIDGE



ADHESIVE SOLUTIONS (24% OF GROUP SALES)



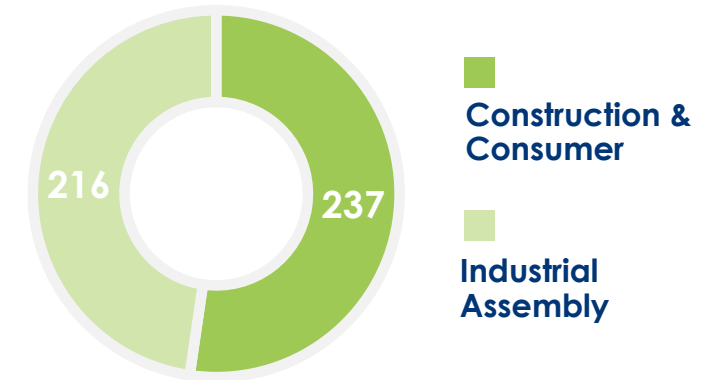
Q2'20 KEY FIGURES

In €m	Q2'19	Q2'20	Change
Sales	520	453	(12.9)%
EBITDA	71	50	(29.6)%
EBITDA margin	13.7%	11.0%	
Rec. operating income	55	35	(36.4)%

Q2'20 SALES DEVELOPMENT

Volumes	(13.2)%
Prices	(0.9)%
Currency	(1.5)%
Scope	+2.7%

Q2'20 SALES BY BUSINESS LINE



Q2'20 HIGHLIGHTS

✦ €453m sales, down 12.9% YoY

- Despite packaging and hygiene markets holding firm, volumes down 13.2%, impacted by the sharp slowdown in the construction, transportation and industrial sectors
- Price -0.9% held up well, reflecting the optimization of the product mix in 2019
- +2.7% scope effect, on LIP and Prochimir integration

✦ €50m EBITDA

- EBITDA down 29.6% YoY on sharp volume contraction in construction in April and May, and weak demand in industrial assembly sector
- Performance picked up sharply in June thanks to the rebound seen in the construction and DIY markets, industrial markets remaining mixed
- Benefits from the operational excellence and fixed cost savings initiatives, as well as favorable impact of certain raw materials
- EBITDA margin at 11.0%, temporarily down versus last year

ADVANCED MATERIALS (33% OF GROUP SALES)



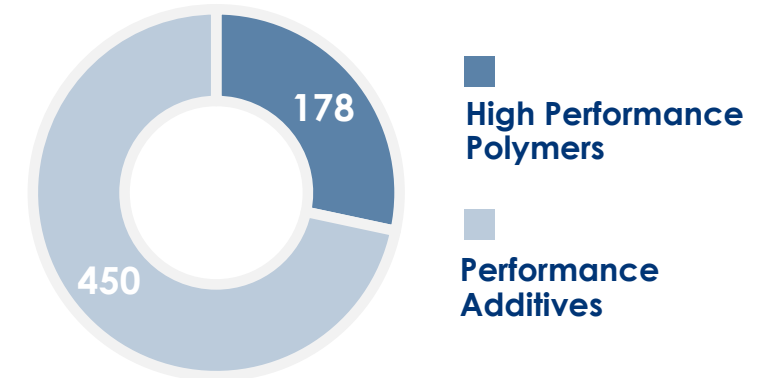
Q2'20 KEY FIGURES

In €m	Q2'19	Q2'20	Change
Sales	650	628	(3.4)%
EBITDA	142	124	(12.7)%
EBITDA margin	21.8%	19.7%	
Rec. operating income	87	61	(29.9)%

Q2'20 SALES DEVELOPMENT

Volumes	(11.5)%
Prices	(2.0)%
Currency	0.0%
Scope	+10.1%

Q2'20 SALES BY BUSINESS LINE



Q2'20 HIGHLIGHTS

➤ €628m sales, slightly down 3.4% YoY

- Volumes down 11.5%, with Covid-19 weighing strongly on demand for High Performance Polymers
 - significant decline in the transportation, consumer electronics, oil & gas and sports sectors
 - good performance of the nutrition market and certain niche applications used in the fight against the virus
- Limited price effect of -2.0%
- 10.1% positive scope effect relating to ArrMaz consolidation, driven by favorable end-markets such as crop nutrition

➤ Resilient performance with €124m EBITDA and 19.7% EBITDA margin

- EBITDA down 12.7% YoY, reflecting sharp drop in volumes, notably for High Performance Polymers, partly offset by the good resistance of Performance Additives
- EBITDA margin at a high level, benefitting from a good product mix, the favorable evolution of certain raw materials and fixed costs reduction

COATING SOLUTIONS (23% OF GROUP SALES)



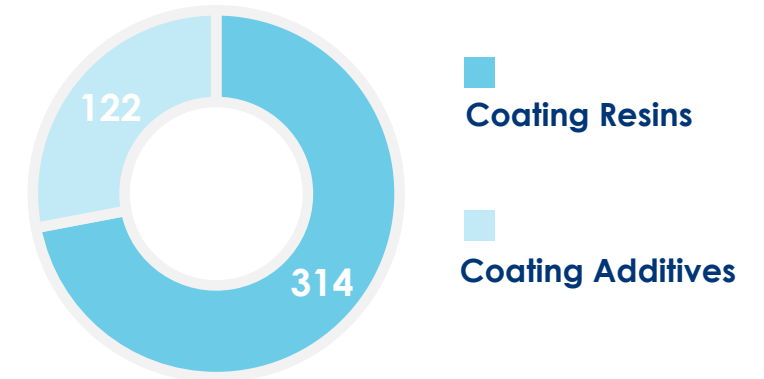
Q2'20 KEY FIGURES

In €m	Q2'19	Q2'20	Change
Sales	575	436	(24.2)%
EBITDA	91	59	(35.2)%
EBITDA margin	15.8%	13.5%	
Rec. operating income	62	28	(54.8)%

Q2'20 SALES DEVELOPMENT

Volumes	(15.8)%
Prices	(9.5)%
Currency	(0.1)%
Scope	+1.2%

Q2'20 SALES BY BUSINESS LINE



Q2'20 HIGHLIGHTS

✦ €436m sales, down 24.2% YoY

- Volumes down 15.8%, due to weak demand in construction, paints and in some industrial markets
- -9.5% price effect, stemming mainly from lower propylene prices
- Scope effect +1.2% reflecting the integration of Lambson

✦ €59m EBITDA and 13.5% EBITDA margin

- EBITDA down 35.2% YoY compared to Q2'19 excellent performance (€91m)
- Benefit from the improvement of the decorative paints market in June
- EBITDA margin held up well, thanks in particular to the benefits of the integration between upstream and downstream activities

INTERMEDIATES (20% OF GROUP SALES)



Q2'20 KEY FIGURES			
In €m	Q2'19	Q2'20	Change
Sales	502	379	(24.5)%
EBITDA	127	66	(48.0)%
EBITDA margin	25.3%	17.4%	
Rec. operating income	99	35	(64.6)%

Q2'20 SALES DEVELOPMENT	
Volumes	(8.1)%
Prices	(12.3)%
Currency	+0.1%
Scope	(4.2)%

Q2'20 HIGHLIGHTS

✦ €379m sales, down 24.5% YoY

- -12.3% price effect mainly reflecting challenging market conditions in Fluorogases and lower propylene prices
- Volumes down 8.1%
 - slowdown in the construction and automotive sectors
 - strong demand in the niche market for PMMA protective sheets, as in the first quarter
- Scope effect -4.2% corresponding to the Functional Polyolefins divestment finalized on 1 June 2020

✦ €66m EBITDA and 17.4% EBITDA margin

- EBITDA down -48.0% YoY in a context of strong declines in volumes and prices
- Performance of Fluorogases impacted by illegal HFC imports into Europe, easing towards the end of the period

PORTFOLIO MANAGEMENT HIGHLIGHTS SINCE 1 JANUARY 2020



Bolt-on acquisitions in Adhesive Solutions

LIP

Danish leader in tile adhesives, water proofing systems and floor preparation solutions

Extended range of high value-added solutions, while **boosting presence in Nordic countries**

Revenue of **~€30m per year**

Finalized on **3 January 2020**



FIXATTI

Leading global manufacturer of high-performance **thermobonding adhesive powders**

Excellent complementarity in terms of product offering and geographic exposure

Revenue of **~€55m per year**, with two production sites in Europe and one in China

Markets: construction, technical coatings, batteries, automotive, and textile printing

Closing expected in **Q4'20***



Divestment finalization

FUNCTIONAL POLYOLEFINS

Sale of Arkema's Functional Polyolefins business, part of PMMA activity, to SK Global Chemical

Revenue of **~€250m** per year in food packaging, cable, electronics and coating markets

Enterprise value of **€335 million** (net proceeds of **€246 million**)

Finalized on **1 June 2020**

MAIN ORGANIC CAPEX SINCE 1 JANUARY 2020



Attractive growth capex in
Advanced Materials

KERTEH 2

Doubling of the methyl mercaptan production capacity at Kerteh site in Malaysia

Supporting the strong growth of the animal feed, petrochemical and refining markets in Asia

Strengthening the Group's world leading position in **high value added sulfur derivative**

Start-up in **Q1 2020**



Innovative partnership for the supply
of anhydrous hydrogen fluoride (AHF)

NUTRIEN

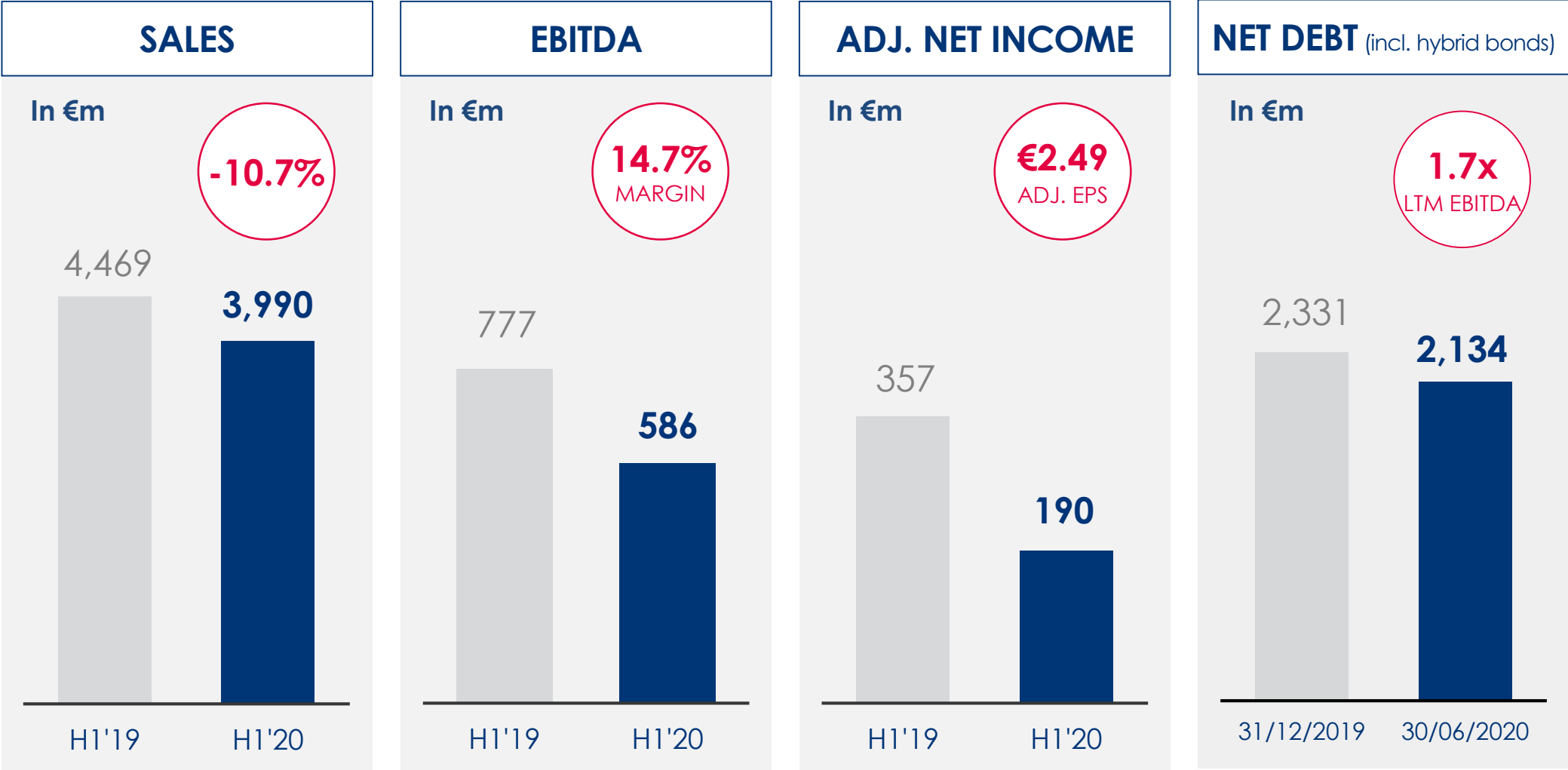
Long term stable and competitive AHF supply for Calvert City site (US)

~50% for high added value fluoropolymers and fluoro-derivatives, ~50% for low-GWP fluorogases

Greater environmental protection than more traditional production processes

US\$150 million investment in a 40 kt/year AHF production plant at Nutrien's site in North Carolina (start-up expected **first half 2022**)

H1'20 PERFORMANCE



H1'20 KEY FIGURES

In €m	H1'19	H1'20	Change
Sales	4,469	3,990	(10.7)%
EBITDA	777	586	(24.6)%
Specialty Materials ¹	596	489	(18.0)%
Intermediates	230	134	(41.7)%
Corporate	-49	-37	
EBITDA margin	17.4%	14.7%	
Recurring operating income (REBIT)	525	304	(42.1)%
REBIT margin	11.7%	7.6%	
Adjusted net income	357	190	(46.8)%

1. Specialty Materials include the three following segments: Adhesive Solutions, Advanced Materials and Coating Solutions

H1'20 CASH FLOW

RECONCILIATION OF EBITDA TO NET CASH FLOW

In €m	H1'19	H1'20
EBITDA	777	586
Current taxes	(96) ¹	(55)
Cost of debt	(49)	(42)
Change in working capital and fixed assets payables ²	(229)	(78)
Recurring capital expenditure	(187)	(157)
Exceptional capital expenditure	(38)	(57)
Non-recurring items and others	(15) ¹	53
FREE CASH FLOW	163	250
Impact of portfolio management	(25)	147
NET CASH FLOW	138	397

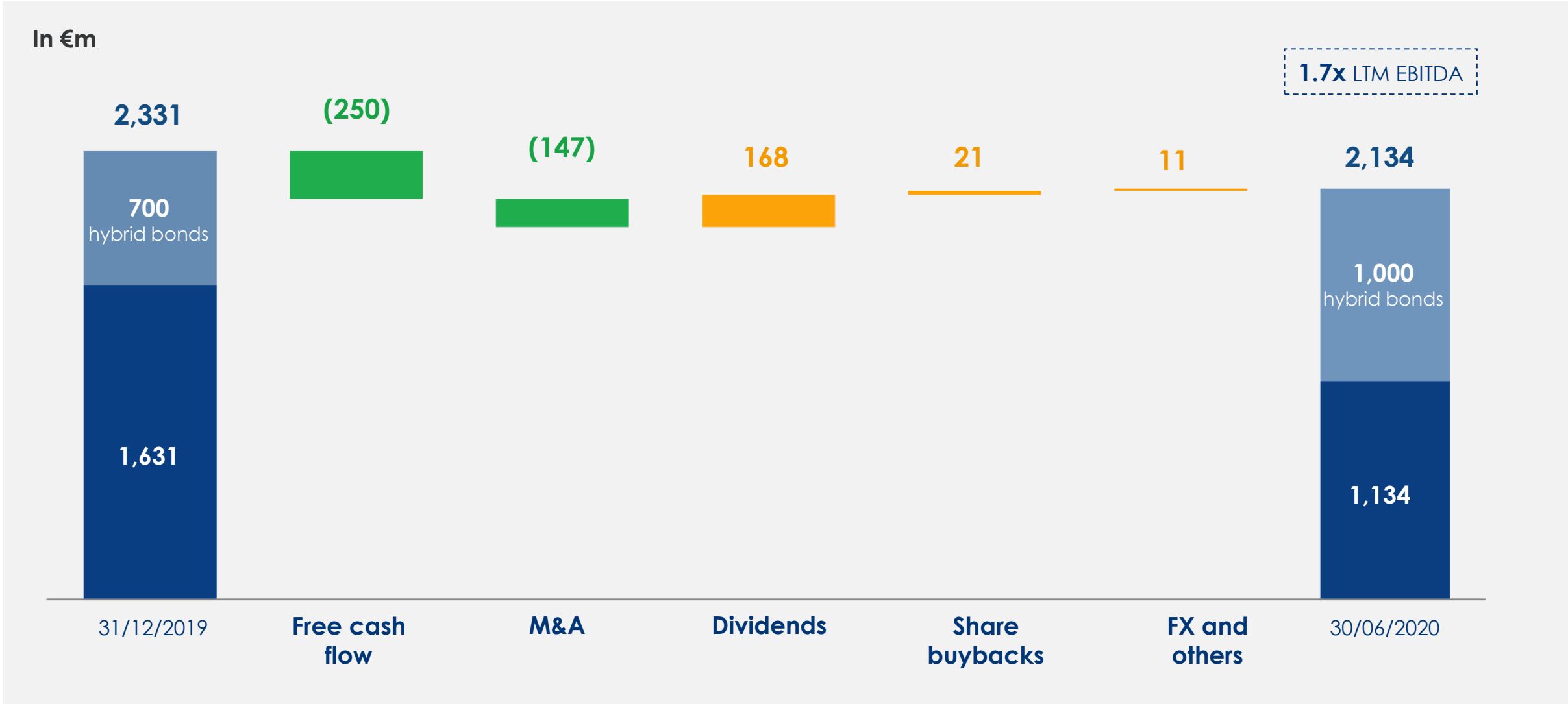
1. Restated for tax impact on non-recurring items

2. Excluding non-recurring items and impact of portfolio management

H1'20 HIGHLIGHTS

- ❖ **Tax rate H1'20: ~22% of REBIT** (excl. exceptional items)
- ❖ **Strict working capital management**
 - 16.5% working capital on annualized sales (16.0% end of June 2019)
- ❖ Non-recurring items include tax savings linked to the use of tax losses for an amount of €55m in Q2'20
- ❖ Portfolio management mainly corresponding to LIP acquisition and Functional Polyolefins divestment

H1'20 NET DEBT BRIDGE (INCLUDING HYBRID BONDS)



2020 OUTLOOK

- ✦ Based on the progressive lifting of lockdown measures in some important countries for the Group, Arkema expects that **demand will continue to improve gradually in the second part of the year**, while remaining below last year's level
- ✦ The **pace and strength of this improvement** are still uncertain, dependent on the evolution of the pandemic, and **will vary between end-markets and geographies**
- ✦ Arkema estimates at this stage that **sales in the third quarter will decline by around 10% year-on-year** at constant scope and currency, representing a clear improvement compared to the decline of around 20% recorded in the second quarter
- ✦ The Group confirms it is on track to **reduce in 2020 its fixed costs by €50 million** compared to 2019 and to **reduce capital expenditure by €100 million** compared to the level originally planned
- ✦ Arkema will continue its acquisition strategy, the roll-out of its major organic growth projects, as well as its strategic review for Intermediates, in line with its ambition to become **a pure Specialty Materials player by 2024**

DISCLAIMER

The information disclosed in this document may contain forward-looking statements with respect to the financial condition, results of operations, business and strategy of Arkema.

In the current context, where the Covid-19 epidemic continues to rapidly spread across the world, and the evolution of the situation as well as the magnitude of its impacts on the global economy are highly uncertain, the retained assumptions and forward looking statements could ultimately prove inaccurate.

Such statements are based on management's current views and assumptions that could ultimately prove inaccurate and are subject to material risk factors such as among others, changes in raw material prices, currency fluctuations, implementation pace of cost-reduction projects, developments in the Covid-19 situation, and changes in general economic and business conditions. These risk factors are further developed in the 2019 Universal Registration Document.

Arkema does not assume any liability to update such forward-looking statements whether as a result of any new information or any unexpected event or otherwise.

Further information on factors which could affect Arkema's financial results is provided in the documents filed with the French *Autorité des marchés financiers*.

Financial information since 2005 is extracted from the consolidated financial statements of Arkema. Quarterly financial information is not audited.

The business segment information is presented in accordance with Arkema's internal reporting system used by the management.

The main performance indicators used by the Group are defined in the 2019 Universal Registration Document. As part of the analysis of its results or to define its objectives, the Group uses in particular the following indicators:

EBITDA margin: corresponds to EBITDA as a percentage of sales, EBITDA equaling recurring operating income (REBIT) plus recurring depreciation and amortization of tangible and intangible assets

REBIT margin: corresponds to the recurring operating income (REBIT) as a percentage of sales

Free cash flow: corresponds to cash flow from operations and investments excluding the impact of portfolio management

EBITDA to cash conversion rate: corresponds to the free cash flow excluding exceptional capital expenditure divided by EBITDA

Return on average capital employed (ROACE): corresponds to the REBIT divided by the average of capital employed at the end of years Y and Y-1.