MERCK KGAA, DARMSTADT, GERMANY

Q4 19 ROADSHOW

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Agenda

01 Business overview

02 Transforming the company

03 Healthcare – Funding for success

04 Life Science – Focusing on profitable growth

05 Performance Materials – Maintaining leadership and innovation

06 Executive summary and guidance

01 STRATEGIC ROADMAP

Group

Three high-tech businesses competing in attractive markets

Healthcare

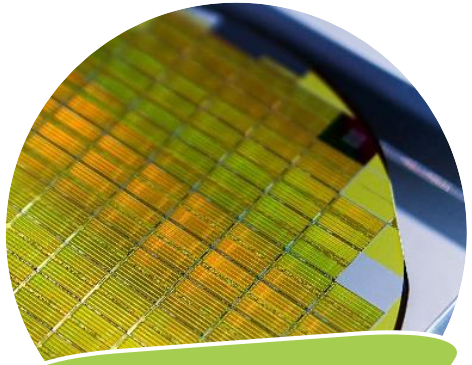
Leading in specialty pharma markets

- Biologics and small-molecule **prescription medicines** against cancer, multiple sclerosis, infertility
- **Research** focus: Oncology, Immunology & Immuno-Oncology
- **Successful portfolio management:** e.g. divestment of Consumer Health business

Life Science

Leading life science company

- Tools and services for **biotech research & production**
- **Tools and laboratory supply** for academic research and industrial testing



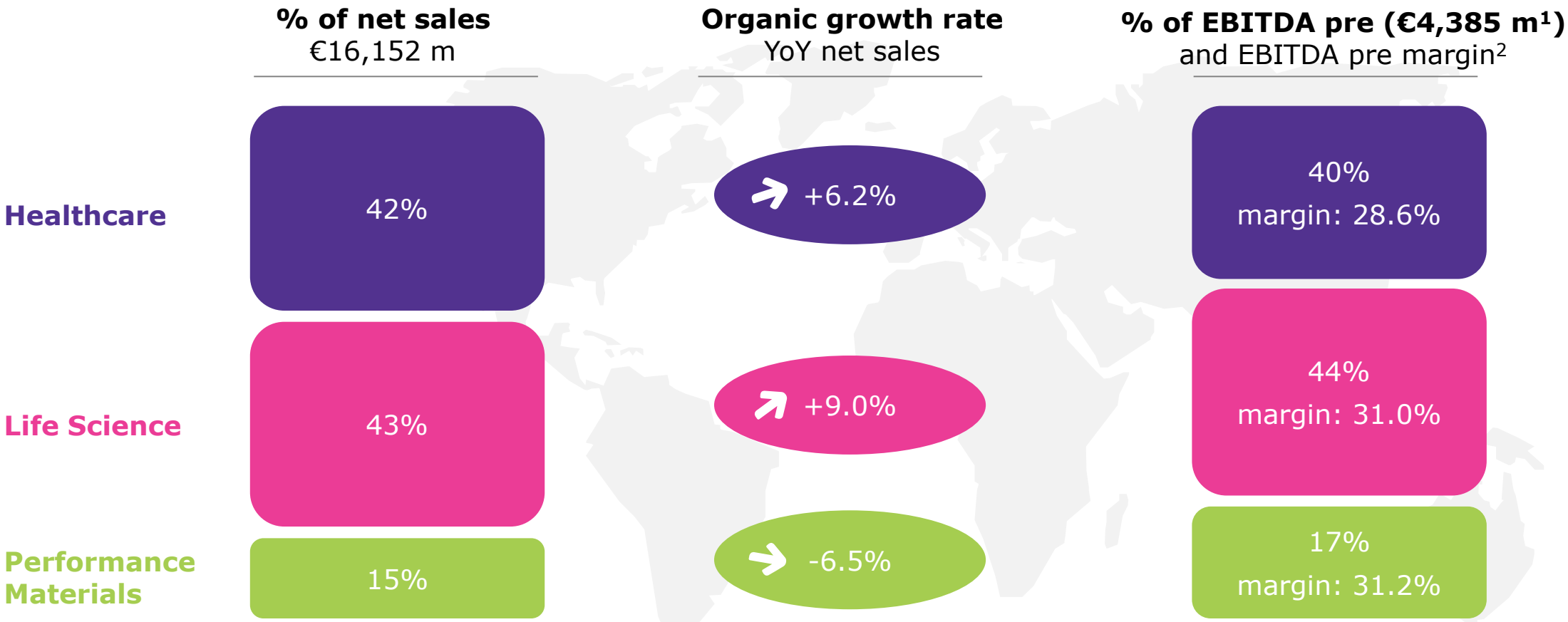
Performance Materials

Leading company in high-tech solutions

- High-tech solutions and materials for **electronics**
- Broad portfolio of **decorative and functional solutions**

Group

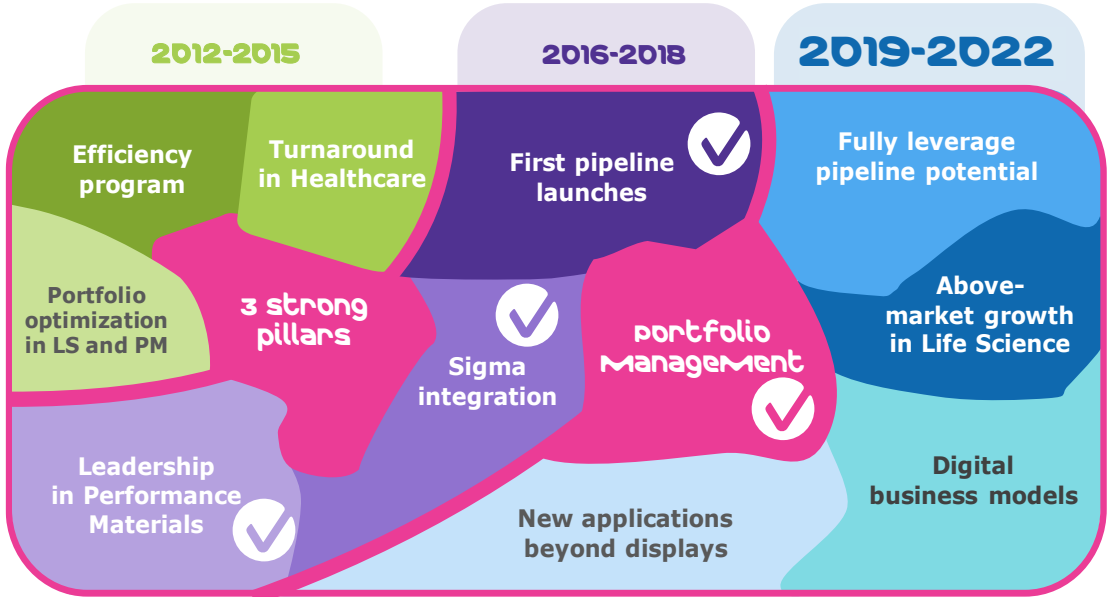
Diverse businesses posting attractive margins and strong growth



[1]includes Corporate/Others of €-469 m; [2]EBITDA pre margin in % of net sales; Totals may not add up due to rounding

Group

2019 – 2022: Entering the Growth & Expansion Phase



Group:
Sustainable profitable growth and regular portfolio evaluation

Healthcare:
Fully leveraging pipeline potential

Life Science:
Sustaining above-market growth

Performance Materials:
On track towards a Bright Future

On track to deliver on the growth phase of the 2016-2022 strategic agenda

Group

2020 and beyond: Growth amid a challenging environment

Group-wide:
Profitable Growth & Cost Discipline

Healthcare

- Sustain profitable growth driven by launches
- Execute on stringent cost discipline

Life Science

- Continue outperformance of market
- Leverage P&L with 20 – 30 bps margin expansion

Performance Materials

- Return to growth at 2-3% CAGR, ~30% margin
- Complete integration of Versum & synergy realization

Group
Executive Summary

Group:
Driving the **profitable growth and expansion phase** of our 2016 – 2022 strategic agenda

Healthcare:
Reaping the **fruit of the investment phase**, while keeping the base business at least stable, driving growth and managing costs

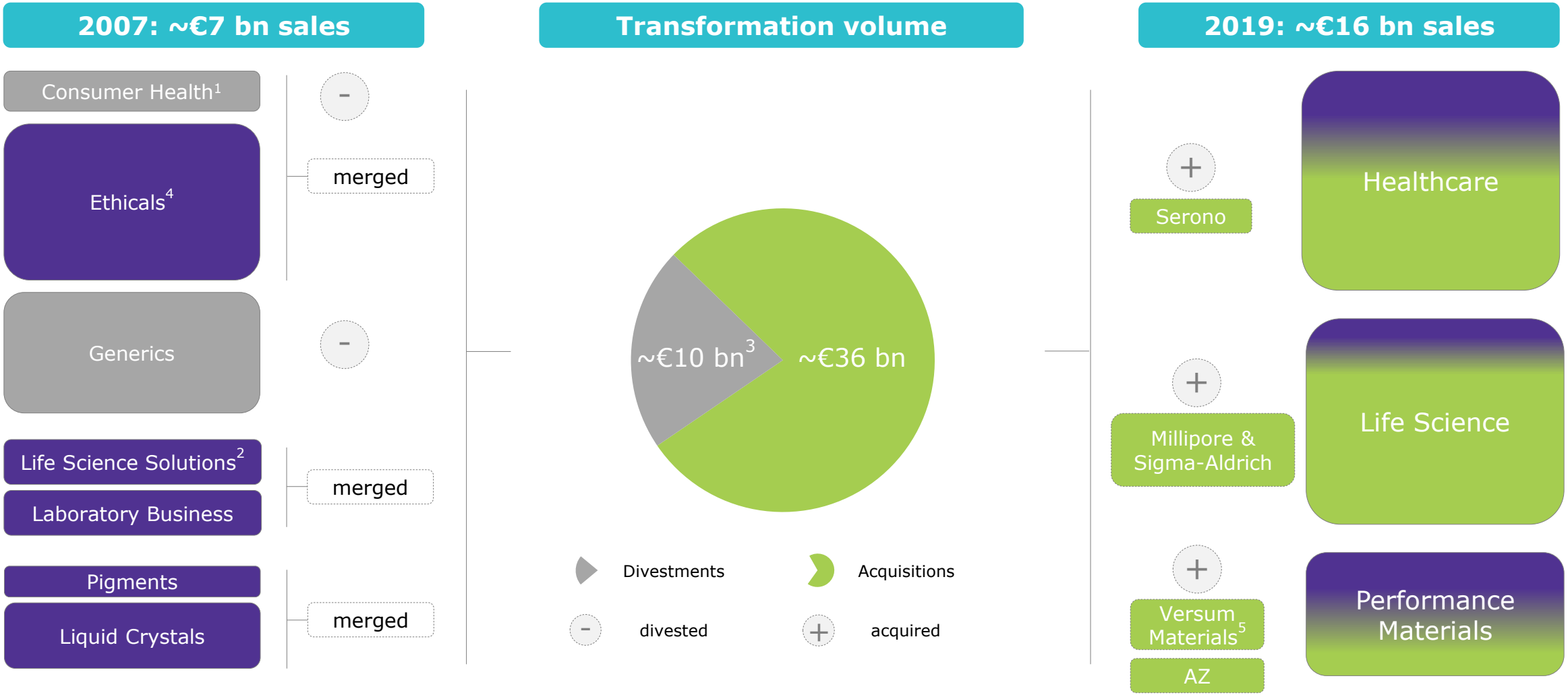
Life Science:
Sustaining **profitable above-market growth** strategy through portfolio focus, customer-centric services and innovation

Performance Materials:
Transitioning from trough-year to **mid-term growth trajectory** supported by roll-out of Bright Future program

Group – steady earnings growth at high margins and a low risk profile

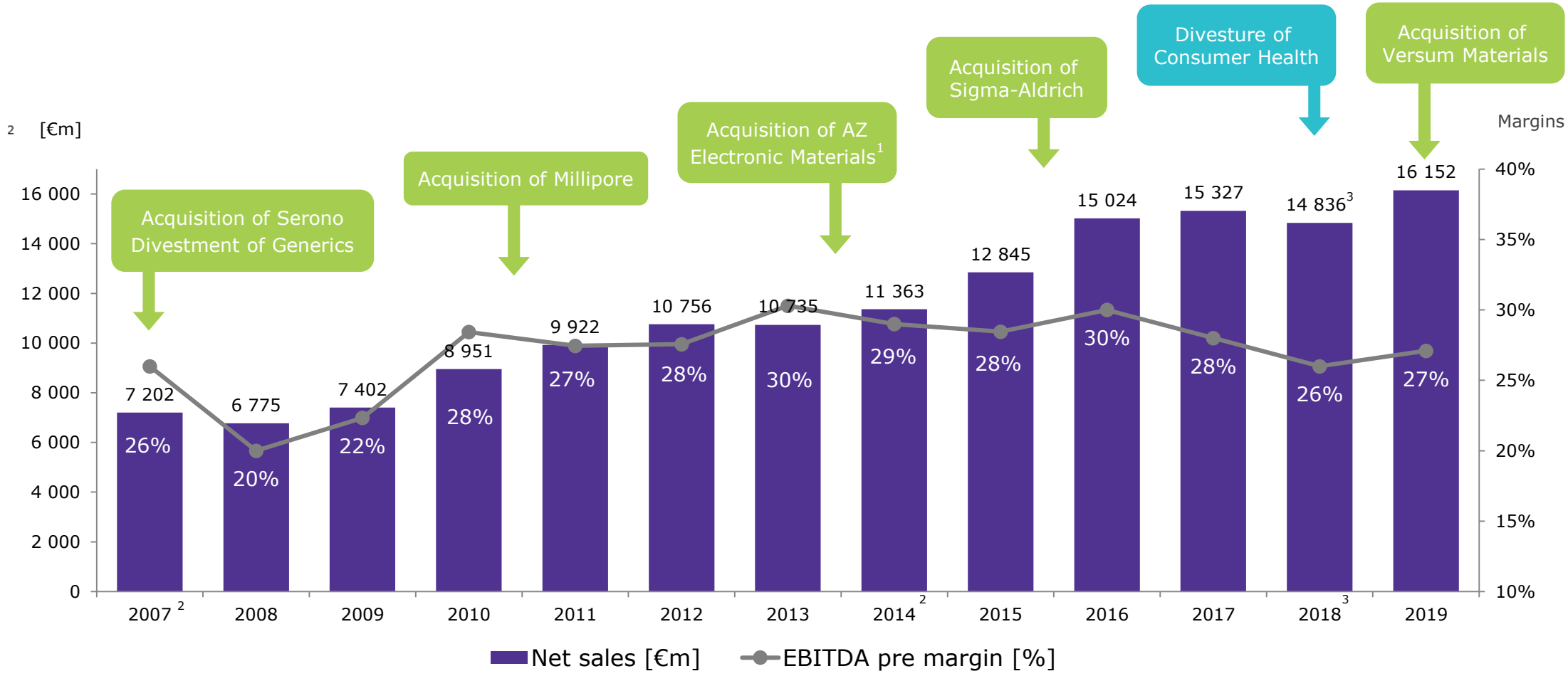
02 TRANSFORMING THE COMPANY

Group
We have added scale and strengthened the attractiveness of our portfolio



[1]Closing of sale of Consumer Health at a cash purchase price of €3.4 bn completed as of December 1 2018; [2]Excluding "Crop Bioscience", which was divested; [3]Profroma divestment volume includes cash proceeds for Consumer Health; [4]Excluding "Theramex", which was divested; [5]Closing of acquisition of Versum Materials at a purchase price of €5.8 bn completed as of October 7 2019

Group
Continue to transform to a science and technology focused company

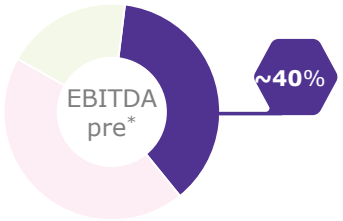


[1]Included since 2 May 2014; [2]2007 and 2014 EBITDA pre margin adjusted for comparability; [3]2018 net sales reflect Consumer Health divesture (reduction of ~ €1 bn net sales p.a.)

Group

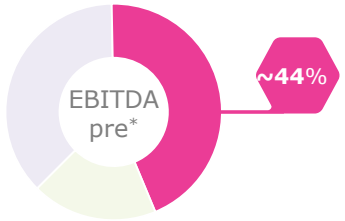
Clear set of priority goals

Healthcare



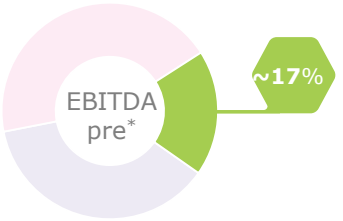
- **Deliver on ambition to keep core business at least stable until 2022**
- **Transition from investment to earnings phase by 2019**
- **Foster successful Bavencio® and Mavenclad® ramp up**
- **Stringent pipeline execution**

Life science



- **Strengthen position as differentiated player in a highly attractive market**
- **Maintain consistent above-market growth trajectory and superior profitability**

Performance Materials



- **Deliver on growth ambition of 2-3% CAGR**
- **Implement 5-year transformation program and focus on seamless integration**
- **Ensure efficient resource allocation to reach financial ambition of 30% margin**
- **Maintain strong cash generation and cash conversion**

*Based on FY 2019 reported EBITDA pre, excluding Corporate & Other

Group

Strategic capital allocation until 2022 newly defined

portfolio guardrails

- Three balanced pillars with no business marginalized
- Leading market positions in attractive markets
- Clear portfolio roles assigned

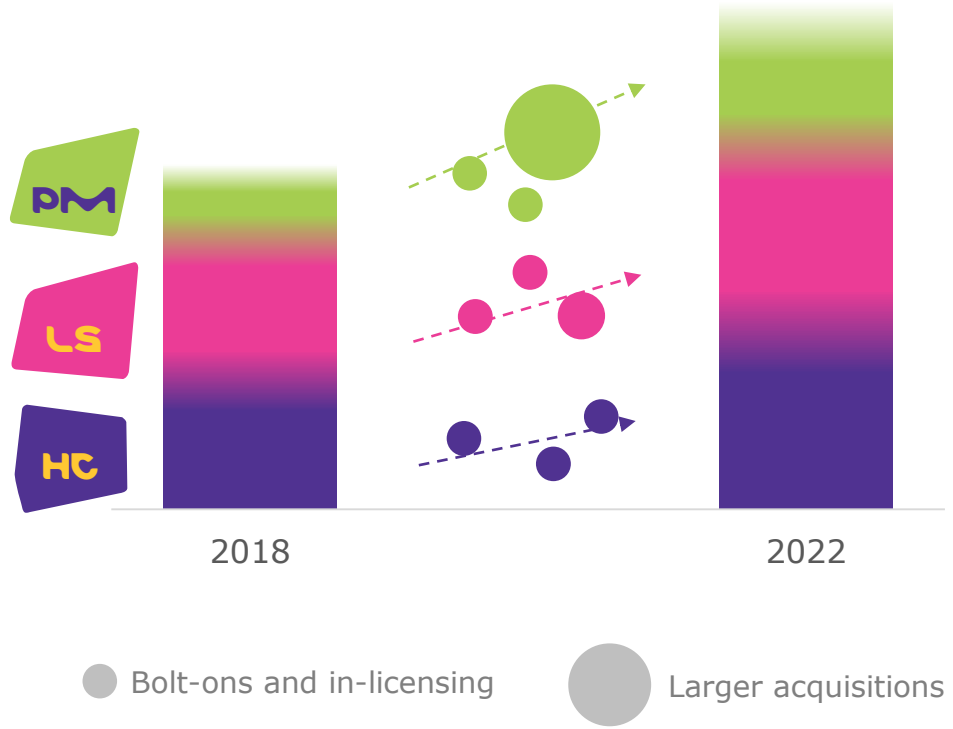
defining portfolio criteria

- Market attractiveness & capabilities
- Best strategic owner
- Risk profile

clear financial M&A criteria

- IRR > WACC
- EPS pre accretive
- Maintain investment-grade credit rating

Illustration group's sales and earnings drivers



Regular portfolio review and disciplined capital allocation will continue to ensure sufficiently diversified and value-creating structure of three strong pillars

03 HEALTHCARE

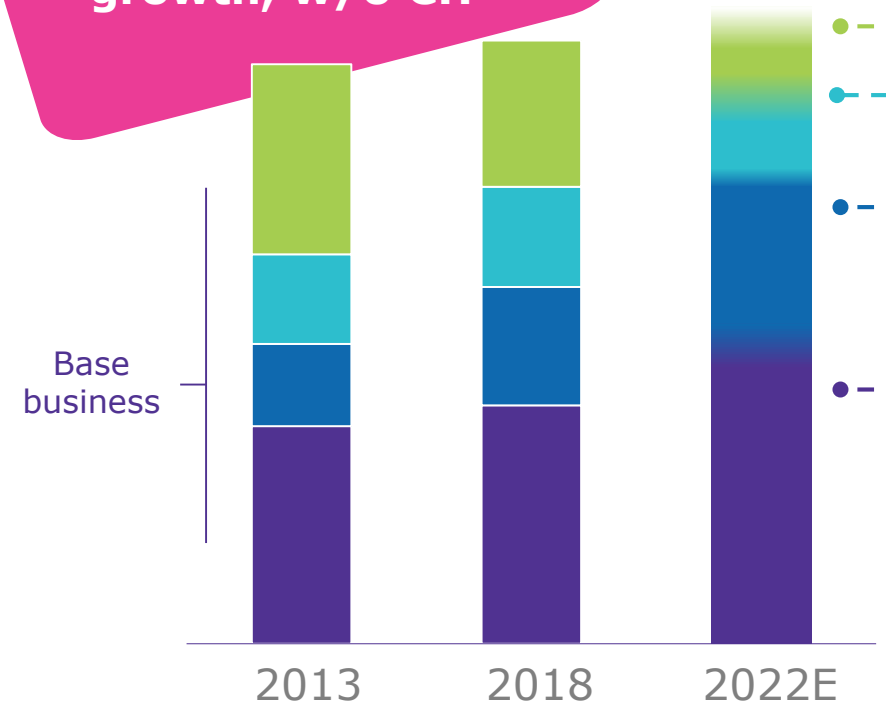
Fully leveraging pipeline potential

Healthcare

Ambition to keep core business sales organically stable until 2022

Healthcare core business net sales until 2022

5 years of organic growth, w/o CH



Rebif®
Decline in line with interferon market

- Maintaining solid track record of patient retention
- Integration into joint franchise strategy with Mavenclad®

Erbitux®
Stable to slightly growing

- Driving emerging markets growth
- Inclusion in China's NRDL
- Mitigate price and competitive pressure in EU by clear Erbitux® franchise positioning

Fertility
Mid single-digit growth

- Drug demand driven by emerging markets growth and demographics
- Differentiation due to coverage of the entire ART portfolio[1]
- Sustainable growth through innovation (e.g. Pergoveris® pen)

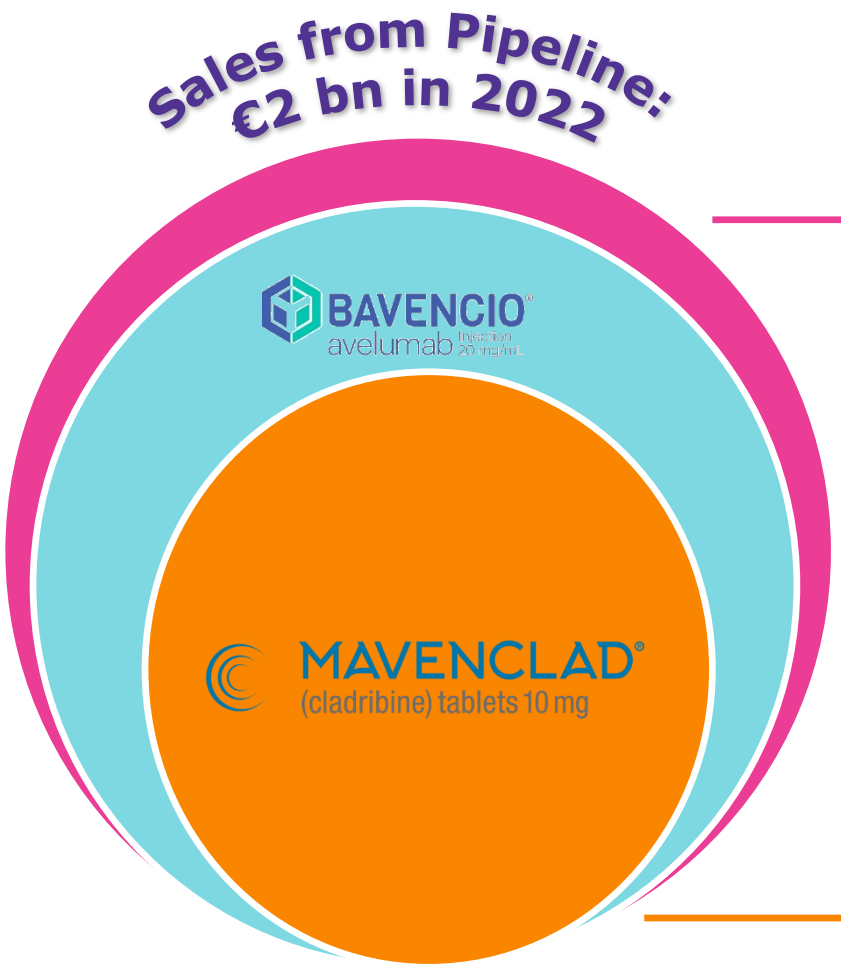
General Medicine[2]
Mid to high single-digit growth

- Increasing prevalence of diabetes and cardiovascular diseases
- Emerging markets growth
- Effective lifecycle management

[1]ART: Assisted Reproductive Technology; [2]includes General Medicine, CardioMetabolic Care (CMC), Endocrinology & Allergopharma

Healthcare

Mavenclad® and Bavencio® launches on track for €2 bn pipeline sales ambition



Tepotinib

- Filed in Japan in Q4 2019 (Sakigake and ODD)
- Filing in the USA in H1 2020 (BTD)

Bavencio®

- FY 2019: €103 m
- Approved for aRCC (USA, EU, Japan), mMCC (50 countries incl. USA and EU), and UC 2L (USA, Canada, Israel)
- UC 1L: Primary endpoint (OS) met at IA
- Phase III read outs remaining: NSCLC 1L and Locally Advanced Head & Neck Cancer 1L

Mavenclad®

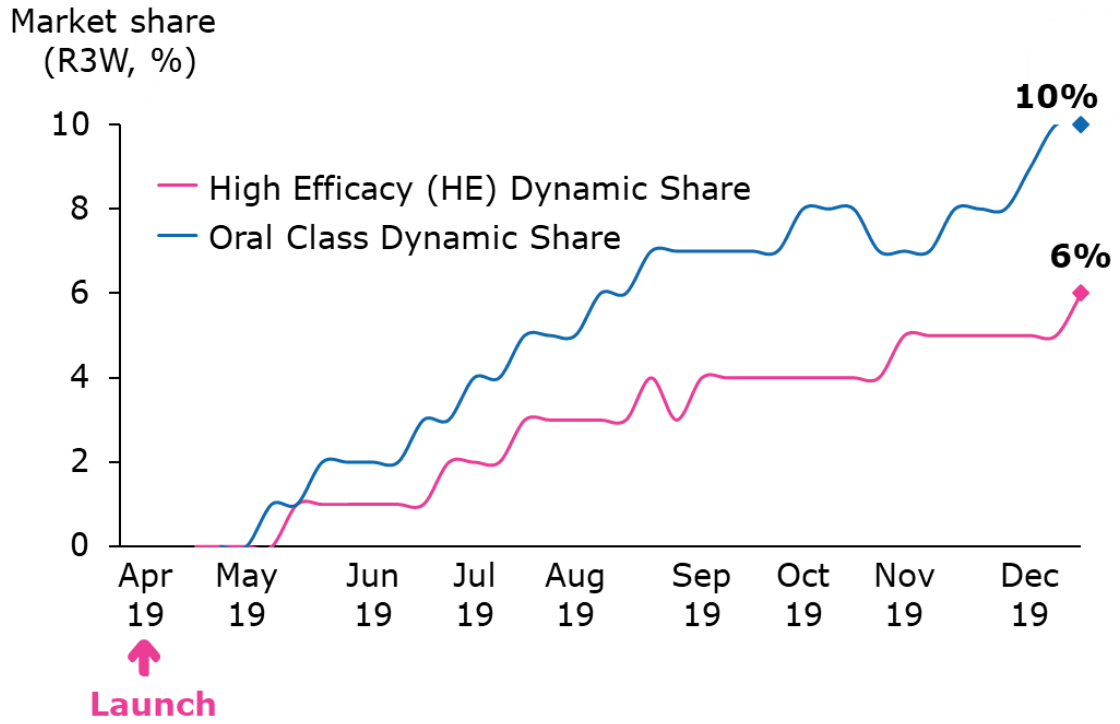
- FY2019: €321 m
- Global peak sales: €1–1.4 bn
- Approved in 75 countries, including USA, EU, Canada and Australia

ILLUSTRATIVE - Not to scale;
Acronyms: BTD = Breakthrough Designation; ODD = Orphan Drug Designation; IA = Interim Analysis

Mavenclad® - Triple digit YoY growth (+ €230 m, x3.5 vs FY 2018)

MAVENCLAD® (cladribine) tablets 10 mg

USA: Continued growth within High Efficacy and Oral market[1]



Increased patient access exceeding recent oral benchmarks:
3 out of 4 US patients have access to MAVENCLAD with no NDC blocks[4]

Ex-USA: Strong launch progress globally

- Approved in **75 countries**[2]
- **Leading clinical perception** among oral class in key markets (Germany, UK, Italy and Spain)[3]
- 2020 ex-USA growth to be driven by **continued demand acceleration and FY impact of H2 2019 market access wins**

[1]IQVIA Projected National Claims weekly data; R3W = Rolling 3 Weeks; HE market comprises Ocrevus®, Tysabri®, Gilenya®, Lemtrada® and Mavenclad®; Dynamic High Efficacy (HE) market describes share of patients starting on/switching to HE treatments; [2]Internal data on file; [3]Global MAVENCLAD HCP Awareness, Trial, Usage, panel of ~140 physicians in EU4; [4]Driven by major plans incl. Prime Therapeutics and Optum PBM including United Healthcare

Bavencio® - Enhancing its foundation in GU (genitourinary) cancers with positive first line data from the JAVELIN 100 Bladder study

BAVENCIO® avelumab Injection 20 mg/mL

Intend to file

Urothelial Cancer 1L (UC)

(~90% of bladder cancers)

- **JAVELIN Bladder 100 study**: Met primary endpoint of prolonging overall survival (OS) as 1L maintenance treatment vs standard of care, announced on January 6, 2020
- **First immunotherapy to significantly prolong OS** in locally advanced or metastatic urothelial carcinoma in the first-line setting
- **Data to be presented at an upcoming medical congress** and **shared with US FDA and other health authorities**

Launch mode

Renal Cell Carcinoma 1L (RCC)

- Approved by **US FDA** in May 2019, by the **European Commission** in October 2019, and by the **Japanese PMDA** in December 2019
- **USA launch update:**
  - Participating in the **establishment of IO–TKI as the leading class** in 1L mRCC with all other classes declining[1]
  - Building on **greater academic use (8% share)** to make progress in the community setting (2% share)

In development

Remaining Phase III Trials[2]

Mid-2020

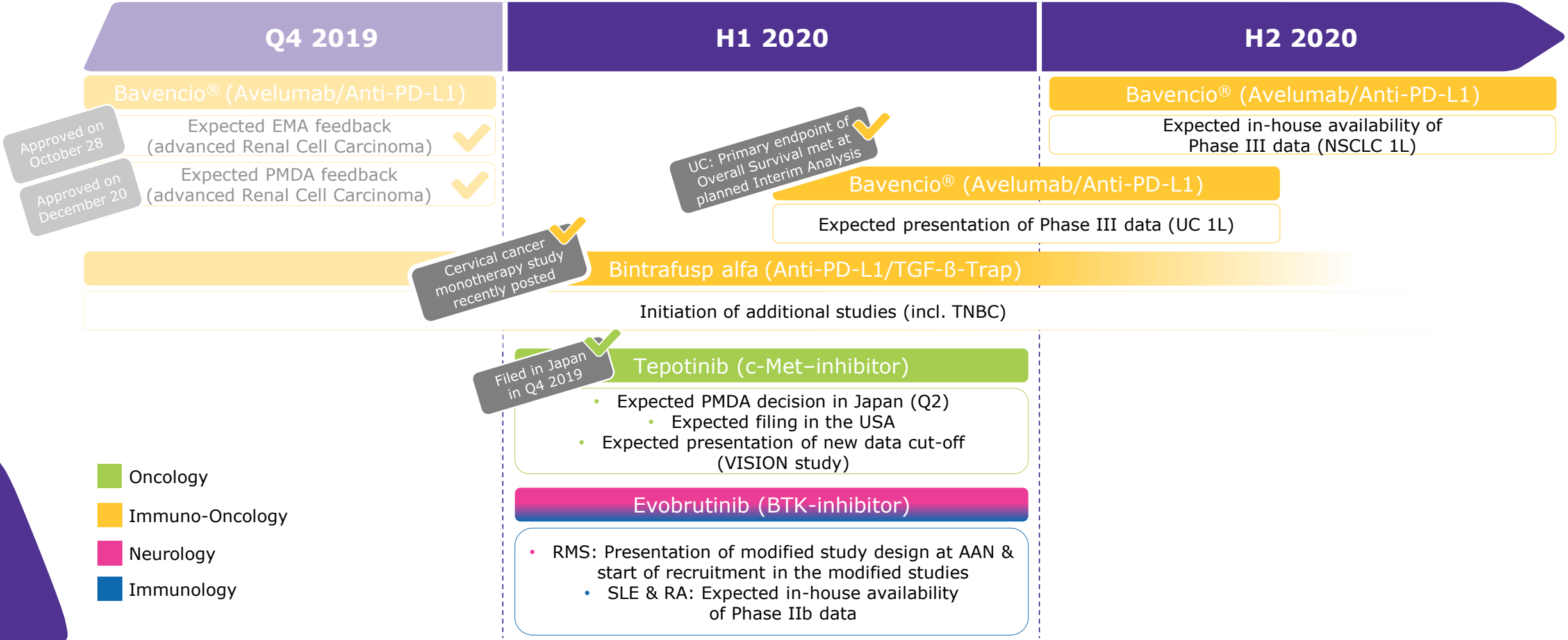
NSCLC 1L

2021

Locally advanced head & neck

[1]BrandImpact Rx - 1L New Patient Start Share, Rolling 3 Months Ending December 2019, decline since Q1 2019 (VEGF mono, IO-IO); [2]Dates shown refer to estimated primary completion date as per www.clinicaltrials.gov; Acronyms: EMA = European Medicines Agency, FDA = Food and Drug Administration; IO = Immuno-Oncology, mRCC = Metastatic Renal Cell Carcinoma, TKI = Tyrosine Kinase Inhibitor, VEGF = Vascular Endothelial Growth Factor

Pipeline: Upcoming Healthcare catalysts mark progress across all therapeutic areas



Acronyms: AAN – American Academy of Neurology, EMA = European Medicines Agency, NSCLC = Non-Small-Cell Lung Carcinoma, PMDA = Pharmaceuticals and Medical Devices Agency of Japan, RA = Rheumatoid Arthritis, RRMS = Relapsing Multiple Sclerosis, SLE = Systemic Lupus Erythematosus, TNBC = Triple-Negative Breast Cancer, UC = Urothelial Cancer

04 LIFE SCIENCE

Focus on profitable growth

The Life Science tools market is attractive and dynamic

Attractive market…

€170 Bn

4-6%[10]

CAGR

23-25%

average margin

…with robust trends

Research

~€45-50 bn
~2-3% CAGR[9]

- Increase in **NIH Funding and Pharma R&D**[1,2]
- Increase in **novel technologies**[3]
- Increase in **research outsourcing**[4]

Process

~€55-60 bn
~8% CAGR[9]

- Increase in **biologics pipeline**[5]
- More **novel modalities** (>30% CAGR)
- Greater **production outsourcing**[6]

Applied

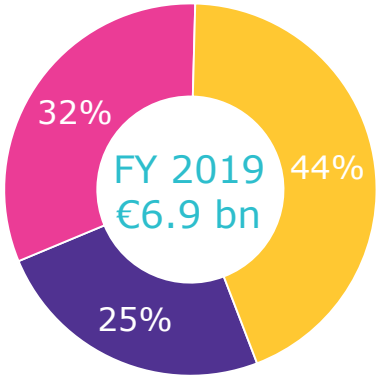
~€60-65 bn
~4-5% CAGR[9]

- Higher **Drug standards** (e.g. in China)[7]
- Tighter **F&B regulations** (e.g. US FSMA[8])
- More **novel assays/diagnostics**

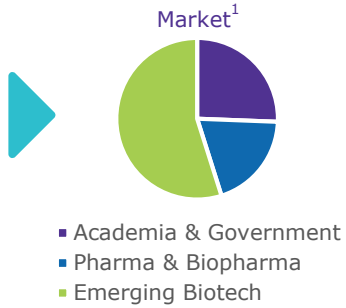
[1]CAGR 2015-2019; [2]PhRMA members, CAGR 2013-2017; [3]CAGR 2014-2018 VC investment into platform technologies; [4]CAGR 2015-2022. Discovery outsourcing market; [5]CAGR through 2020; [6]CAGR 2016-2020; [7]International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use; [8]Food Safety Modernization Act implementation through 2024; [9]Total market CAGR; [10]Company estimate based on industry forecast over 5 year horizon;
Acronyms: NIH = National Institutes of Health, US FSMA = FDA Food Safety Modernization Act

Life Science
Business is on track to deliver above-market organic growth

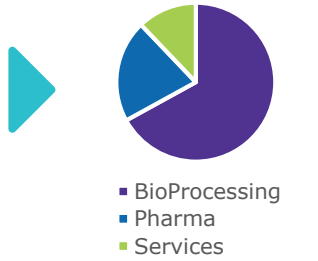
Life Science



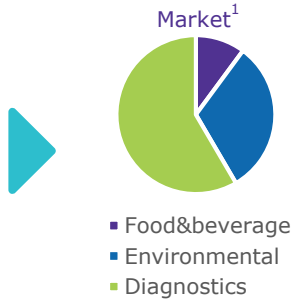
Research Solutions
Low single digit growth



Process Solutions
High single digit growth



Applied Solutions
Mid single digit growth



Long-term growth drivers

- **Research activity**: >3,000 projects in research pipelines[2], rising number of experiments and newly emerging therapies/technologies backs healthy growth in biotech and CROs[3]
- **Public and private funding**: availability, access and predictability drive demand from academia and emerging biotech customers
- **Regulation**: rising requirements foster long-term customer partnerships

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- **Biologics**: mAbs production[5] growing by ~11-15% p.a. for 2018-2024 driven by new molecules and biosimilars
- **Diversification**: contribution by top 10 molecules will decline to ~20% until 2024 from 60% today[6]
- **Noval modalities**: innovation in complex-to-deliver therapies, e.g. gene and cell therapy, will drive demand for single-use, end-to-end and new technology solutions

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- **Regulation**: testing volumes overall are rising globally rise in quality standards and increased demand for testing across customer segments
- **Population and economic growth**: demand for access to more sophisticated products and services rises, e.g. in emerging markets
- **Speed**: need for fast testing results raises requirements for Applied customers, esp. in clinical testing and food & beverage testing

[1]Source: Merck KGaA, Darmstadt, Germany Factbook; [2]Source: PhRMA; [3]CRO = Contract Research Organization; [4]Indicative only; [5]mAbs = monoclonal antibodies; [6]Source: EvaluatePharma September 2018

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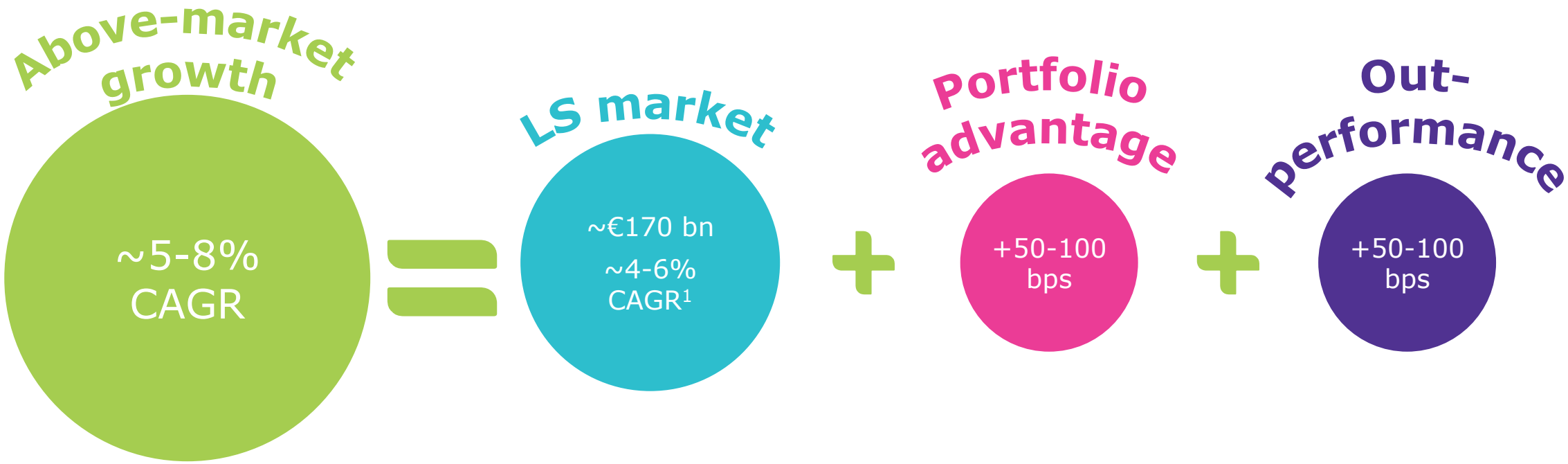
Life Science

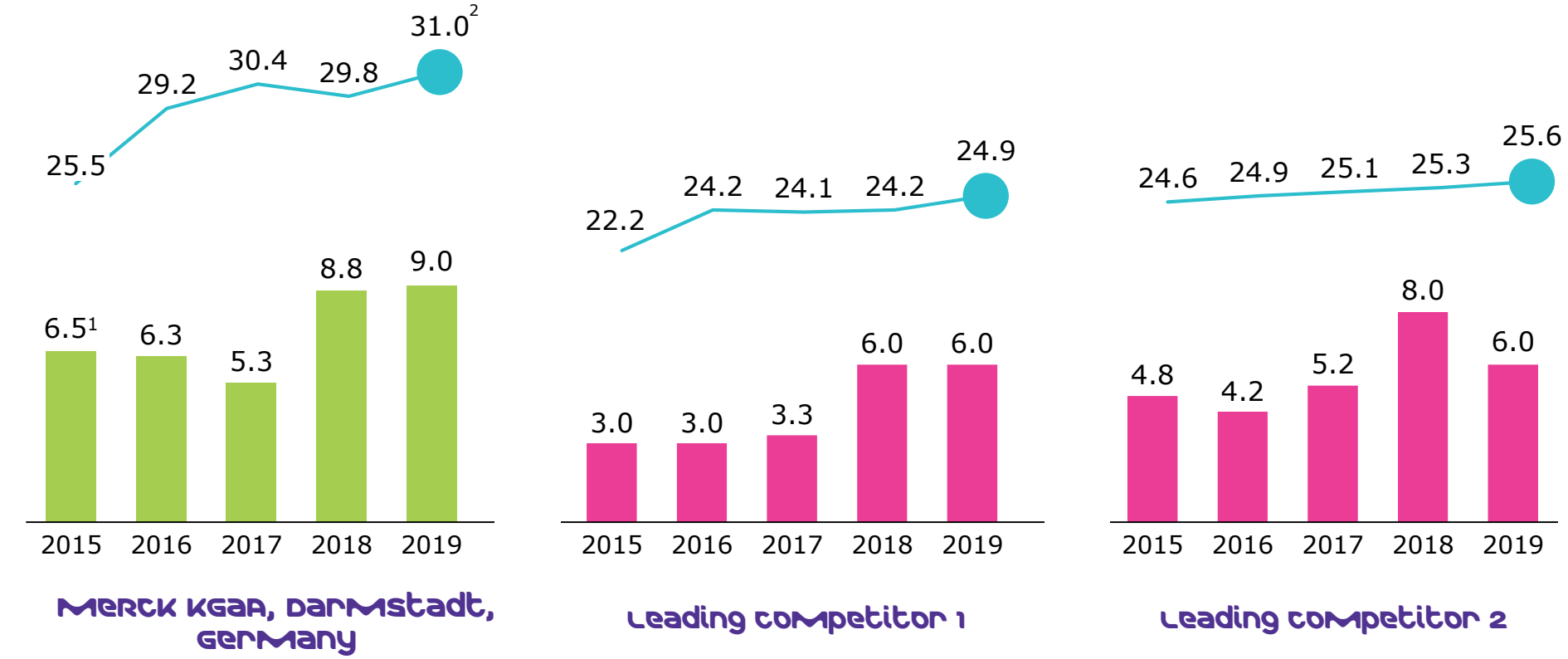
Above-market growth continues to be driven by portfolio focus



[1]Company estimate based on industry forecast over 5 year horizon

Life Science

Continuing to set the benchmark for industry performance



Objective

- Grow **above market**
- Maintain **industry-leading profitability with 20-30 bps underlying margin progression**
- Sustain **leading market position**

[1]6.5% for EMD Millipore; 6.0% for SIAL calculated from first 9 months of 2015; [2]excl. CO

Life Science

Capitalizing on three key life science trends

1 COMPLEX BIOLOGICS

Single Use / End to End

Opened Wuxi site in 2018, and expanded Danvers facility

Viral Vectors

Expanded Carlsbad viral vector manufacturing site in 2016

Antibody Drug Conjugates (ADC)

Launched ADC Express™ for the rapid production of ADCs

2 DIGITAL UNIVERSE

#1 eCommerce site in Life Science[1]

- **>90%** of Millipore products on eCommerce platform
- **x2** net sales growth of eCommerce vs. non-eCommerce[2]

3 ASIA

Manufacturing/Distribution

Nantong, Wuxi Single use

Commercial expansion

Tier 2 cities

eCommerce partnership

Alibaba Group 阿里巴巴集团

[1]measured by traffic, rated by external service SimilarWeb; [2]by business segment within Life Science

05 PERFORMANCE MATERIALS

Maintaining leadership and innovation

Performance Materials
Strong setting to capture attractive value in the electronics market

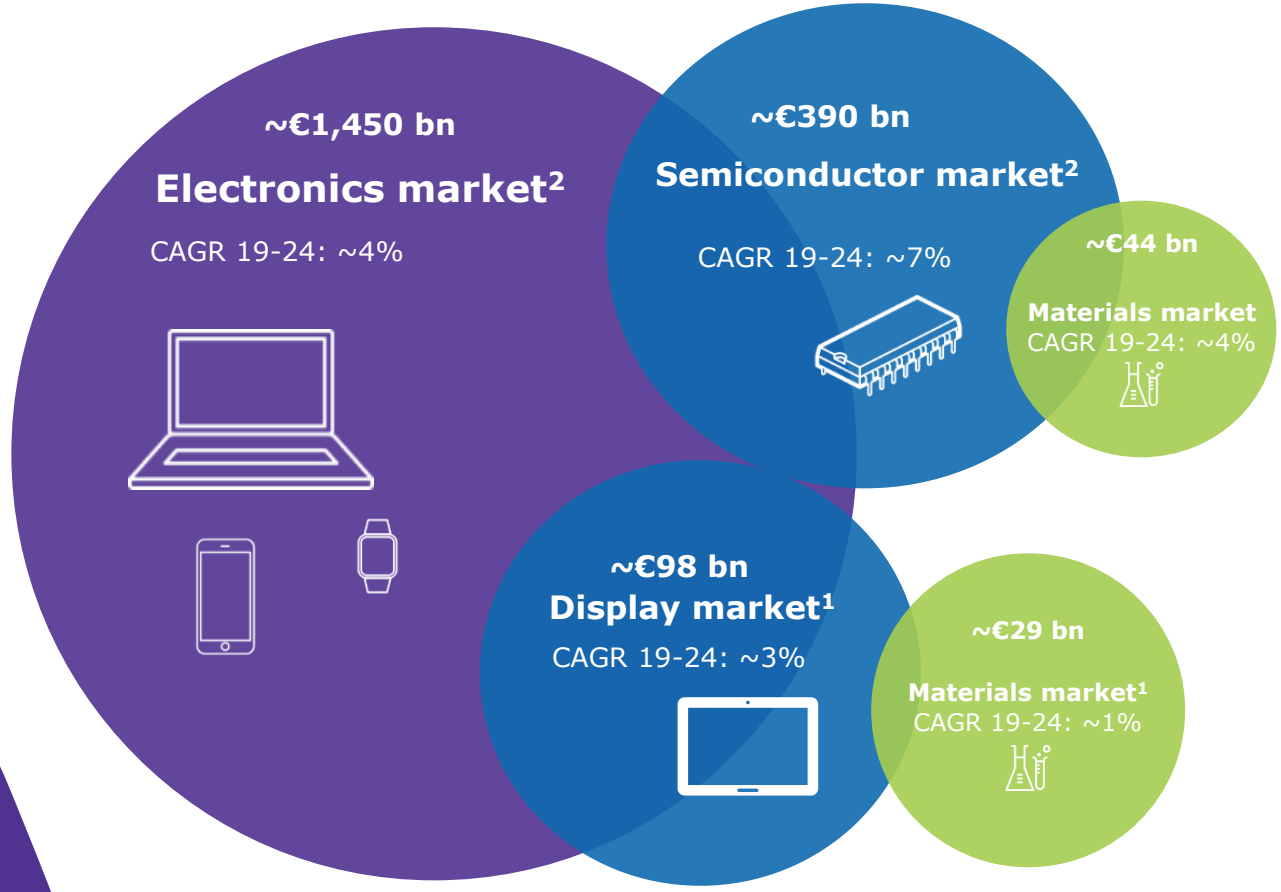
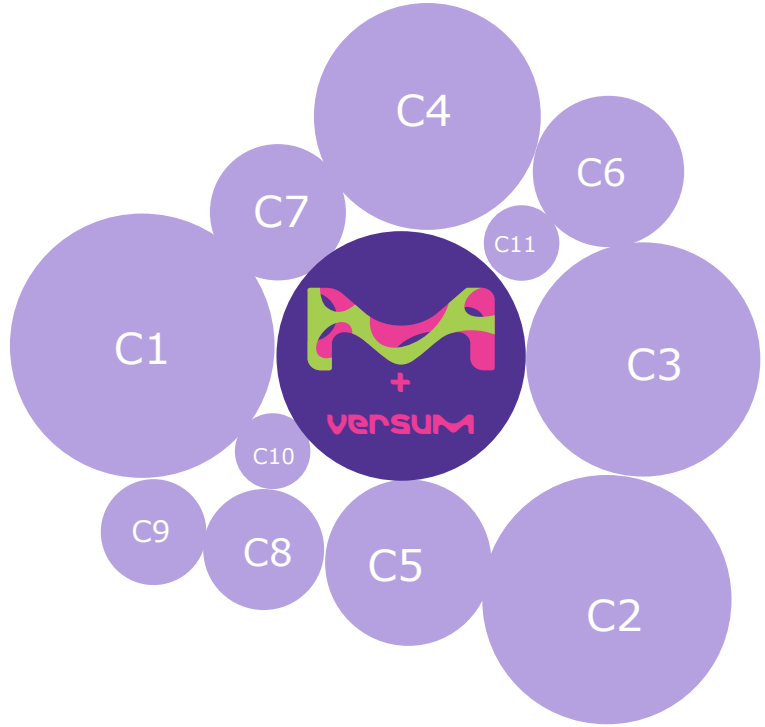


Illustration of the electronics market and thereof its selected sub markets

Electronic materials competitor landscape[1]

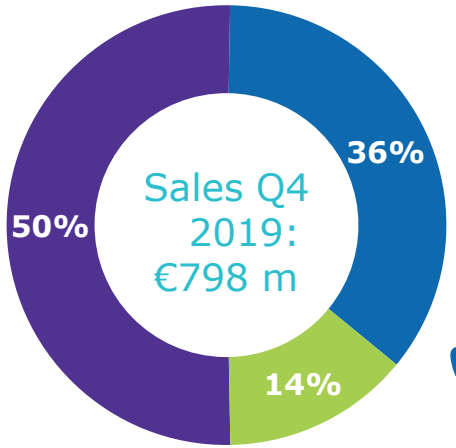


[2]Bubble size in competitive landscape illustrates share of electronics material sales of indicated competitors (C1 – C11)

Source: [1]Prismark 2019; [2]McClean/IC Insights 2020

Performance Materials: Attractive underlying market trends and business conditions to deliver the turnaround in 2020

Mid term outlook



semiconductor solutions

Mid- to high single-digit growth

- Continued market growth due to technological advances (Artificial intelligence, 5G, Big Data and cloud, Internet of Things) serving customers in **Logic, Memory, Packaging and others**
- DS&S representing ~15% of Semiconductor Solutions net sales is driven by investments in new semiconductor fabs as well as a safe and reliable supply of high-purity materials
- Semiconductor market expected to **grow ~7% CAGR**[1]

display solutions

Low single-digit decline

- Driven by trend to bigger TV size, higher resolutions, more mobile devices
- Maturing **LC** market expected to decline in **mid to high single-digit**, driven by ~3% CAGR[2] (2018-2023) of LCD area shipment more than offset by ongoing price pressure
- **OLED** display shipment area[3] [km²] to grow **~28% CAGR** (2018-2023) with OLED material market[4] to exceed LC material market by 2022

surface solutions

Low single-digit growth

- Surface Solutions well balanced exposure to **automotive** and **cosmetics** market
- Drivers are raising living standards, higher disposable income in growing markets and increasing demand for high value products at reasonable prices
- **CAGR ~3%** volume growth[5] for pearlescent pigments

DS&S = Delivery Systems and Services;
Source: [1]McClean 2020; [2 & 3] IHS display long term demand forecast Q3 2019; [4]Internal Business Intelligence; [5]Smithers Rapra, Merck KGaA, Darmstadt, Germany-internal analysis, McKinsey

Implement 5-year transformation program

Performance Materials

5-year transformation program Bright Future is well on track

- Site closures in Atsugi, Japan (2021) and Chilworth, UK (2019) announced
- Outsourcing progressing; reduction of LC production capacity in Darmstadt until 2022 announced
- Cost saving measures ahead of plan; target of approx. 500 FTE worldwide until 2022

Portfolio Management

- Acquisition of Versum Materials and Intermolecular successfully closed

Cultural change

- Significant changes in composition of leadership team
- Cultural change addressed in three dedicated initiatives focused on customer centricity, market-driven innovation and corporate culture

[1]Assumes LTM Dec-2018 Versum Materials Revenue of €1,233m and 1.12 USD to EUR exchange rate.

Performance Materials
Strategic roadmap starting to materialize…

Measures for a bright future

Darmstadt

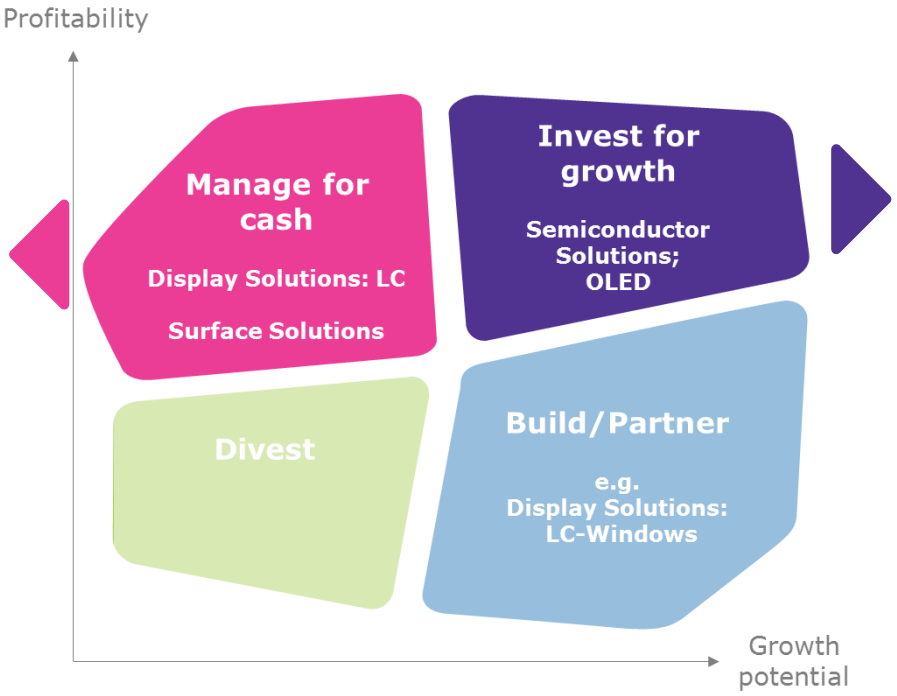
- The focus in Darmstadt will be on R&D and production
- Immediate bottom line contribution from 2019 onwards
- Reduce the number of FTEs by ~15% = ~400 FTEs

Chilworth

- Chilworth site during September 2019 successfully closed

Atsugi

- Shut down of Performance Materials activities at Atsugi site started (to be completed during 2021)
- R&D and production activities in Atsugi transferred and consolidated in other PM locations in Asia
- Consolidation of site structure in Japan



VERSUM MATERIALS

- Leading supplier of high-purity process chemicals, gases and equipment serving semiconductor manufacturers
- Track record of accelerated growth and industry leading profitability

➢ Creating a **leading electronic materials player** with **attractive long-term prospect**

INTERMOLECULAR®

- Leading in advanced materials innovation
- Acquisition to strengthen semiconductor technology offering

➢ Application specific **materials expertise with** that **perfectly complement** Group's business and technology portfolio

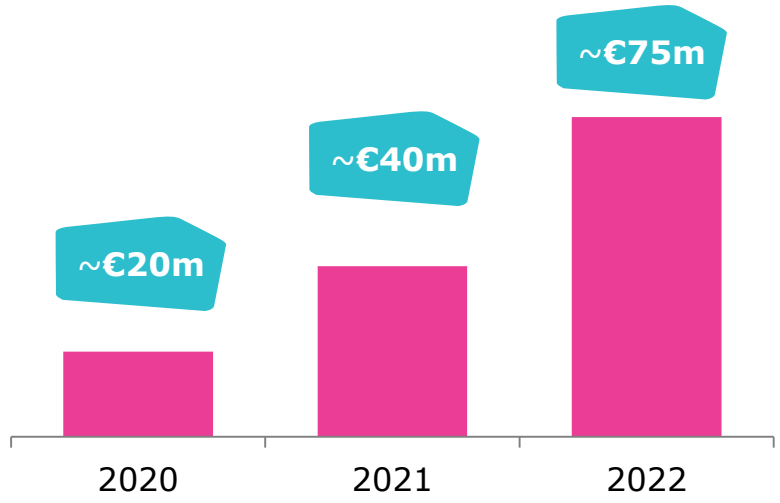
Bottom-line management to support margin ambition of 30% in the long-term

Both transactions successfully closed

Merck KGaA
Darmstadt, Germany

Performance Materials: Versum integration and synergy realization in focus

cost synergies on EBITDA pre



- **Cost synergy target of ~€75 m from 2022 onwards confirmed as P&L effective**
  - Integration measures on track
  - Integration costs of €125 m in line with previous expectations, mostly in 2020 and 2021
- **Cost synergies represent 6%[1] of acquired net sales**

source of synergies

business optimization

- Transform country setup
- Streamline duplicate structures

procurement and supply chain

- Optimize production and supply chain network
- Achieve savings through joint procurement

corporate and administrative functions

- Integrate corporate & administrative functions
- Cost savings due to U.S. company delistings

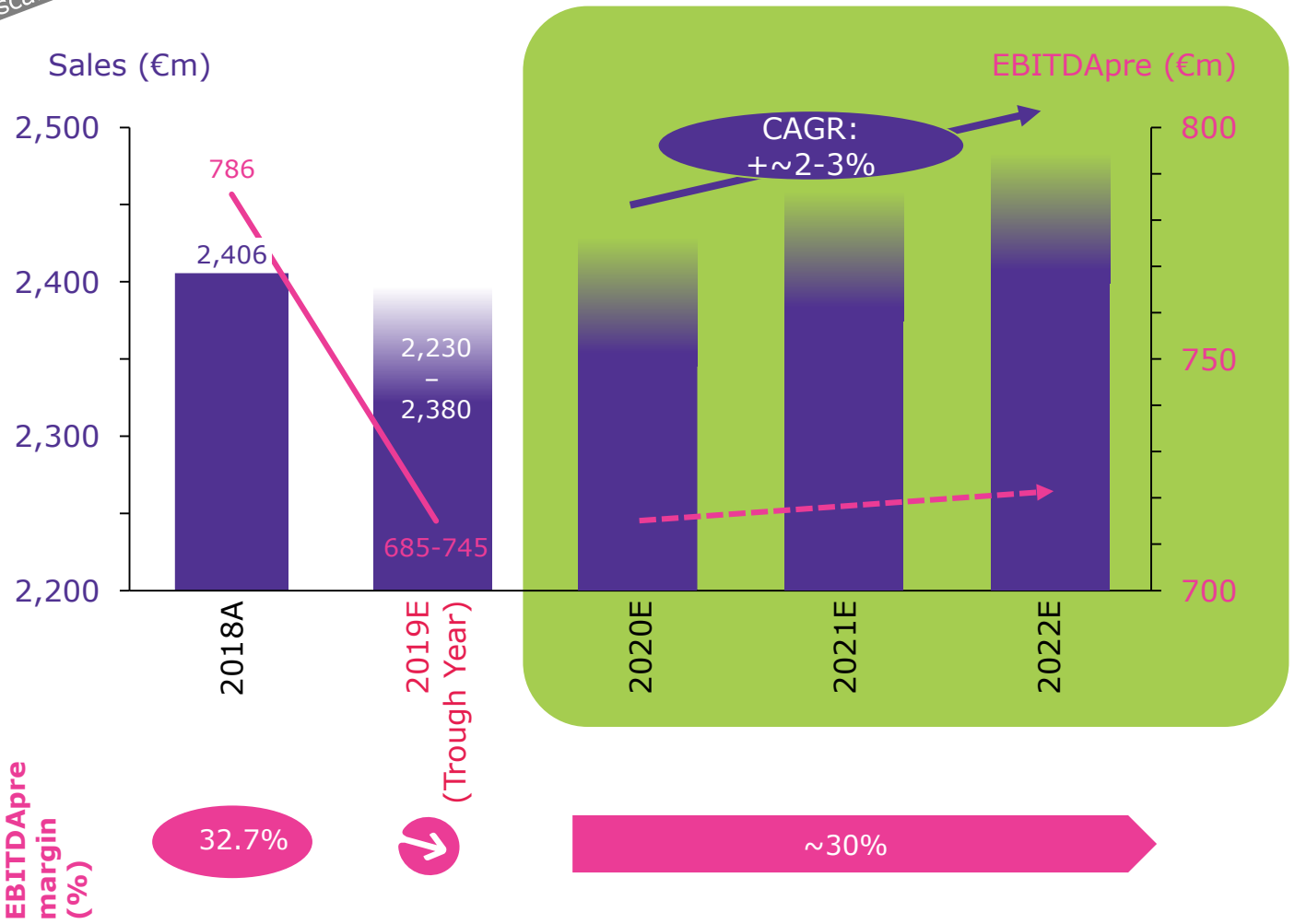
[1]Assumes LTM Dec-2018 Versum Materials Revenue of €1,233m and 1.12 USD to EUR exchange rate.

Performance Materials

The business is expected to return to organic growth as of 2020

Pre Versum Materials

ILLUSTRATIVE Not to scale



Contribution by business

Semiconductor Solutions
Mid- to high-single digit growth

Surface Solutions
Low single digit growth

Display Solutions
Low single digit decline
- OLED
- LC

06 EXECUTIVE SUMMARY AND GUIDANCE

Group
COVID-19 Update

Assumptions as of mid February

If COVID-19 outbreak peaks in Q1, eases in Q2 and the situation is back to normal in H2, the impact on Merck KGaA, Darmstadt, Germany and its sectors is estimated to be the following:

Group

- Around -1% on full year net sales mainly from China
- Impact in Q1, improvement in Q2, and normal business dynamics in H2 2020

Healthcare

- Mid to high double-digit €million impact; mainly in Oncology and Fertility

Life Science

- Mid double-digit €million impact; all businesses affected, mainly Research Solutions

Performance Materials

- Up to mid double-digit €million impact; main effect in Display Solutions

Full year effect of -1% on net sales reflected in qualitative outlook for 2020

Group
Full-year 2020 guidance

Net sales:
Solid organic sales growth, Versum growth contribution in the mid-single digits and slight FX headwinds of 0% to -3% YoY

EBITDA pre:
Strong organic growth, mid-single digit growth from Versum
Slight FX headwinds of 0% to -3% YoY

Group
Key earnings drivers to remember for 2020

EBITDA[1]-supporting factors

- Increasing sales contribution from Mavenclad® and Bavencio®
- Stringent M&S and R&D cost management (decrease YoY as % of sales)
- Ongoing strength in Life Science with above-market sales growth and 20 - 30 bps underlying margin progression
- Post-trough recovery of Semiconductor Solutions and cost savings from Bright Future program related initiatives
- High level of cost consciousness and prioritization
- Three quarters of Versum portfolio contribution

EBITDA[1]-reducing factors

- No more support from Pfizer deferred income (€191 m in 2019)
- Lower income from pipeline management
- Continued decline of Liquid Crystals and Rebif®
- COVID-19 related top-line effect – risk assessment ongoing

[1]EBITDA pre;

Group
2020 business sector guidance[1]

Healthcare

Net sales

- Solid organic growth
- Base business organically stable
- New products with strong contribution

EBITDA pre

- Solid organic growth
- Driven by Mavenclad and Bavencio contribution and continued cost discipline
- Moderate adverse FX impact

Life Science

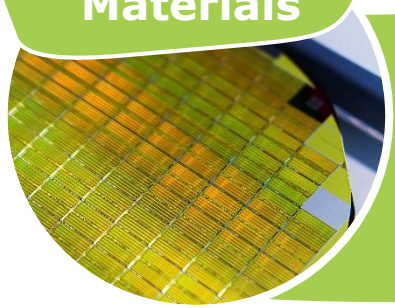
Net sales

- Strong organic growth
- Process Solutions main growth driver but all businesses contributing

EBITDA pre

- Strong organic growth
- Slight margin progression
- Slight adverse FX impact

Performance Materials



Net sales

- Slight organic growth
- Strong contribution from Semiconductor Solutions
- Display declining, driven by LC
- Low- to mid-thirties contribution from Versum

EBITDA pre

- Slight organic growth
- Semiconductor as well as cost management compensating LC price decline
- Slight adverse FX impact
- Low- to mid-thirties contribution from Versum

[1]Divisional guidances are only support to the group guidance and do not have to add up;

Additional financial guidance 2020

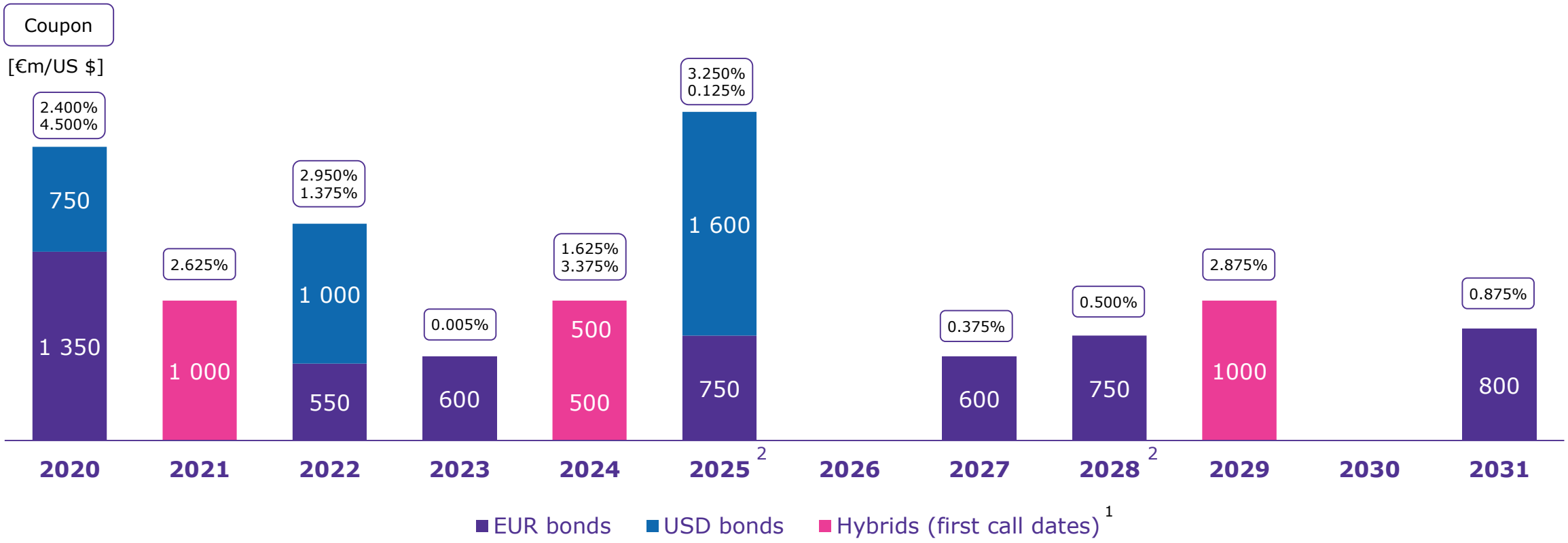
Further financial details

Corporate & Other EBITDA pre*	**~ -€400 – -€440 m**
Interest result	**~ -235 – -260 m**
Effective tax rate	**~24 % – 26%**
Capex on PPE	**~1.1 bn – 1.2 bn**
Hedging/USD assumption	**FY 2020 hedge ratio ~ 50% at EUR/USD ~1.18**
2020 Ø EUR/USD assumption	**~ 1.11 – 1.16**

*CO guidance 2020: -€400 m to -€440 m (assuming FX adjusted CO costs -€380 m to -€420 m)

Maturity profile reflects Sigma-Aldrich and Versum financing transactions

Maturity profile as of Mar. 5, 2020

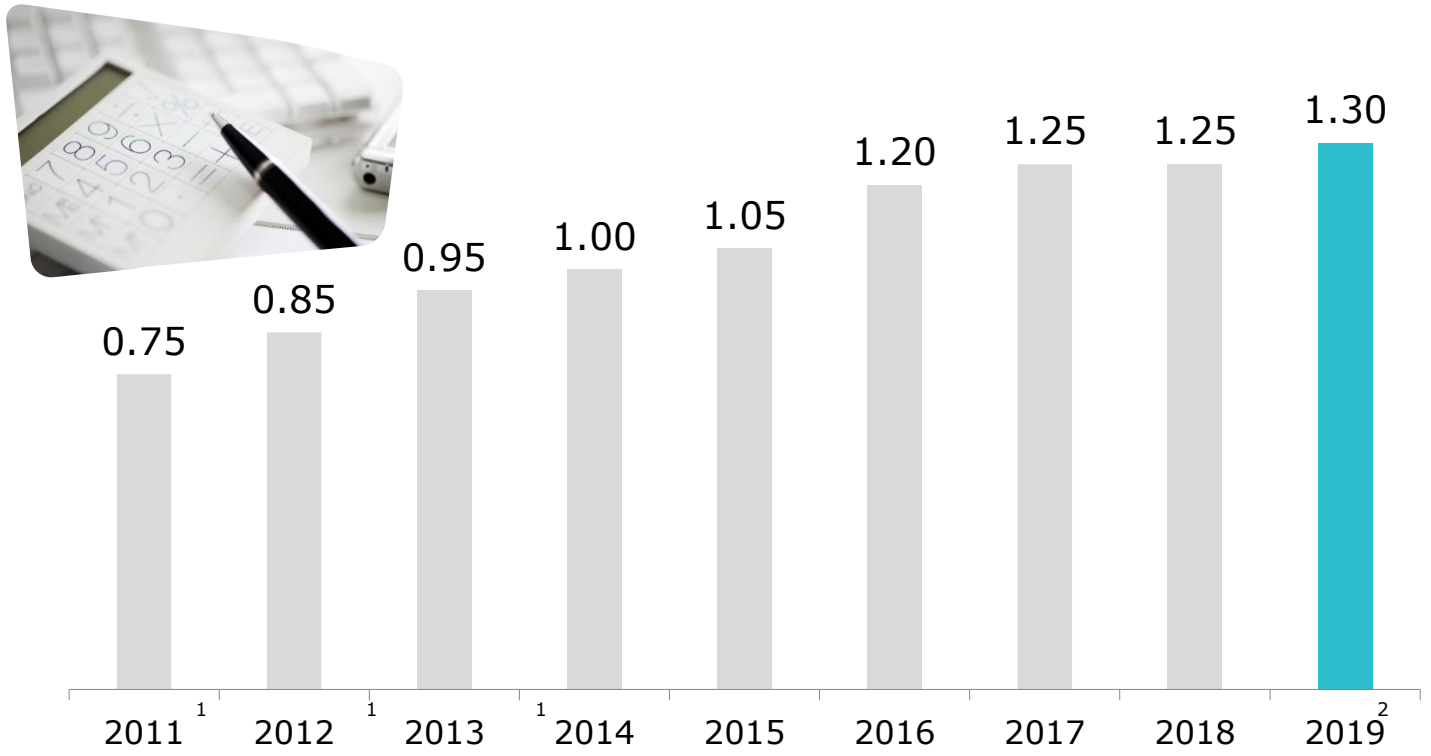


Balanced maturity profile in upcoming years avoids refinancing risks; Merck KGaA, Darmstadt, Germany will become a more frequent issuer

[1]No decision on call rights taken yet;
[2]EUR bonds have been placed on Jan 16th, 2020

Sustainable dividend growth

Dividend[1] development 2011-2019



2019 dividend

- Dividend of €1.30 (+4% YoY) per share proposed[2] for 2019
- Payout ratio of 23.4% of EPS pre in 2019; we aim at 20–25% of EPS pre
- Dividend yield[3] of 1.2%

[1]Adjusted for share split, which has been effective since June 30, 2014; [2]Final decision is subject to Annual General Meeting approval;
[3]Calculated with 2019 year-end share price of € 105.35 per share.

Clinical Pipeline

December 31, 2019

Phase I

M3258
LMP7 inhibitor
Multiple myeloma

peposertib (M3814)
DNA-PK inhibitor
Solid tumors[1]

M4344
ATR inhibitor
Solid tumors

M6620
ATR inhibitor
Solid tumors

M8891
MetAP2 inhibitor
Solid tumors

avelumab
anti-PD-L1 mAb
Solid tumors

bintrafusp alfa
TGFbeta trap/anti-PD-L1
Solid tumors

M9241 (NHS-IL12)
Cancer immunotherapy
Solid tumors[1]

M5049
TLR7/8 antagonist
Immunology

M6495
anti-ADAMTS-5 nanobody
Osteoarthritis

M5717
PeEF2 inhibitor
Malaria

Phase II

tepotinib
MET kinase inhibitor
Non-small cell lung cancer

peposertib (M3814)
DNA-PK inhibitor
Rectal cancer

abituzumab
pan-αv integrin inhibiting mAb
Colorectal cancer 1L

bintrafusp alfa
TGFbeta trap/anti-PD-L1
Non-small cell lung cancer 1L

bintrafusp alfa
TGFbeta trap/anti-PD-L1
Non-small cell lung cancer 1L/2L

bintrafusp alfa
TGFbeta trap/anti-PD-L1
Locally advanced non-small cell lung cancer

bintrafusp alfa
TGFbeta trap/anti-PD-L1
Biliary tract cancer 1L

bintrafusp alfa
TGFbeta trap/anti-PD-L1
Biliary tract cancer 2L

avelumab
anti-PD-L1 mAb
Merkel cell cancer 1L

avelumab
anti-PD-L1 mAb
Solid tumors[2]

avelumab
anti-PD-L1 mAb
Non-small cell lung cancer[2]

avelumab
anti-PD-L1 mAb
Urothelial cancer[2]

atacicept
anti-BlyS/APRIL fusion protein
Systemic lupus erythematosus

atacicept
anti-BlyS/APRIL fusion protein
IgA nephropathy

evobrutinib
BTK inhibitor
Rheumatoid arthritis

evobrutinib
BTK inhibitor
Systemic lupus erythematosus

sprifermin
fibroblast growth factor 18
Osteoarthritis

M1095 (ALX-0761)[3]
anti-IL-17 A/F nanobody
Psoriasis

Phase III

avelumab
anti-PD-L1 mAb
Non-small cell lung cancer 1L

avelumab
anti-PD-L1 mAb
Urothelial cancer 1L-M

avelumab
anti-PD-L1 mAb
Locally advanced head and neck cancer

evobrutinib
BTK inhibitor
Multiple sclerosis

Registration

tepotinib
MET kinase inhibitor
Non-small cell lung cancer,
*MET*ex14 skipping[4]

avelumab
anti-PD-L1 mAb
Renal cell cancer 1L[5]

- Oncology
- Immuno-Oncology
- Immunology
- Neurology
- Global Health

1L, first-line treatment; 1L-M, first-line maintenance treatment; 2L, second-line treatment.

[1]Includes studies in combination with avelumab; [2]Avelumab combination studies with talazoparib, axitinib, ALK inhibitors, cetuximab, or chemotherapy; [3]As announced on March 30 2017, in an agreement with Avillion, anti-IL-17 A/F nanobody will be developed by Avillion for plaque psoriasis and commercialized by Merck KGaA, Darmstadt, Germany; [4]In Q4 2019, tepotinib was filed in Japan for the treatment of patients with non-small cell lung cancer harboring *MET*ex14 skipping; [5]On December 20 2019, avelumab in combination with axitinib was approved in Japan for treatment of patients with curatively unresectable or metastatic renal cell carcinoma.

Tepotinib: Significant unmet need

Tepotinib is a highly selective oral, once daily, MET TKI that blocks MET-mediated signaling pathways

- Preclinical and clinical evidence support MET activation as a **primary oncogenic driver in lung cancer subsets** and as a **secondary driver** of acquired resistance to targeted therapy in other lung cancer subsets[1]
- Higher **prevalence of MET alterations amongst elderly patients in Lung** (median age of patients with METex14: 72.5 years)
- Evidence exists to support the **role of MET in cancers and resistance settings other than lung cancer**

Adressable Patient Population

Total global NSCLC patients
(2 million new cases/year)[2]

- METex14: ~3%
- METamp: ~2%
- EGFRm+: US/EU: ~12% Asia: ~35%
- Other genetic alterations

15 – 20% with METamp

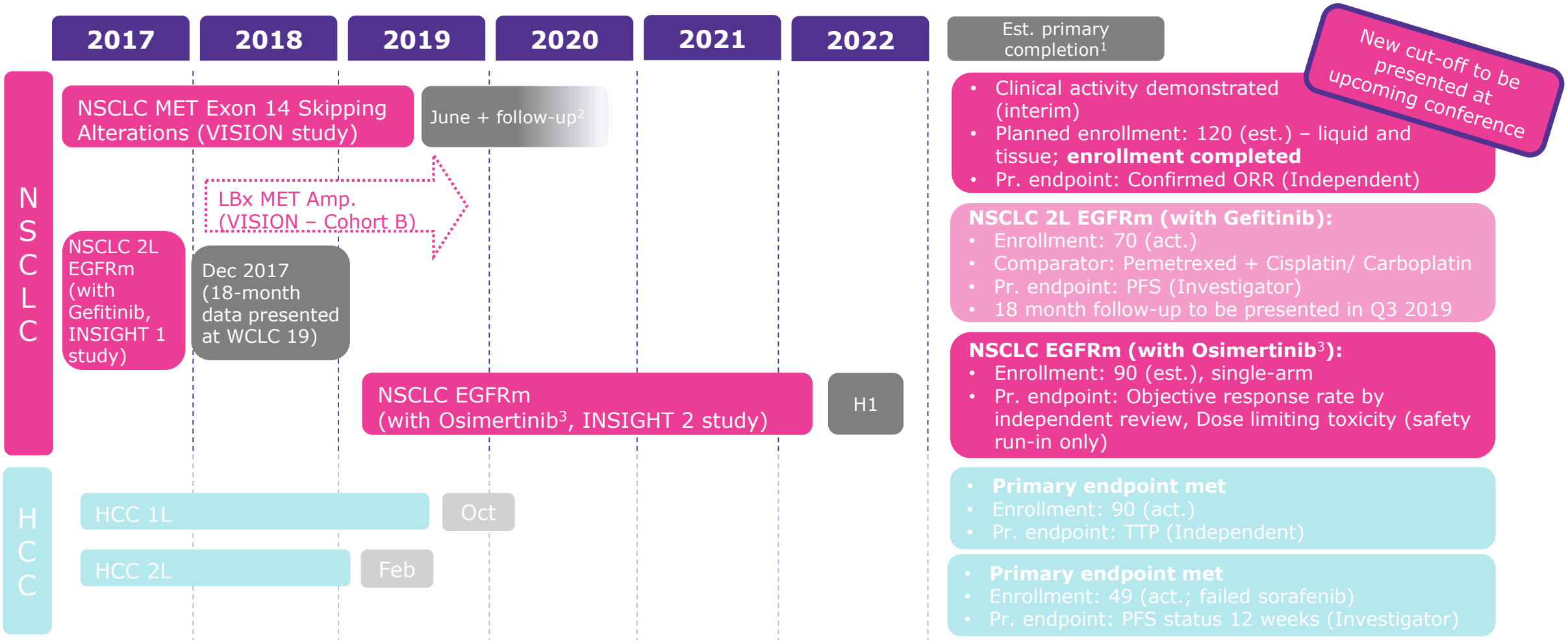
- METex14: ~3% + METamp: ~2% → ~3-5% of total NSCLC population → VISION Trial
- EGFRm+: US/EU: ~12% Asia: ~35% → 2-5% of total NSCLC population → INSIGHT 2 Trial

Key Achievements

- **SAKIGAKE designation** awarded in Japan, **Breakthrough designation** awarded by US FDA
- **Validated liquid biopsy and/or tissue biopsy test** used to prospectively recruit in both trials
- **METex14:** On track for filing in 2020 in USA, filed in Japan in Q4 2019
- **EGFRm+/METamp:** INSIGHT 2 program started in 2019

[1]Drilon A et al., J Thoracic Oncol. 2016; [2]Bray F, et al. CA Cancer J Clin. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. 2018;68(6):394–424. https://doi.org/10.3322/caac.21492 PMID:30207593

Tepotinib: Program overview
Development focused on biomarker enriched patient populations



[1]Timelines are event-driven and may be subject to change; [2]Confirmed ORR expected approx. in June 2019, subsequent durability of response/follow-up period pending outcome of discussions with health authorities; [3]brand name: Tagrisso®

Data presented at ASCO 2019
Promising data from VISION (NSCLC, MET Exon 14 cohort) study

New cut-off to be presented at upcoming conference

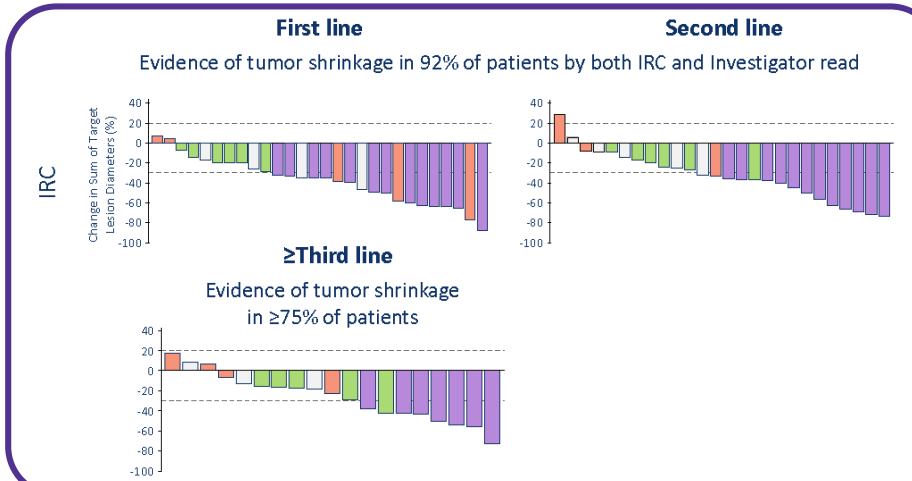
Durable clinical activity across treatment lines[2]

	Other leading MET inhibitor[1]		VISION (tepotinib)[2]	
			Liquid biopsy analysis set (L+)	Tissue biopsy analysis set (T+)
	Oral		Oral	Oral
Cut off date	(15 Apr 2019)		(18 Feb 2019)	(18 Feb 2019)
	IRC		IRC	IRC
Overall	N=97		n=48	n=51
ORR, % [95% CI]	48.5%* Not reported		50.0% [35.2, 64.8]	45.1% [31.1, 59.7]
mDOR, months [95% CI]	Not reported		**12.4** [5.8, ne]	**15.7** [9.0, ne]
1L	N=28		n=17	n=18
ORR, % [95% CI]	67.9% [47.6, 84.1]		58.8% [32.9, 81.6]	44.4% [21.5, 69.2]
≥2L	N=69		n=31	n=33
ORR, % [95% CI]	40.6% [28.9, 53.1]		45.2% [27.3, 64.0]	45.5% [28.1, 63.6]
mDOR, months [95% CI]	9.7 [5.6, 13.0]		**12.4** [5.6, ne]	**12.4** [3.7, ne]
PFS	**1L n=28**	**2L/3L n=69**	n=57	n=58
mPFS, months [95% CI]	9.7 [5.5, 13.9]	5.4 [4.2, 7.0]	**9.5** [6.7, ne]	**10.8** [6.9, ne]

Favorable safety profile[2]

- Grade 3 TRAEs reported in **19% of patients**
- **No grade 4 or grade 5** TRAEs
- **Discontinuations** due to treatment-related adverse events in **only 4.6% of patients**

Consistent tumor shrinkage across lines[2]



[1]J. Wolf et al., Capmatinib (INC280) in METΔex14-mutated advanced non-small cell lung cancer (NSCLC): Efficacy data from the phase II GEOMETRY mono-1 study, presented at ASCO 2019; [2]P. Paik et al., Phase II study of tepotinib in NSCLC patients with METex14 mutations, presented at ASCO 2019; *Data not reported in the oral presentation. Manually calculated from 1 CR, 18 PRs in Cohort 5b (1st line) and 28 PRs in Cohort 4 (+2nd line).

Clinical Efficacy in Met-amp EGFR-mutant Population

INSIGHT 2 study follows from encouraging INSIGHT 1 data

Data from INSIGHT 1 study (18-months follow-up presented at WCLC 2019)[1]

- **MET-amp population:**

Endpoint	Tepotinib + gefitinib	Chemotherapy
Primary - PFS (HR 0.13 [90% CI 0.04, 0.43])	16.6 m	4.2 m
Secondary - ORR (OR 2.67 [90% CI 0.37, 19.56])	66.7%	42.9%
Secondary - OS (HR 0.09 [CI 0.01, 0.54])	37.3 m	13.1 m

- **METamplification** can be considered a **suitable biomarker for treatment with tepotinib**
- **Safety:** generally well-tolerated, most AEs mild to moderate
- Enrollment halted due to low recruitment

INSIGHT 2 study

Study Design:
- Locally advanced/metastatic EGFR + NSCLC
- MET amplification
- Acquired resistance to prior EGFR TKI therapy
- N = 90

Dose:
- Tepotinib 500mg QD + Osimertinib 80mg QD (21-day cycles until PD)

Primary endpoints:
- Objective response rate by independent review
- Dose limiting toxicity (safety run-in only)

[1]Yi Long Wu et al., Long term outcomes to tepotinib plus gefitinib in patients with EGFR mutant NSCLC and MET dysregulation: 18 month follow up, presented at WCLC 2019

Biomarker focused development program in NSCLC with potential beyond NSCLC **MET exon-14; Met-amp; and EGFR-mutant populations**

NSCLC MET exon-14 alterations (VISION study)

- **SAKIGAKE designation** awarded by Japanese Ministry of Health, Labour and Welfare in March 2018
- **Promising ORR, durable responses and long PFS** reported across treatment lines presented at ASCO 2019
- **Favourable safety profile** with 19% treatment-related grade 3 events, no grade 4 events and **only 4.6% treatment related discontinuations**

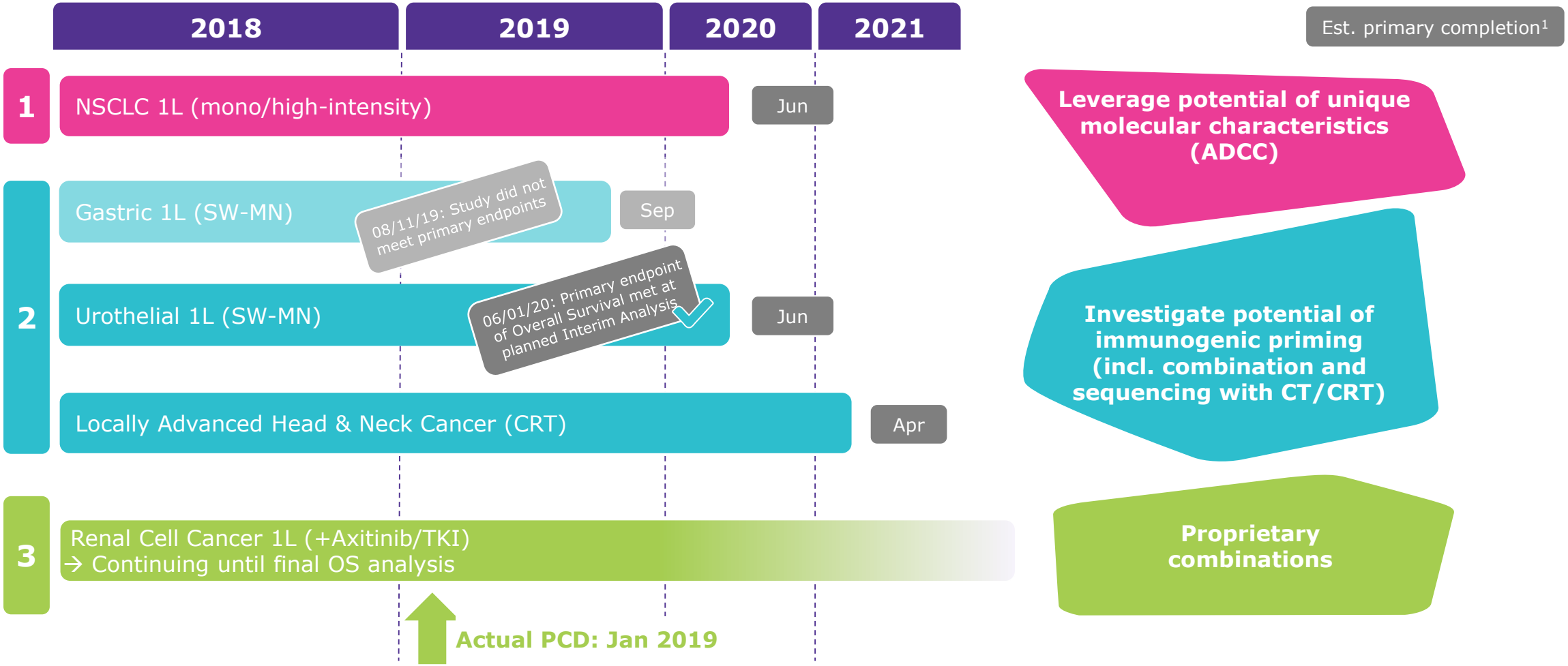
NSCLC harboring EGFR-mutations (INSIGHT study)

- Encouraging data seen in INSIGHT 1 trial, triggering **recent initiation of INSIGHT 2** (Tepotinib + Osimertinib)
- **Liquid biopsy testing (LBx)** integrated into INSIGHT 2 to help mitigate the limited availability of tissue in this tumor indication and treatment setting

Patients prospectively recruited with validated liquid biopsy (LBx) test in VISION

1. **Less invasive** (i.e. than tissue based testing) → appropriate for **elderly patients**, **rapid study recruitment**
2. **Increased selectivity/identification** → improved recruitment numbers/**greater identification**

Avelumab: Program overview
Ongoing studies –UC 1L data presentation expected in mid-2020

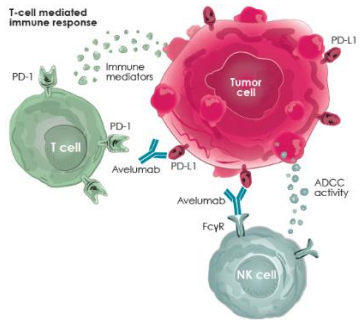


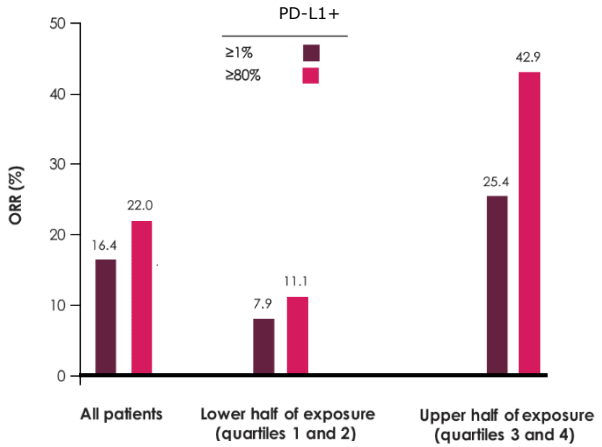
[1]Estimated primary completion date according to clinicaltrials.gov as of February 6, 2020, timelines are event-driven and may be subject to change;
Acronyms: NSCLC = Non-small Cell Lung Cancer, CT = Chemotherapy, CRT = Chemoradiotherapy, MN = Maintenance, SW = Switch, TKi = Tyrosine Kinase inhibitor

Avelumab: NSCLC 1L

Assessing potential efficacy upside in mono-therapy[1]

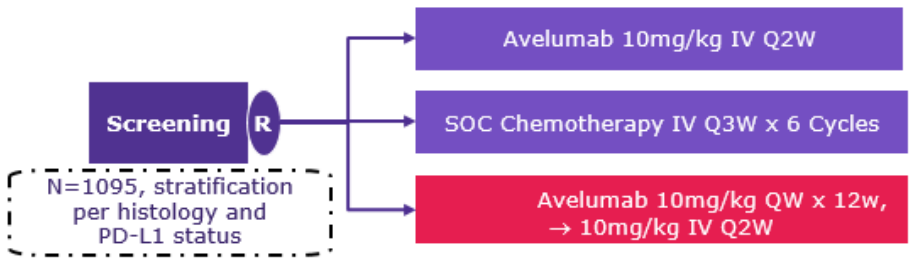
NSCLC 2L+: exposure response





NSCLC 1L: testing hypothesis of higher efficacy/intensity correlation

- **Hypothesis:** higher drug intensity may result in greater efficacy (potentially driven by ADCC)
- Potential association between **higher ORR** and **higher avelumab exposure**
- ORR highest in patients with both higher avelumab **exposure** and tumors with higher levels of **PD-L1 expression**
- **NSCLC 1L phase III trial amended** to leverage high-intensity hypothesis (est. primary completion Jun 2020)



- **Primary endpoints:** PFS & OS @ high PD-L1-expression
- **Secondary endpoints:** PFS & OS @ moderate and low PD-L1-expression (BOR, DOR, Safety, QoL)
- **Hierarchical ordered hypothesis**

[1]Abstract No. 9086. Presented at the 53rd ASCO Annual Meeting; June 2-6, 2017; Chicago, IL, USA: Exposure–response and PD-L1 expression analysis of second-line avelumab in patients with advanced NSCLC: data from the JAVELIN Solid Tumor trial; Acronyms: ORR = Overall Response Rate

Avelumab: Renal Cell Carcinoma (RCC) 1L
Extensive biomarker data set released at ASCO 2019 from Javelin Renal 101

Core data presented at ESMO 2018 and ASCO GU 2019[1]

HR < 1 = favors Avelumab-Axitinib or competitor combo HR > 1 = favours sunitinib	mPFS (Hazard Ratio, Risk groups per IMDC)[2,4]		
	Favorable	**Intermediate**	**Poor**
Competitor A	2.18 (1.29-3.68)	0.82 (0.64-1.05)	
Competitor B	0.81 (0.53-1.24)	0.70 (0.54-0.91)	0.58 (0.35-0.94)
Avelumab – Axitinib (JAVELIN)	**0.54 (0.32-0.91)**	**0.74 (0.57-0.95)**	**0.57 (0.38-0.88)**

Safety (% patients, Gr 3-5 TRAEs)[3,4]
- Avelumab-Axitinib: 57% / 55% (Sunitinib)
- Competitor B: 63% / 58% (Sunitinib)

Discontinuation (% patients)[3,4]:
- Avelumab-Axitinib: 4%
- Competitor B: 8.2%

- **Approved for 1L treatment of advanced RCC by US FDA on May 15, 2019**
- **Filing validated by EMA and submitted to Japanese health authorities**

Significant contribution to understanding of biomarkers presented at ASCO 2019[5]

- **Sunitinib patients with PD-L1+ tumors showed reduced PFS**
- Patients whose tumors contained **greater number of CD8+ cells had extended PFS in the avelumab + axitinib arm** and reduced PFS in the sunitinib arm
- **Novel signature comprised of immune-related genes associated with PFS** in the avelumab + axitinib arm
- Elevated **expression of the published angiogenesis gene signature** and other related genes was **associated with improved PFS in the sunitinib arm**, but did not differentiate PFS in the avelumab + axitinib arm
- Significant **treatment-arm specific differences in PFS were observed relative to wild type when mutations** in genes such as CD163L1, DNTM1 or PTEN were present

"Findings may inform personalized strategies for patients with advanced RCC"

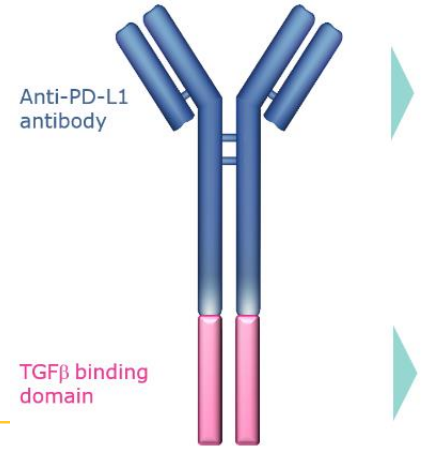
[1]Choueiri et al., „Subgroup analysis from JAVELIN Renal 101: outcomes for avelumab + axitinib vs sunitinib in advanced renal cell carcinoma", presented at ASCO GU 2019; [2]Table adapted from slides of discussant Dr. Lori Wood, presented at ASCO GU2019; [3]Motzer et al., „Avelumab plus Axitinib versus Sunitinib for Advanced Renal-Cell Carcinoma", New England Journal of Medicine, February 16, 2019; Brian et al., „Pembrolizumab plus Axitinib versus Sunitinib for Advanced Renal-Cell Carcinoma", New England Journal of Medicine, February 16, 2019; [4]Note that this is not a head-to-head trial comparisons; [5]Choueiri et al., „Biomarker analyses from JAVELIN Renal 101: Avelumab + axitinib (A+Ax) versus sunitinib (S) in advanced renal cell carcinoma (aRCC)", presented at ASCO 2019

Bintrafusp alfa[1] (M7824)

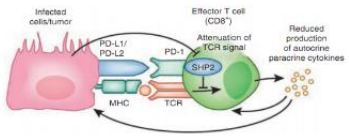
An innovative first-in-class bifunctional fusion protein discovered in-house leading the TGF-β immuno-oncology field

Mode of action

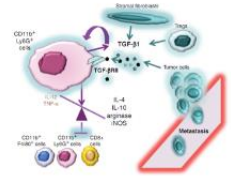
- Innovative **first-in-class bifunctional fusion protein** designed to simultaneously target two immune suppressive pathways (blocking PD-L1 and reducing TGF-β signaling)
- Demonstrated **superior anti-tumor activity in pre-clinical study** compared to anti-PD-L1 alone, and anti-PD-L1 and TGF-β given in combination as separate agents
- **Great excitement in IO community** about M7824 uniquely addressing TGF-ß biology widely accepted as key resistance factor for anti-PDx therapies



PD-1/PD-L1 immune checkpoint[1]



TGFβ immunosuppressive cytokine[2]



clinical development achievements

- Tested in **14 Phase Ib expansion cohorts** across >700 patients in more than 10 tumor types
- Shown clinical anti-tumor activity across multiple hard-to-treat cancers including **advanced NSCLC, biliary tract cancer, HPV-associated cancers, and gastric cancer**
- PhII study **M7824 monotherapy versus pembrolizumab 1L**, advanced NSCLC high PD-L1-tumor expressers started in October 2018

clinical development plans

- **Multiple high priority immuno-oncology clinical development studies** ongoing or expected to commence shortly, including **studies in non-small cell lung and biliary tract cancers with registrational intent** and most recently **advanced, unresectable cervical cancer**
- Further plans to be communicated at a later stage

[1]proposed International Nonproprietary Name (INN)
Acronyms: NSCLC = Non-small Cell Lung Cancer, IO = Immuno-Oncology

Strategic Alliance with GlaxoSmithKline (GSK)
Attractive payment terms rewarding developmental success

Effective as of March 27, 2019

upfront & Milestone payment structure

Total deal volume: €3.7 bn

Upfront payment: €300 m

Milestone payments: €3.4 bn

- Development (up to €500 m)
- Approval
- Commercial

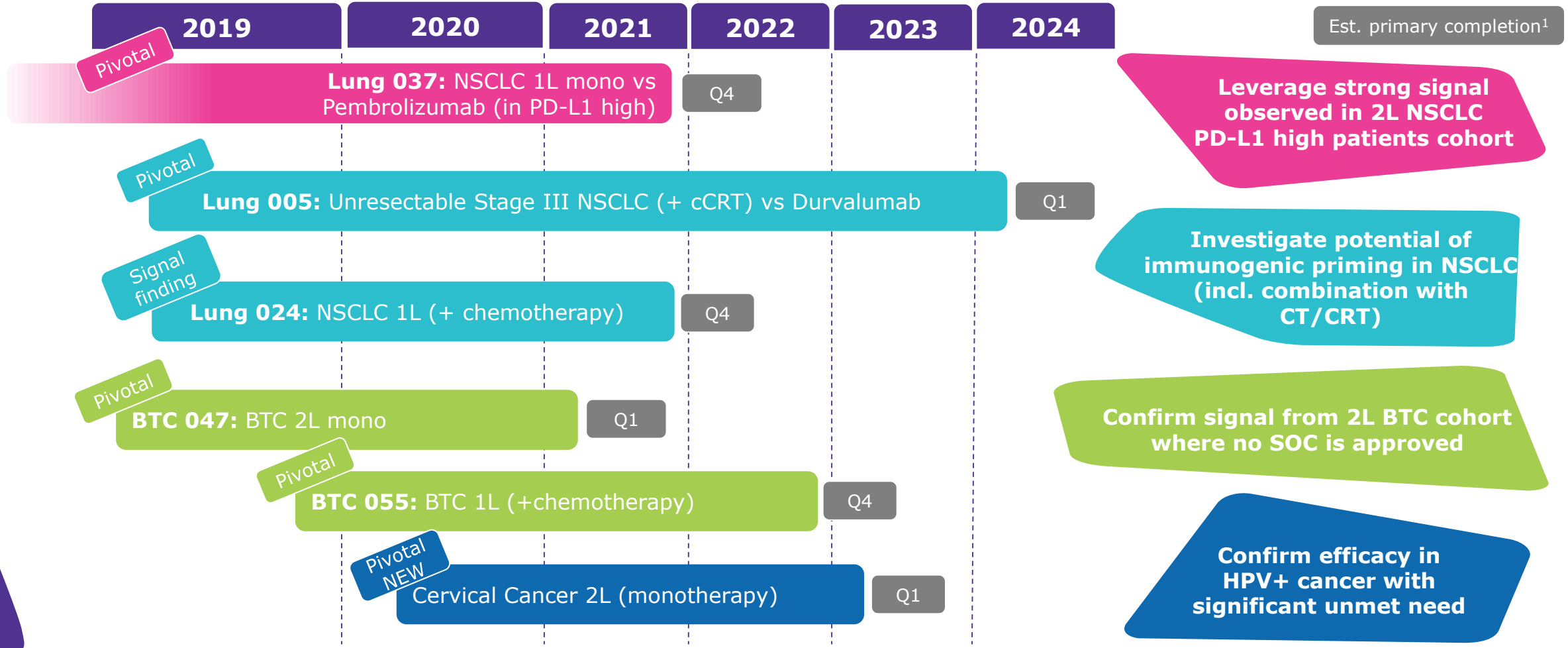
Development milestones: Up to €500 m triggered by data from the M7824 lung cancer program

profit & cost sharing

- **Profits & Costs:** Shared equally on a global basis
- **Sales:** Merck KGaA, Darmstadt, Germany to recognize sales in the United States, GSK to recognize sales ex-US

Development Strategy

Program overview: Five pivotal studies on track, several safety run-in and signal finding studies recently initiated or in planning



[1]Estimated primary completion date according to clinicaltrials.gov as of February 6, 2020, and internal estimates for upcoming studies; timelines are event-driven and may be subject to change; Acronyms: NSCLC = Non-small Cell Lung Cancer, BTC = Biliary Tract Cancer, CT = Chemotherapy, cCRT = Chemoradiation therapy, FPI = First Patient In

Developmental Progress
2L Biliary Tract Cancer (BTC) monotherapy trial recently initiated

M7824 BTC data presented at ESMO 2018

- **Need:** Few available treatment options (no 2L standard of care)[1]
- **Results: Encouraging activity[2]** in 30 Asian patients with pretreated biliary tract cancer
- **ORR[2]:** 20% (IRC assessment). Median DoR was NR (range, 8.3–13.9 months) with confirmed responses ongoing in all patients
- **Overall Survival by IRC: mOS:** 12.7 months (6.7 – NR), comparing favorably with historical data in pretreated patients receiving second- or later line treatment (<7 months mOS in 2L[1])
- Responses observed **irrespective of PD-L1 expression levels[2]**
- **Orphan Drug Designation** granted by FDA in December 2018

Leading PDx data presented at ASCO 2019[3]

- **ORR:** 5.8% (PhII, 2L); 13.0% (PhI)
- **OS:** 7.4 months (PhII, 2L); 6.2 months (PhI)

INTR@PID BTC 047

INTR@PID CLINICAL TRIALS
BTC 047

Locally advanced or metastatic BTC 2L N = 141 → M7824 1200 mg IV, Q2W, up to 24 months

Endpoints

Primary endpoint: ORR

Secondary endpoints: DOR, DRR ,PFS, OS, Safety

Biomarker endpoints: PDL1 expression MSI status, comprehensive genomic profiles

[1]Lamarca A, et al. Ann Oncol. 2014;25(12):2328–2338; [2]Yoo et al., Poster presented at the 43rd European Society for Medical Oncology Annual Meeting, Munich, October 19–23, 2018; [3]Bang et al., "Pembrolizumab (pembro) for advanced biliary adenocarcinoma: Results from the KEYNOTE-028 (KN028) and KEYNOTE-158 (KN158) basket studies", presented at ASCO 2019; Acronyms: DoR = Duration of Response, NSCLC = Non-small Cell Lung Cancer, NR = Not Relevant, MSI = Microsatellite Instability Status , OS = Overall Survival, PFS = Progression-Free Survival

Developmental Progress
NSCLC Stage III cCRT Combo trial recently initiated

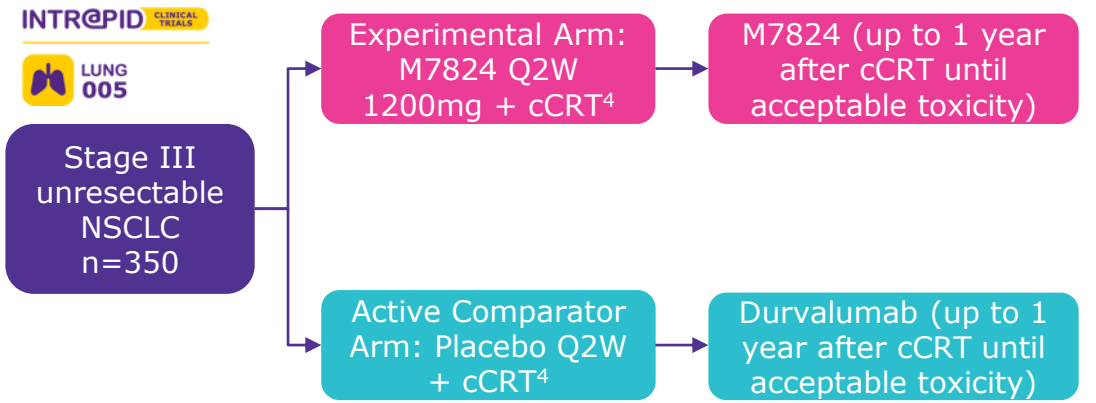
NSCLC 2L data presented at ESMO 2018

- **Need:** NSCLC accounts for 80-85% of all cases of lung cancer[1]
- **Results: Encouraging efficacy comparing favorably** to established PDx-inhibitor monotherapy (IRC)[2,3]:
  - **ORR (all-comers):** 25.0%
  - **ORR (PD-L1-positive):** 37.0%
  - **ORR (PD-L1-high):** 85.7%
- **Progression free survival by IRC** (PD-L1 ≥ 1%):
  - M7824: **mPFS = 9.5 months**, competitor: 4.0 months[2,3]
- **Overall Survival by IRC** (PD-L1 ≥ 1%):
  - M7824: **mOS not reached**, competitor: 12.7 months[2,3]

Pre-clinical data on M7824 + RT combo[5]

- M7824 and RT combination therapy **enhances antitumor activity relative to mono-therapies** in mouse models
- EMT, VEGF, and RT-induced fibrosis gene signatures are decreased with M7824 and combination therapy, and **M7824 reduces RT-induced fibrosis**
- Results **support evaluation of M7824 + RT in the clinic**

INTR@PID LUNG 005



Endpoints

Primary endpoint: PFS

Main secondary endpoints: OS, Safety, Pulmonary function, Association of PD-L1 expression at base line and efficacy

[1]Jemal A et al., Cancer statistics, 2007, CA Cancer J Clin 2007;57:43-66; [2]Paz-Ares et al., Poster presented at the 43rd European Society for Medical Oncology Annual Meeting, Munich, October 19–23, 2018, data shown for 1200mg Q2W dose; [3]Herbst et al.; Pembrolizumab versus docetaxel for previously treated, PD-L1-positive, advanced non-small-cell lung cancer (KEYNOTE-010): a randomised controlled trial (www.thelancet.com Published online December 19, 2015 http://dx.doi.org/10.1016/S0140-6736(15)01281-7); [4]Cisplatin/Etoposide or Carboplatin/Paclitaxel or Cisplatin/Pemetrexed concomitant with Intensity Modulated Radiation Therapy (IMRT); [5]Lan et al., Combination of M7824 and radiation therapy enhances antitumor activity, increases immune response, and modulates radiation-induced fibrosis in cancer models, 2018

Developmental Progress
Data shown at AACR 2019 highlights opportunity in HPV-related cancers

Efficacy variable	HPV-associated cancer (n=43)	HPV+* (n=36)
Confirmed BOR, n (%)		
CR	2 (4.7%)	2 (5.6%)
PR	10 (23.3%)	9 (25%)
SD	6 (14.0%)	5 (13.9%)
PD	20 (46.5%)	17 (47.2%)
Not evaluable	5 (11.6%)	3 (8.3%)
Delayed PR†	3 (7.0%)	3 (8.3%)
ORR per RECIST v1.1, n (%) [95% CI]	12 **(27.9%)** [15.3–43.7]	11 **(30.6%)** [16.3–48.1]
Total clinical response rate†, n (%)	15 **(34.9%)**	14 **(38.9%)**
DCR, n (%)	18 (41.9%)	44.4%

Prevalence: >630,000 new cases of HPV-related cancer are reported worldwide annually[1]

Response Rates:

- Bintrasfusp alfa response rates **compared favorably to those with anti–PD-1 inhibitors** (ORRs of 13%–24%)[1-7]
- **ORR was 27.9% and 30.6% in HPV-associated and HPV+ cancers, respectively**
- Including three additional patients with delayed PRs after initial PD: **Total response rate was 34.9% and 38.9% in HPV-associated and HPV+ cancers, respectively**

Long-term Benefit:

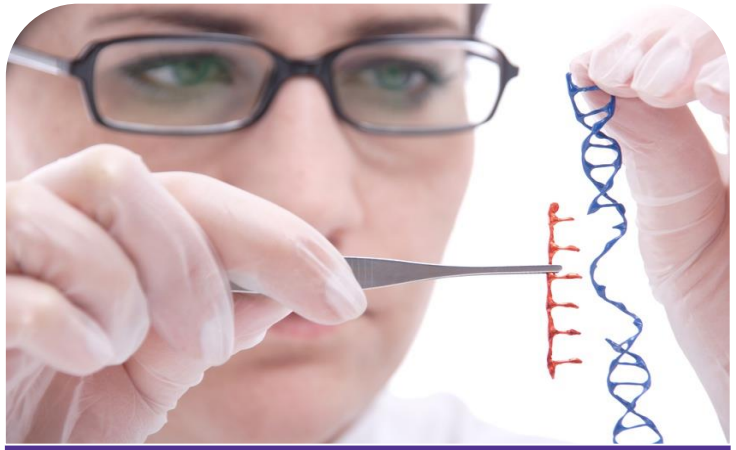
- **Most responses durable** with 4 responses having DoR >18 months and 11/15 responses ongoing at the data cutoff
- Responses to bintrafusp alfa occurred **irrespective of tumor type** or PD-L1 expression
- **Safety profile was similar to anti–PD-(L)1 therapy[1,5]** except for SCC/KAs and low grade mucosal bleeding which are anticipated AEs with TGF-β inhibition[8,9]

Cervical Cancer 2L study recently posted on ct.gov NEW

†Due to confirmed PD before onset of response, these patients did not meet response criteria by RECIST v1.1; *HPV status was determined from prior documentation, or by using cobas® 4800 HPV Test (Roche) in the dose escalation phase or RNA sequencing (RNASeq) in the expansion phase. [1]Bauml J, et al. J Clin Oncol. 2017;35:1542–49; [2]Ott PA, et al. Ann Oncol. 2017;28:1036–41; [3]Hollebecque A, et al. J Clin Oncol. 2017;35(Suppl):Abstract 5504; [4]Chung HC, et al. J Clin Oncol. 2018;36(Suppl):Abstract 5522; [5]Ferris RL, et al. N Engl J Med. 2016;375:1856–67; [6]Mehra R, et al. Br J Cancer. 2018;119:153–59; [7]Morris VK, et al. Lancet Oncol. 2017;18:446–53; [8]Lacouture ME, et al. Cancer Immunol Immunother. 2015;64:437–46; [9]Trachtman H, et al. Kidney Int. 2011;79:1236–43

Merck KGaA
Darmstadt, Germany

DNA Damage Response (DDR)
Leadership in next generation assets beyond PARP



DNA Damage Response

A Core Research Innovation Cluster

- DDR defects are an **"achilles heel" of cancer cells**
- **ATR, ATM and DNA-PK are the trinity of targets** that orchestrate cellular response DNA damage and replication stress
- **Leading clinical portfolio** with 6 assets (in Phases 1 and 2) targeting ATR, ATM and DNA-PK
- Rich pre-clinical and translational science driving **biological innovation and patient selection**
- Ideally placed to drive **novel combinations within DDR portfolio and broader immuno-oncology portfolio**
- Multiple **early signal finding studies** allow for **evidence-based decision making** & **focus** in future development

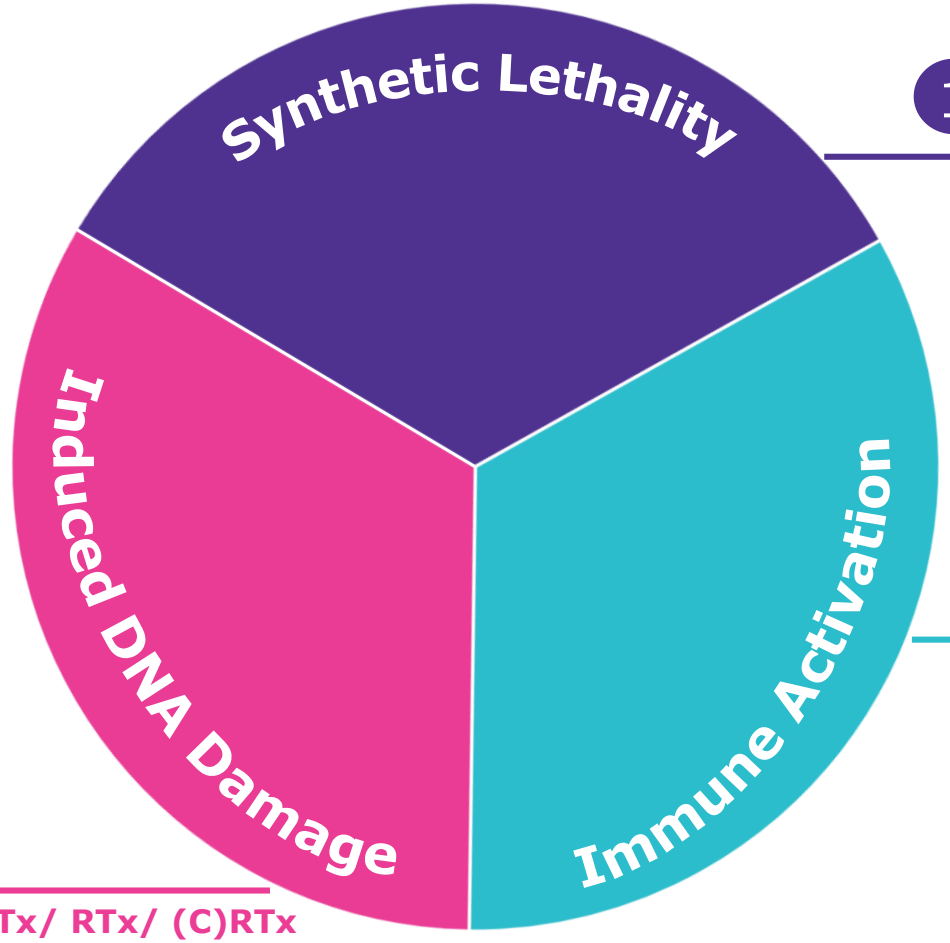
Acronyms: ATM = Ataxia-Telangiectasia Mutated, ATR = Ataxia Telangiectasia and Rad3, DNA-PK = DNA-dependent Protein Kinase, PARP = Poly ADP Ribose Polymerase

DNA Damage Response (DDR)
Development is focused on three foundations

Differentiating aspects of cancer DDR that can be targeted therapeutically[1]:

- **Loss of one or more DDR pathways**
- **Increased levels of replication stress**
- **Increased levels of endogenous DNA damage**

Increased Immunogenicity



1
Monotherapy
DDRi + DDRi (incl. PARP)
Grow the DDR class, building on PARPs

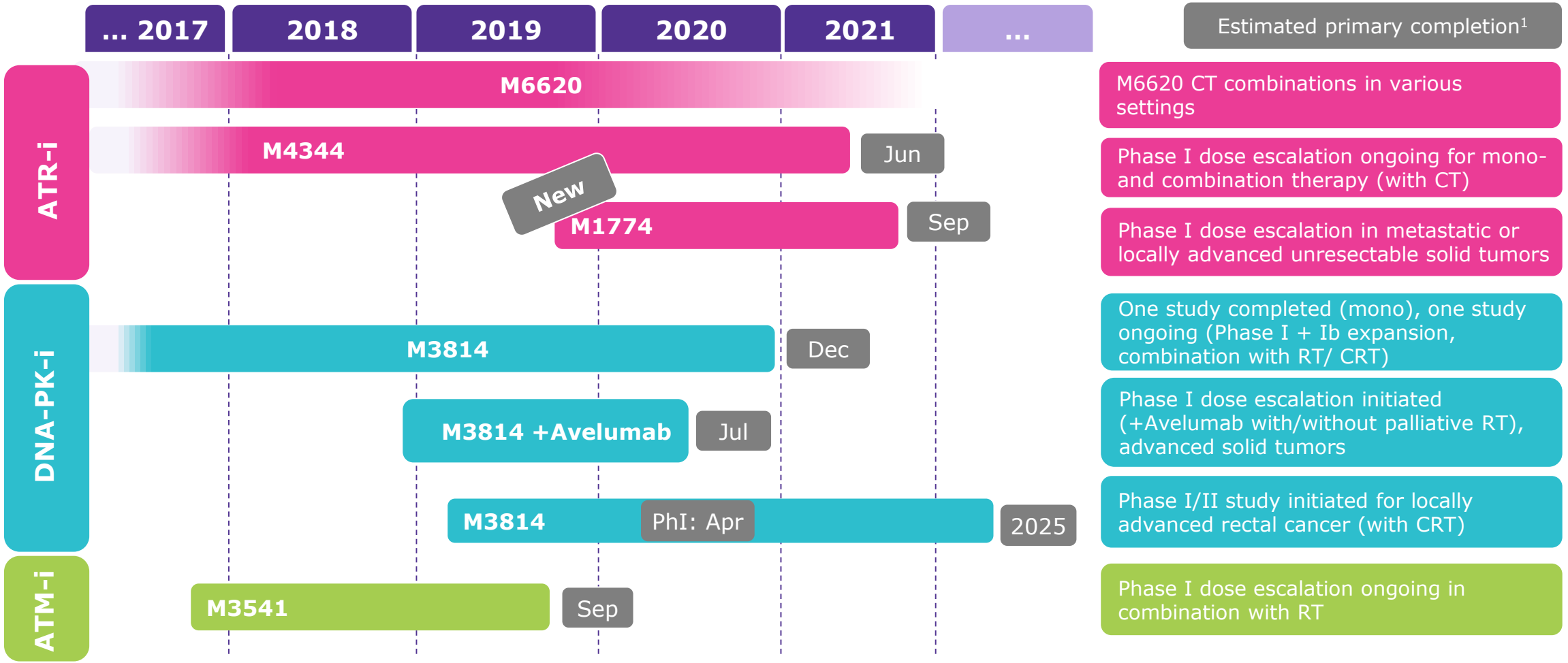
2
DDRi + IO
Differentiate future IO treatments

3
DDRi + CTx/ RTx/ (C)RTx
Improve efficacy in post-IO landscape

[1]adapted from M. O'Connor, Targeting the DNA Damage Response in Cancer, *Molecular Cell Review*, November 2015;
Acronyms: IO = Immuno-Oncology, CT = Chemotherapy, DDRi = DNA Damage Response inhibitor, RT = Radiotherapy, (C)RT = Chemo-radiotherapy

DNA Damage Response (DDR)

Clinical program targets three major DDR pathways, in mono- and combination (incl. Avelumab)



[1]Estimated primary completion date acccording to clinicaltrials.gov as of January 8, 2020, timelines are event-driven and may change;
Acronyms: ATM = Ataxia-Telangiectasia Mutated, ATR = Ataxia Telangiectasia and Rad3, DNA-PK = DNA-dependent Protein Kinase, CT = Chemotherapy, RT = Radiotherapy, CRT = chemoradiotherapy, NSCLC = Non-small Cell Lung Cancer, SCLC = Small-cell Lung Cancer, TNBC = Triple Negative Breast Cancer

Neurology & Immunology

Broad portfolio positions Merck KGaA, Darmstadt, Germany as a growing Multiple Sclerosis player

core portfolio

Rebif®

- **Stable market share:** within declining interferon class
- **Renewed HCP interest:** driven by updated pregnancy & lactation label
- **Continued blockbuster status in 2020**

Launch

MAVENCLAD® (cladribine) tablets 10 mg

- **Growth:** Continued growth within the high efficacy and oral class dyamic share
- **Focused execution:** Driving depth and 2nd year returns
- **Global peak sales: €1 - 1.4 bn**

Development

Evobrutinib (BTK-inhibitor)

- **Advancing on benefit-risk in high efficacy oral category**
- **Blockbuster potential**

Acronyms: HCP = Healthcare Professional

Mavenclad could change the MS treatment paradigm

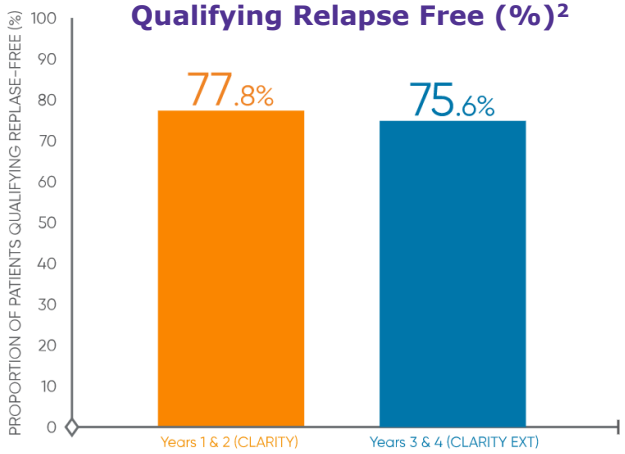
MAVENCLAD® (cladribine) tablets 10 mg

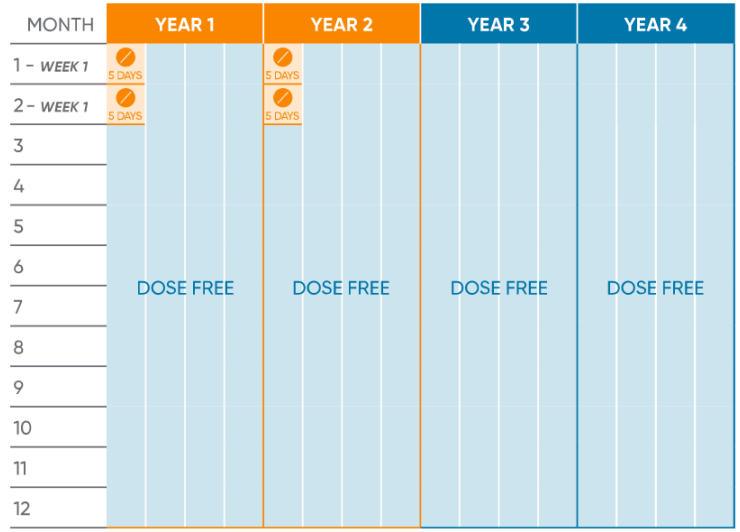
Consistent efficacy: High efficacy[1] across all relevant clinical and radiological endpoints

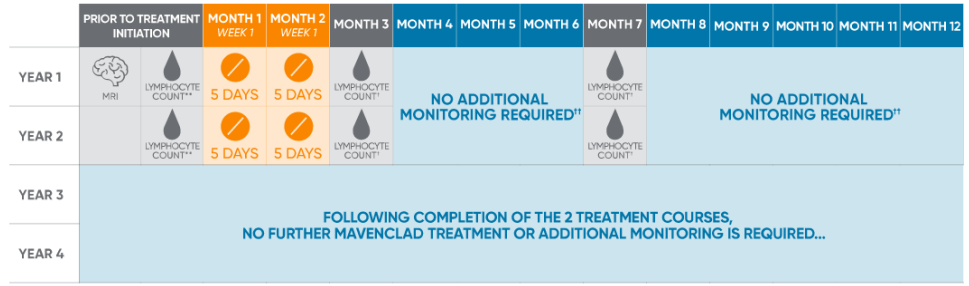
- 58% reduction in annualized relapse rate[2]
- 47% reduction in 6-month confirmed disability progression[3]
- 86% reduction in T1 Gd+ lesions[2]
- 73% reduction in T2 lesions[2]

Durability : Relapse-free for 4 years with no treatment in years 3 and 4[2]

Proportion of Patients Qualifying Relapse Free (%)[2]







Unique posology: Weight-based, max. 20 days of oral treatment[2,3]

Lowest monitoring requirements across all currently approved high-efficacy DMDs in a 4-year horizon

[1]Vs. placebo. The term 'high efficacy' is generally accepted in MS literature; [2]Giovannoni G et al. N Engl J Med 2010; 362:416–426. [3]Cook S et al. AAN 2016; [P3.058].
[3]MAVENCLAD SmPC, 2018

Merck KGaA
Darmstadt, Germany

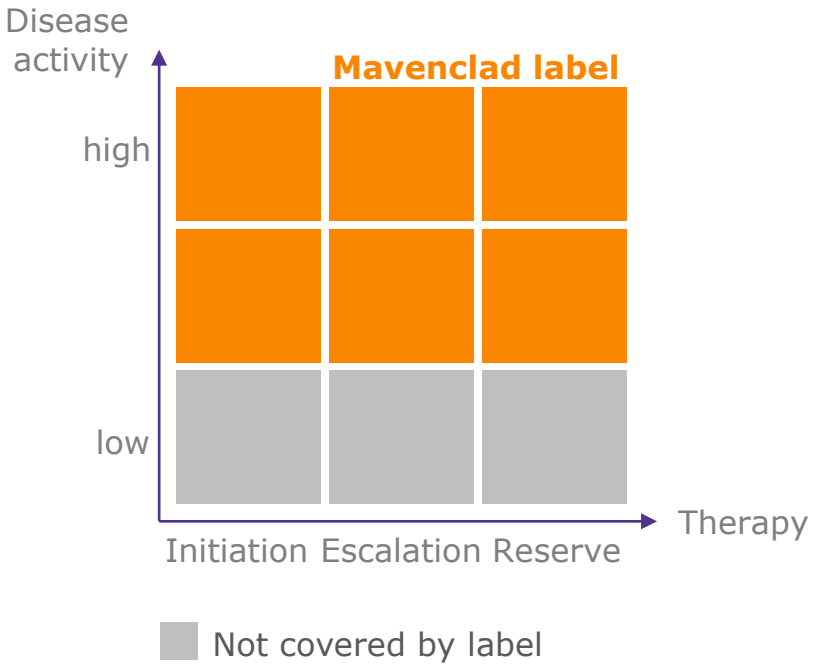
Mavenclad's attractive label in Europe supports integrated franchise strategy

Mavenclad label covers 60-70% of patients with RRMS[1] within the MS[1] patient population in Europe

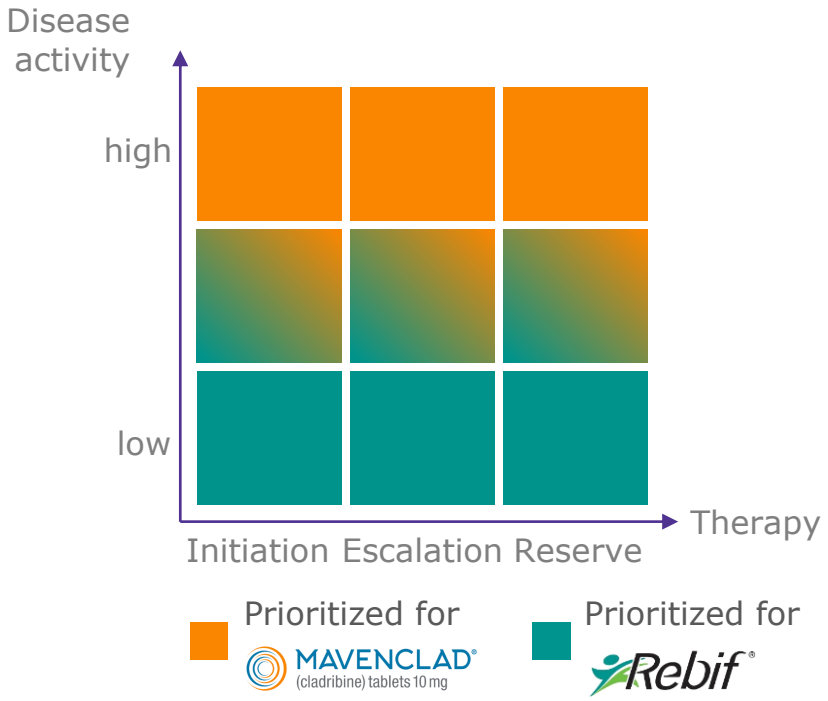
Group's overall NDD franchise will cover a broad MS patient pool

Integrated franchise strategy

MS patient population[2]



RRMS patients, EU-5[3]



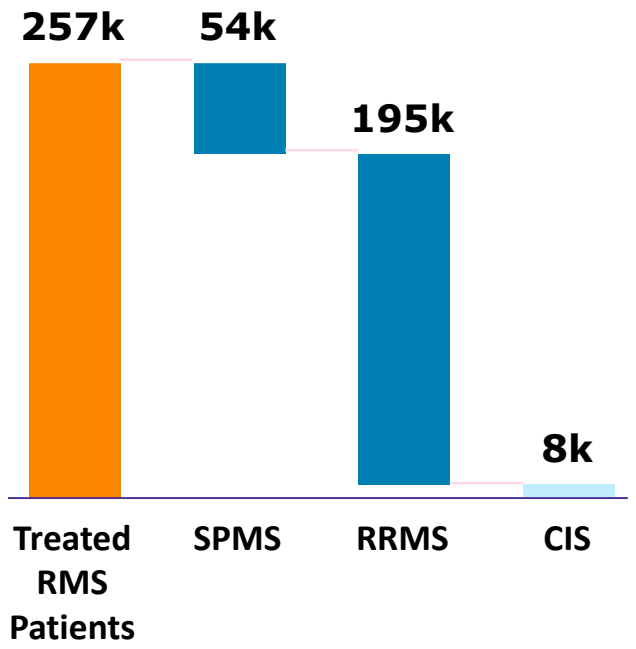
- At patient level: Rebif and Mavenclad are **highly complementary**
- At physician level: High overlap
- Franchise infrastructure investment benefits both brands

[1]Approved by EMA for treatment of highly active relapsing multiple sclerosis; Abbreviations: RRMS = Relapsing-Remitting Multiple Sclerosis; [2]Source: Merck KGaA, Darmstadt, Germany; [3]Source: Merck KGaA, Darmstadt, Germany, Ipsos; As of May 2019, Mavenclad was approved in 55 countries globally and reimbursed in half

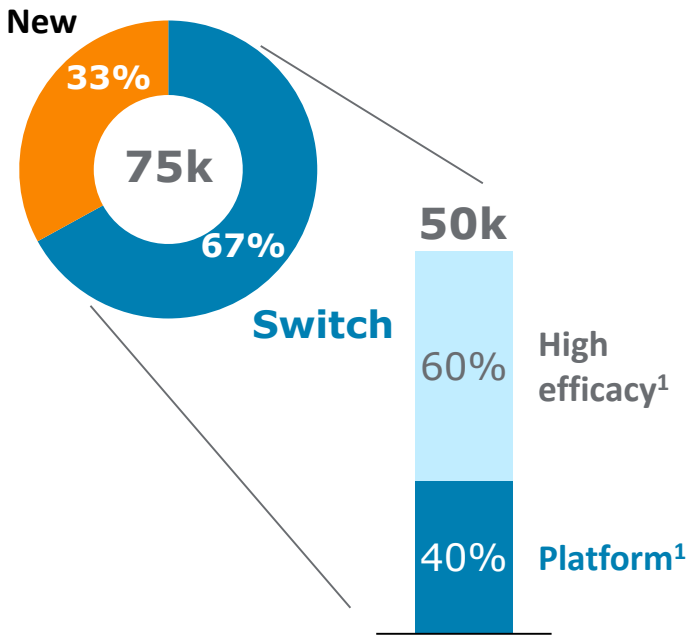
Mavenclad

On March 29, the FDA approved Mavenclad for the treatment of adults with relapsing-remitting (RRMS) and active secondary progressive disease (SPMS)

Treated RMS patients in US



Dynamic RMS treated patients



Mavenclad addresses clear medical needs

- **Previously treated** patients represent the vast majority of the dynamic patient pool
- **Lack of efficacy** is the predominant driver of switching, hence observed "high-efficacy" share of switches
- **Intolerance** also drives switching, though to a lesser degree, and results in switches between classes

→ Novel mechanism and unique oral short-course regimen of **Mavenclad addresses these needs**

Source: Decision Resource Group, MS Epidemiology Overview, October 2017; [1]High efficacy includes Ocrevus, Tysabri, Lemtrada, Gilenya – platform includes all other approved agents

Merck KGaA
Darmstadt, Germany

Mavenclad
Dosing regimen and revenue recognition

MAVENCLAD® (cladribine) tablets 10 mg

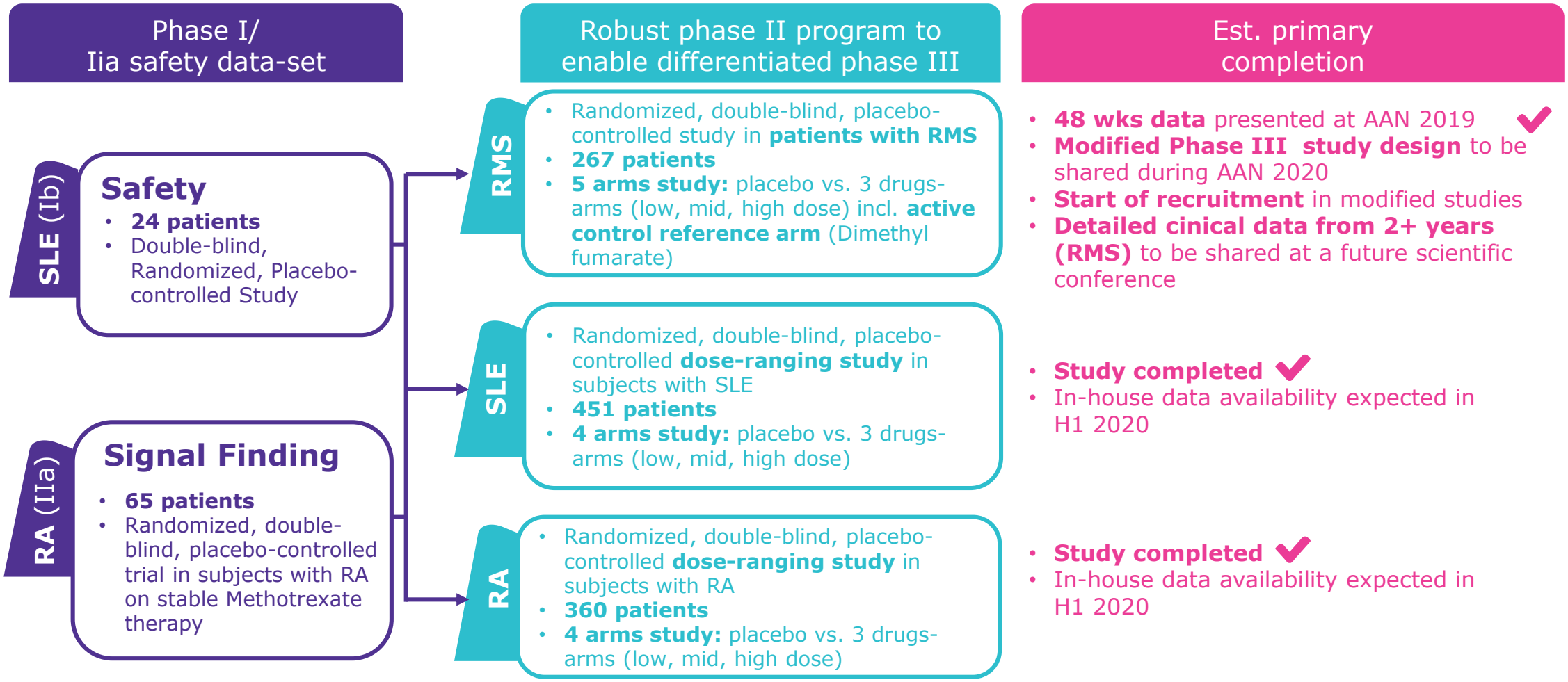
Simplified for illustrative purposes

	Year 1	Year 2	Year 3	Year 4
Treatment	**Maximum of 20 days of oral treatment** spread over 2 years (# of tablets weight-based) **Week 1:** max. 10 tablets **Week 2-4:** no treatment **Week 5:** max. 10 tablets **Week 6-52:** no treatment	**Week 1:** max. 10 tablets **Week 2-4:** no treatment **Week 5:** max. 10 tablets **Week 6-52:** no treatment	**No treatment**	
Payment	**Rx:** Max 20 tablets prescribed across Week 1 & Week 5 followed by immediate payment	**Rx:** Max 20 tablets prescribed across Week 1 & Week 5 followed by immediate payment	**No payment** **No revenue**	

Physician issues one SRF per year, pharmacy registers 2 TRx per 1 SRF

Acronyms: Rx = Prescription, SRF = Service Request Form,

Evobrutinib
Comprehensive development plan across immune-mediated diseases



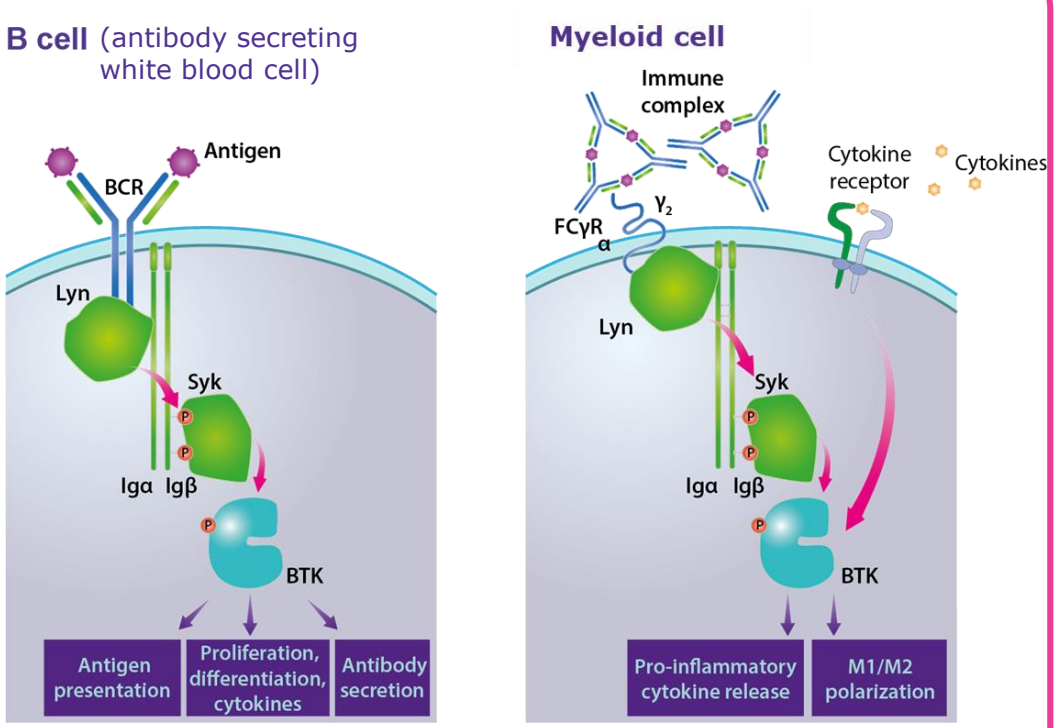
All timelines are event-driven and may be subject to change

Evobrutinib
BTK inhibitor with a dual mode of action

Dual Mechanism of Action

- **Bruton's tyrosine kinase inhibitors (BTKi's)** are traditionally used in oncology but are now also **being evaluated in immunology**
- B-cell depletion studies have shown that antibody-independent **B-cell functions play an important role in MS pathogenesis** (development)[1-3]
- An **altered innate immune system contributes to progression in MS**[4,5]
- **Evobrutinib has a dual mode of action**, impacting on B-cells, macrophages and pathways involved in inflammation in MS; this has been confirmed in animal models[6-11]

Involvement of BTK in immune cell function



[1] Bar-Or A, et al. Ann Neurol 2010; [2]Fraussen J, et al. Autoimmun Rev 2016; [3]Jelcic I, et al. Cell 2018; [4]Rawji KS, et al. Front Cell Dev Biol 2016; [5]Vogel DY, et al. J Neuroinflammation 2013; [6]Data on file: EMD Serono M2951 Investigator's Brochure July 2015; [7]Haselmayer P, et al. EULAR 2016; [8]Data on file: EMD Serono Internal Study Report Aug 2012; [9]Alankus YB, et al. ECTRIMS 2018; [10]Torke S, et al. ECTRIMS 2018; [11]Boschert U, et al. ECTRIMS 2017

Significant unmet medical need remains in RMS

Evobrutinib (BTK-inhibitor)

Unmet needs in RMS …

Need for new mechanisms to control disease

- **Approx. 50% of patients with RMS continue to have ongoing disease activity** over 2 years even when treated with the most effective agents[1]
- Therapies addressing adaptive and innate pathobiology **peripherally and in the CNS**

Need for higher efficacy oral therapies

- 5 approved therapeutic classes considered "higher efficacy"[2], **only 2 of which are oral**
- No approved oral therapy with **efficacy on progression vs. an active control**

Opportunity to advance on benefit-risk

- **Systemic side effects** of therapies limit patient acceptance and compliance
- All approved higher efficacy therapies **associated with elevated risk of infection**

… addressed by Evobrutinib in RMS

- **Well Tolerated**, **no new safety signals** identified up to ~96 weeks
- Long term exposure of Evobrutinib did **not result in increase of serious infections nor lymphopenia**, consistent with Evobrutinib's mechanism of action
- Evobrutinib is **not associated with systemic side effects** (e.g. GI disturbances)
- **LFT elevations in a minority of patients restricted to first 6 months** enabling patient management through appropriate monitoring
- **Comprehensive safety characterization** based on exposure to Evobrutinib across RMS, RA and SLE studies

≥1,200 patient data base

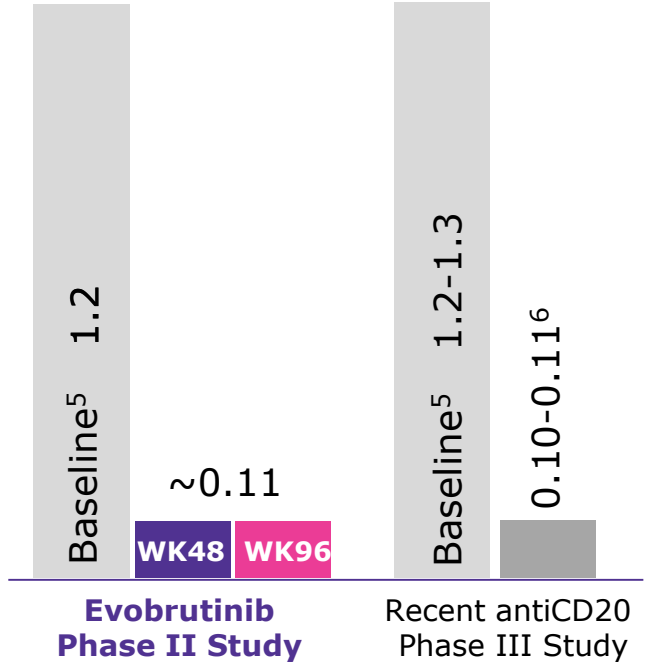
2 years+ in RMS

[1]Disease activity based on NEDA/No Evidence of Disease Activity; [2]5 Higher efficacy classes: VLA-4 (Natalizumab, IV), CD52 (Alemtuzumab, IV), CD-20 (Ocrelizumab, IV), S1PR (Fingolimod & Siponimod, Oral), Cd-ATP (Cladribine tablets, Oral); Acronyms: CNS = Central Nervous System, RMS = Relapsing Multiple Sclerosis

Evobrutinib
~96 weeks data from Phase II confirms potential for mAb like efficacy with a rapid onset of action

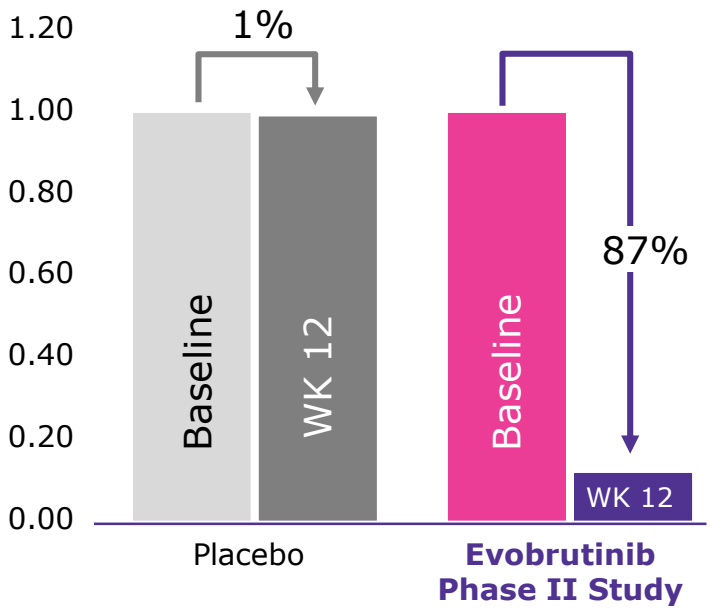
UPDATED DATA

"mAb like" Efficacy[4]



Annualized Relapse Rate

Rapid Onset of Action



Mean Number of T1 Gd+ lesions by visit[2] (Week 12 Indexed vs. Baseline)

Direct CNS and Peripheral Effects

- **Impacts B-Cells and Myeloid Cells**, which play a key role in the pathophysiology of MS
- **Crosses the blood-brain barrier[1]**
- Achieves **Brain BTKi occupancy[3]**
- **Potential to impact CNS** resident innate immunity as well as peripheral immune components

[1]Experiment in Healthy Mice (Data on file); [2]Exploratory analysis; [3]Boschert U et al. ECTRIMS 2017 [P678]; [4]Aspirational indirect comparison, no H2H studies performed; [5]Mean number of relapses in last 12 months; [6]Flexible duration, maximum duration for up to 30 months; Acronyms: BTKi = Bruton's Tyrosine Kinase inhibitor, CNS = Central Nervous System, mAb = monoclonal Antibody, Gd+ = Gadolinium Enhancing Lesions, WK = Weeks

Evobrutinib
mAb like efficacy data drives modification of Phase III study design

Initial Design
- Evobrutinib 48 wk data
- No data from H2H studies vs. Aubagio®

CIS + RRMS + aSPMS

Evobrutinib

Avonex®

Treatment period 96 Weeks

2 x Ph III

Modified Design
- Evobrutinib ~96 wk data
- Data from 2 H2H studies vs. Aubagio®

CIS + RRMS + aSPMS

Evobrutinib

Aubagio®

Treatment period 96 Weeks

2 x Ph III

Impact

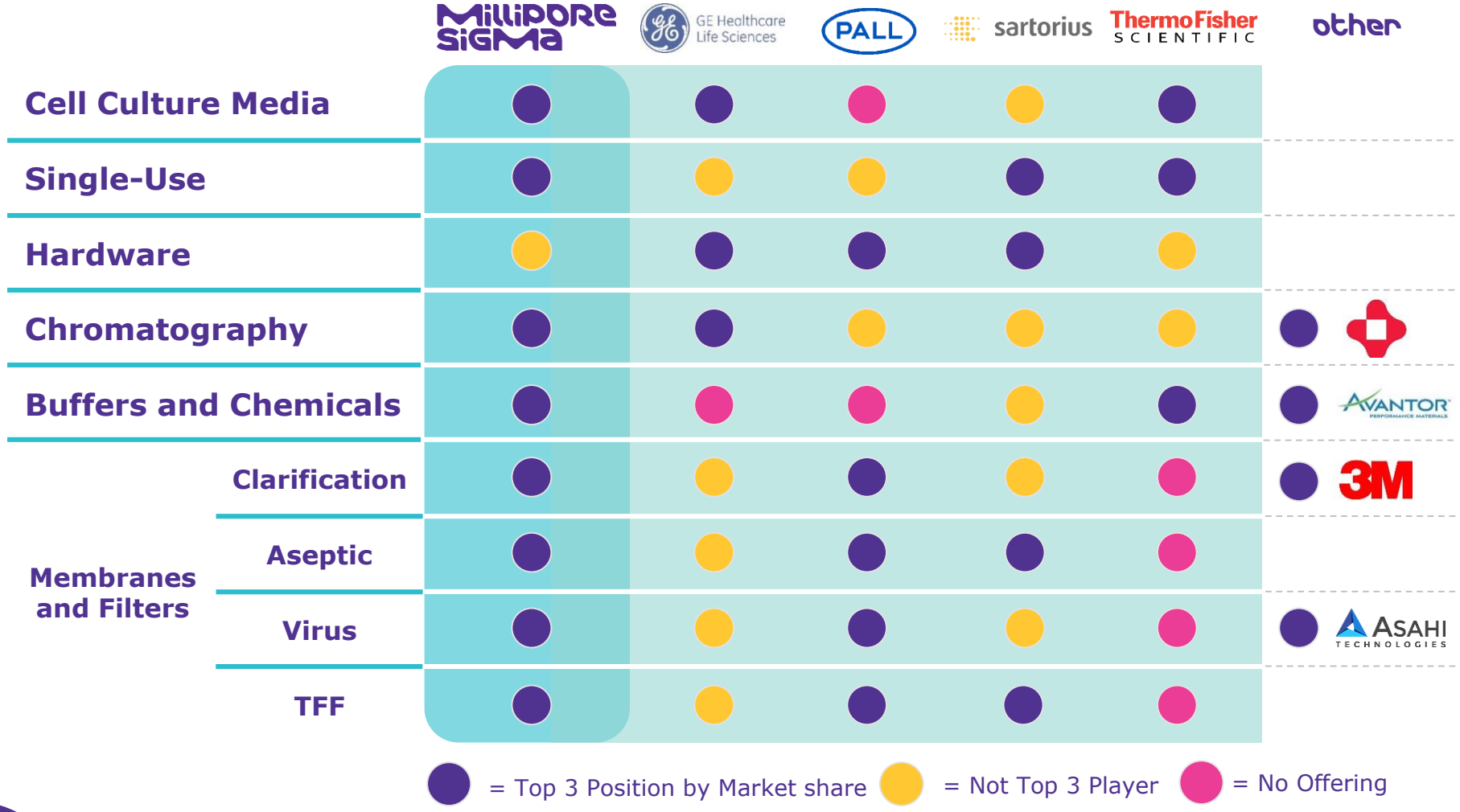
- Studies vs Avonex® will be replaced by **2 new studies vs Aubagio®**
- **Fundamentally unchanged study design**, POS, and cost
- **Broad network of sites selected** for study vs. Avonex® ready to pivot to modified design
- Goal is to have **Phase III RMS data in-house in Q4 2023, and filing shortly thereafter**

Acronyms: aSPMS = active Secondary Progressive Multiple Sclerosis, CIS = Clinically Isolated Syndrome, H2H = head-to-head, mAb = monoclonal Antibody, wk = weeks, POS = Probability Of Success, RRMS = Relapsing-Remitting Multiple Sclerosis; Avonex® is a registered trademark of Biogen; Aubagio® is a registered trademark of Sanofi

Process Solutions

We are the only company to span the entire value chain of our customers

2018 Market share position estimate[1]



Life science has a leading position in 8 out of 9 critical steps

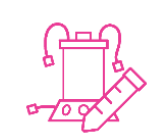
[1]Based on internal Life Science market research; TFF = tangential flow filtration

Process Solutions

Next-generation bioprocessing on the cards

Today's process & portfolio

Make



CHOZN
Cell Line

Ex-Cell® Advanced™
media

Mobius®
bioreactor

Clarisolve®
Depth Filters

Eshmuno®
Chrom. resin

purify

Viresolve®
Pro Solution

ProSep®
Ultra Plus Resin

Opticap®
Filters

Launched 2018

Pellicon®
Ultrafiltration Cassettes

Durapore®
Filtration

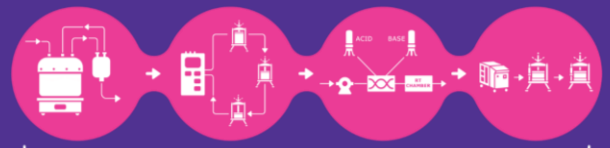
Launched 2018

Millipak®
Final Fill Filter

BioReliance ® | **cGMP SOLUTIONS & SERVICES** | **EMPROVE®**

Tomorrow's process

mAb process intensification 2017 - 2020+



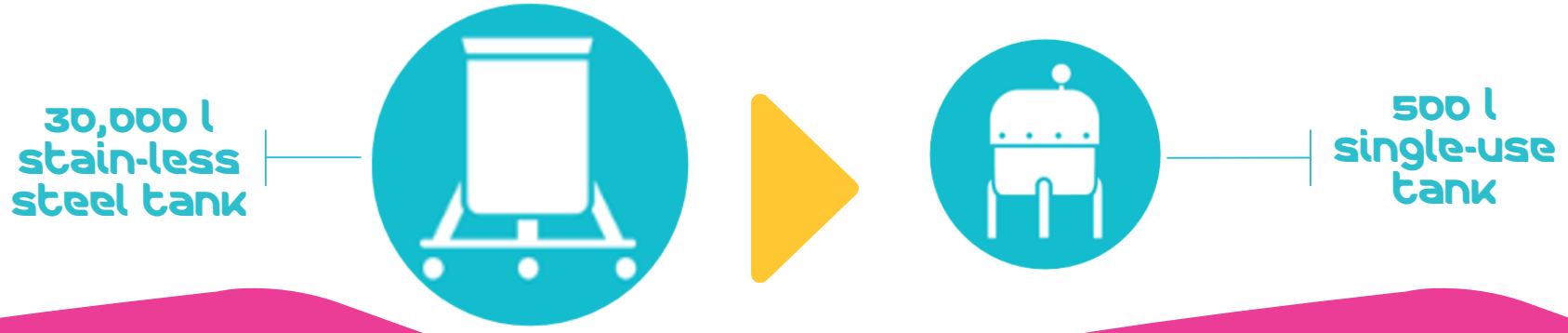
continuous processing >2025

Continuous bioprocessing will …

- be an evolution in mAb bioprocessing
- take time to establish
- leverage the present
- lead to hybrid solutions

Process Solutions

Our single-use technologies drive flexibility in modern bioprocessing



Traditional Multi-use facility	
CAPEX* required	**~$500 m to $1 bn**
Time to construct	**5 to 10 years**
Change over time	**4 weeks**
Footprint	**~>70,000 m²**

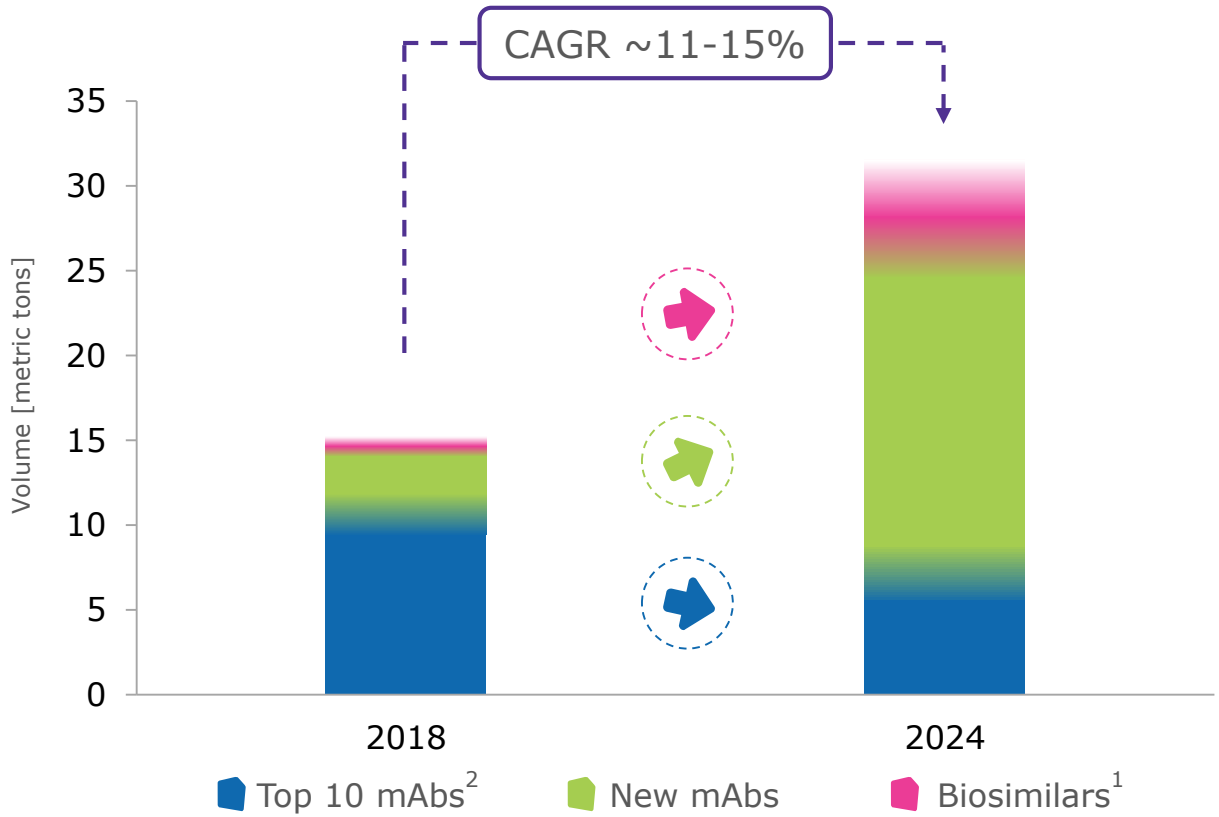
Innovative single-use facility	
CAPEX required	**$20 m to $100 m**
Time to construct	**1.5 years**
Change over time	**0.5 days**
Footprint	**~11,000 m²**

Strong demand for single-use technologies and Process Solutions' broad offering was and will remain a key source of growth for Life Science

*CAPEX = Capital Expenditure

Democratization of mAbs market will drive diversification, change, variability

mAb volume projections 2018 to 2024



Market development

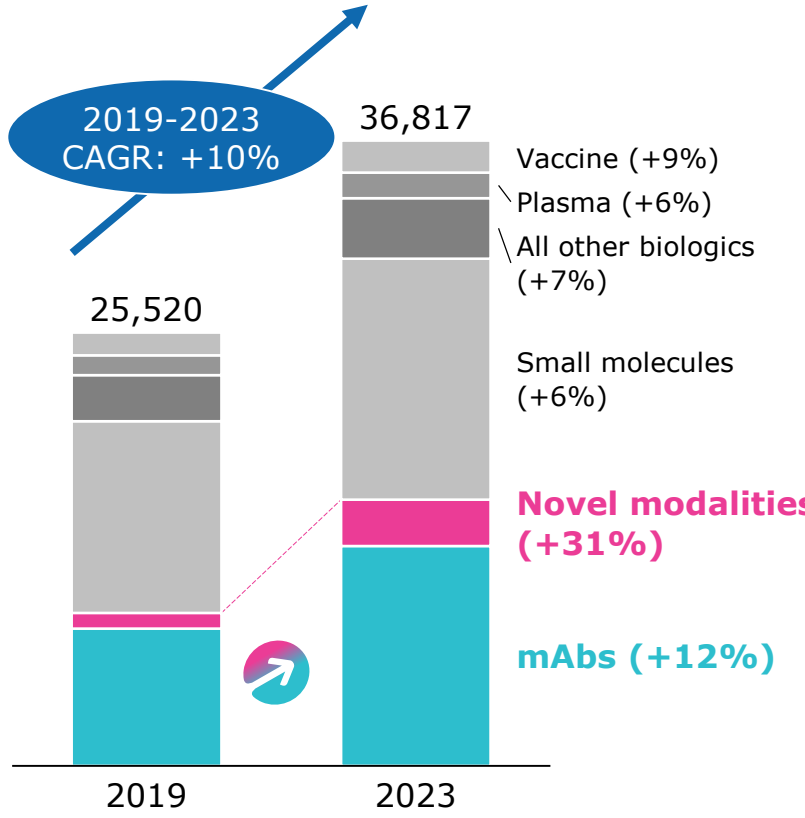
- Overall mAbs market will grow ~11-15% CAGR
- Top 10 originator mAbs represent ~ 60% of market volume today and will decline to ~20% in 2024
- Biosimilars will gain share

[1]Biosimilars scaling factor = 2.8 based off internal estimates and McKinsey analysis; [2]Top 10 mAbs by 2017 volume, includes Enbrel.
Source: EvaluatePharma | Sept 2018; mAbs = Monoclonal antibodies

Life Science

Process Solutions: Growth opportunities beyond mAbs

Growth potential by segment
Accessible market [€m], 2019-2023 CAGR[1]



- **Diversifying products and services** in line with the new modalities coming to the market: fusion biologics, viral and gene therapies, cellular therapies
- **Leading technologies:** investments over 15 years, 20 granted CRISPR patents
- **Services:** investments in CDMO capacity for Viral Vector Manufacturing, and HP-API

- **Leading technologies:** Single Use and BioContinuum™ for intensified and continuous bioprocessing
- **Services:** Contract manufacturing for biotechs at 3 global sites

Growth market - China

- **Half of world-wide early stage mAb market** by 2022
- **A leading country** in clinical trials

- **Increased investments** into **Nantong and Wuxi manufacturing sites**
- **China's first BioReliance® End-to-End Biodevelopment Center** opened in Shanghai in 2017

[1]Evaluate Pharma market research; Novel modalities include VGT, Cell Therapy and Stem Therapy; Acronyms: CDMO = Contract Development and Manufacturing Organization, CRISPR = Clustered Regularly Interspaced Short Palindromic Repeats, HP-API = Highly Potent Active Pharmaceutical Ingredients ased on internal Life Science market research; TFF = tangential flow filtration

Applied Solutions

Broad offering across the dynamic cell and gene therapy value chain

understand → prove → deliver →

Merck KGaA, Darmstadt, Germany offering

Develop **cutting-edge tools** for scientists to

- Uncover **foundational understanding**, e.g. CRISPR patent grants in 7 geographies
- **Modify** genetic functions, e.g. CRISPR/Cas 9 tools, library and reagents, ZFN

Create **cell lines and cell models** for testing **safety and efficacy**

- Pharmacokinetics (ADME)
- Toxicology testing
- Potency model
- Examples: primary human hepatocytes, Intestine, liver and kidney assays

- Offer cGMP clinical and commercial manufacturing, e.g. manufacture **viral vectors**
- Improve the **supply chain of cell therapy**, e.g. cell and gene therapy products and services

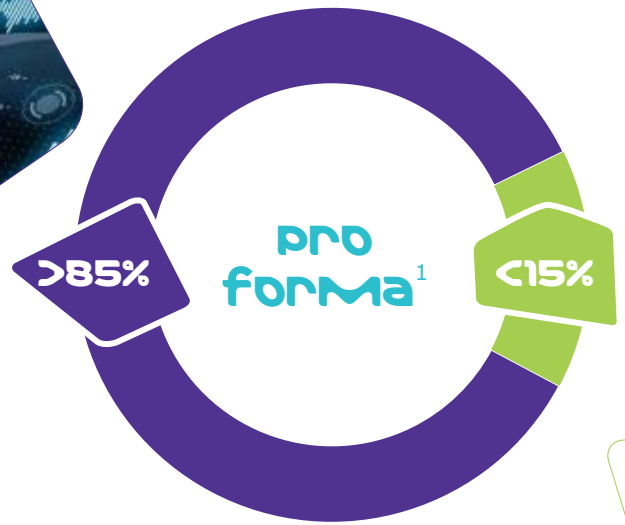
Merck KGaA, Darmstadt, Germany is a supplier of novel products and services with a strong IP portfolio to meet the rapidly growing demand for novel therapies

Abbreviations: CRISPR = Clustered Regularly Interspaced Short Palindromic Repeats; VGT = Virology and Gene Therapy, ZFN = zinc finger nuclease; ADME = absorption, distribution, metabolism, and excretion; GMP = good manufacturing practice

Performance Materials targets attractive markets – especially in the electronics space

- Driven by digital disruptions and megatrends such as digitalization
- Heterogeneous end-user applications
- Semiconductors as the engine of all electronic systems

Performance Materials sales by end market

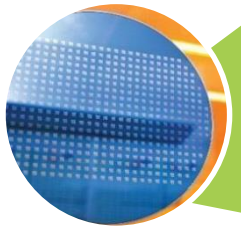


- Driven by world GDP growth
- Increasing demand in emerging markets

- Driven by world GDP growth
- Rising living standards and higher disposable income

[1]Pro forma net sales: PM net sales LTM Q3 2018-Q2 2019 + Versum Materials sales LTM Q4 2018-Q3 2019; Source: McClean/IC Insights 2020, Prismark 2018, Statista 2016; Abbreviation: CAGR = Compound annual growth rate; GDP = Gross domestic product

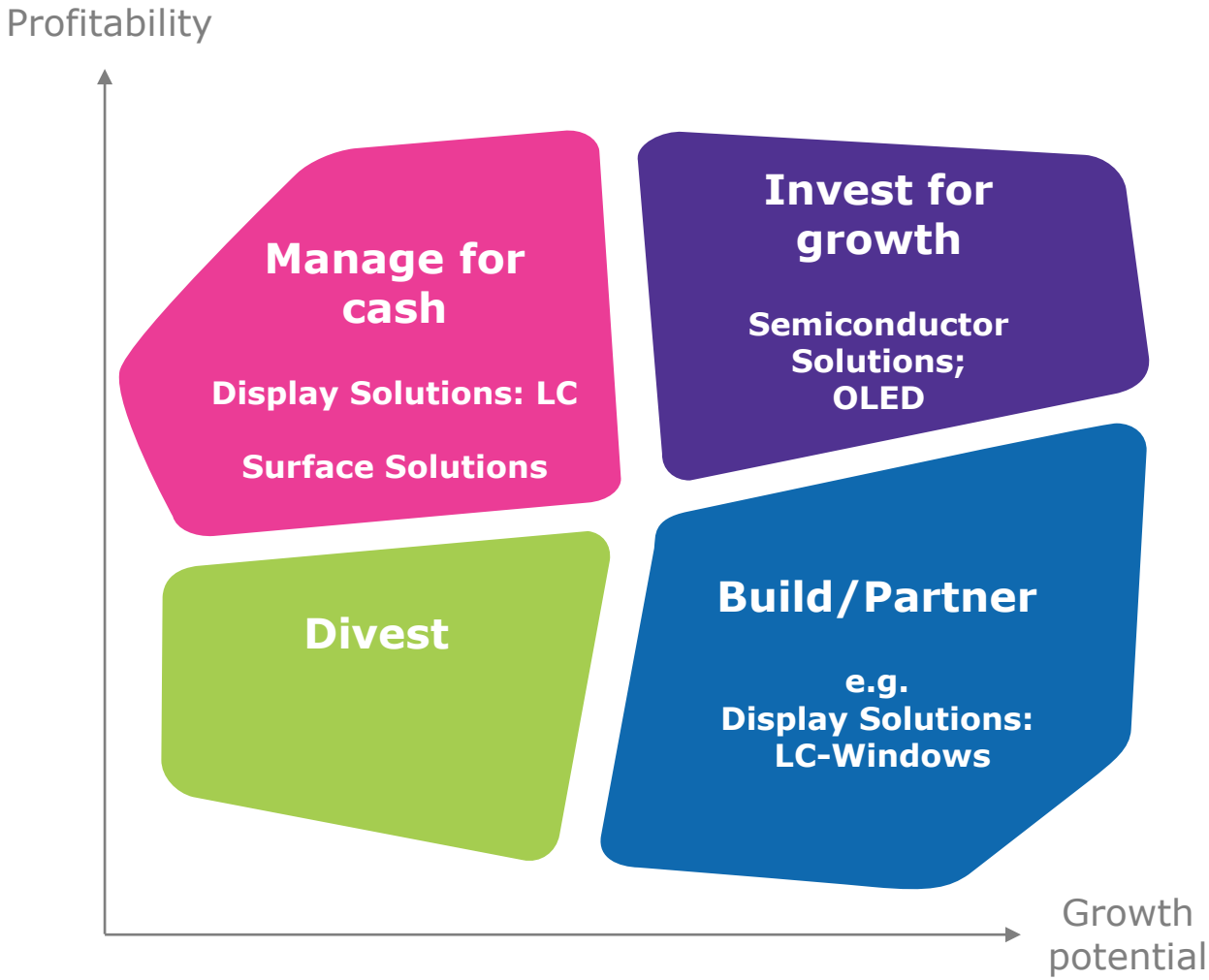
Performance Materials
Three high-tech pillars serving a diverse customer base

Business allocation within Performance Materials	% of sales[1]	Products
 semiconductor solutions	 ~50%	• Dielectrics, colloidal silica, lithography materials, yield enhancers, edge-bead removers • Polyimide raw materials, printing materials and specialty gases • Delivery equipment for gas, chemicals and CMP slurries, installation services and parts & support
 display solutions	 ~35%	• Liquid crystals (LC) and photoresists for TVs, smartphones and tablet computers • Other display and non-display applications (e.g. LC Windows) • Organic and inorganic light emitting diodes
 surface solutions	 ~15%	• Effect pigments and functional materials for coatings, plastics, printing and cosmetics • Functional materials for cosmetics & special applications • Functional materials for electronics and energy solutions

[1]Pro forma net sales: PM net sales LTM Q3 2018-Q2 2019 + Versum Materials sales LTM Q4 2018-Q3 2019

Performance Materials

Business portfolio management drives capital allocation and enables future value creation



Invest for growth

- Strong and sustainable market growth
- Leading positions and attractive growth opportunities

Manage for cash

- Mature and lucrative market segments
- Invest in extension, while managing for profit

Build or Partner

- Early industry cycles with strong potential
- Strictly prioritize and diversify risk

Divest

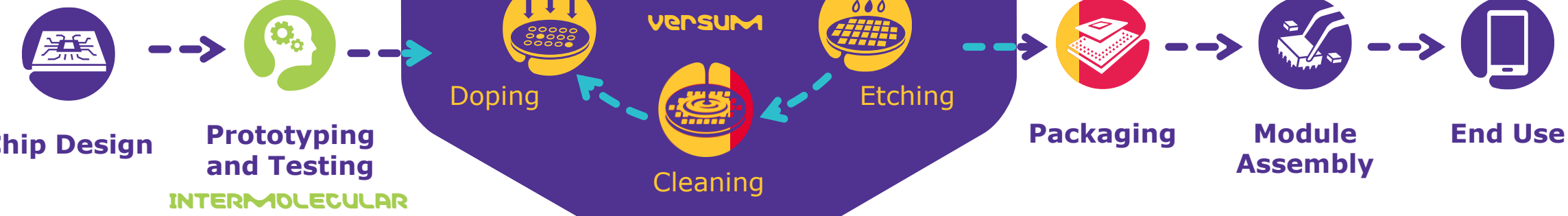
- Regular review for better strategic owner

Performance Materials

Semiconductor Solutions even stronger with Versum and Intermolecular

Newly combined portfolio offers **End2End solutions** with leading positions in **high growth segments**

Wafer processing offers **highest value creation potential** along the semiconductor value chain

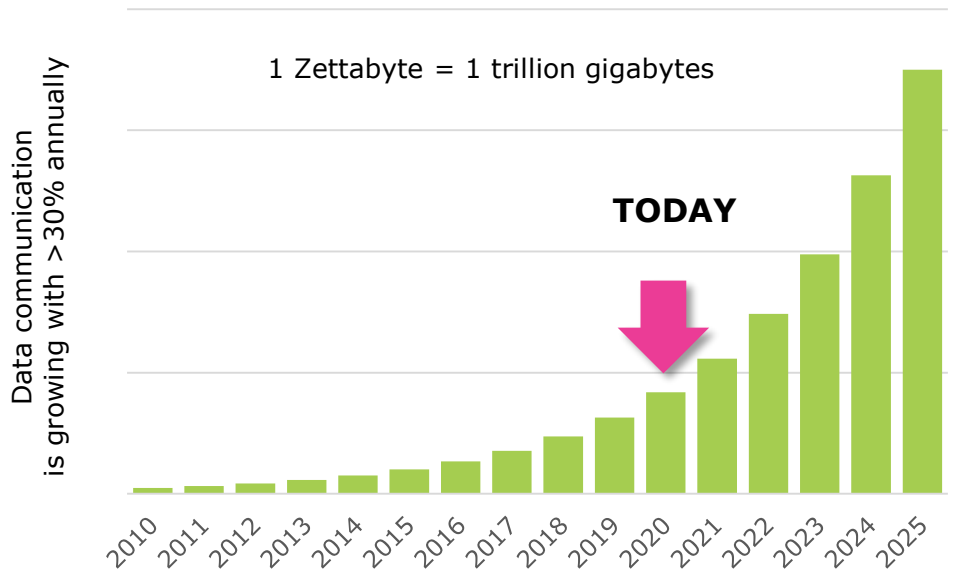


Performance Materials

Semiconductor Solutions – Data explosion driving secular growth

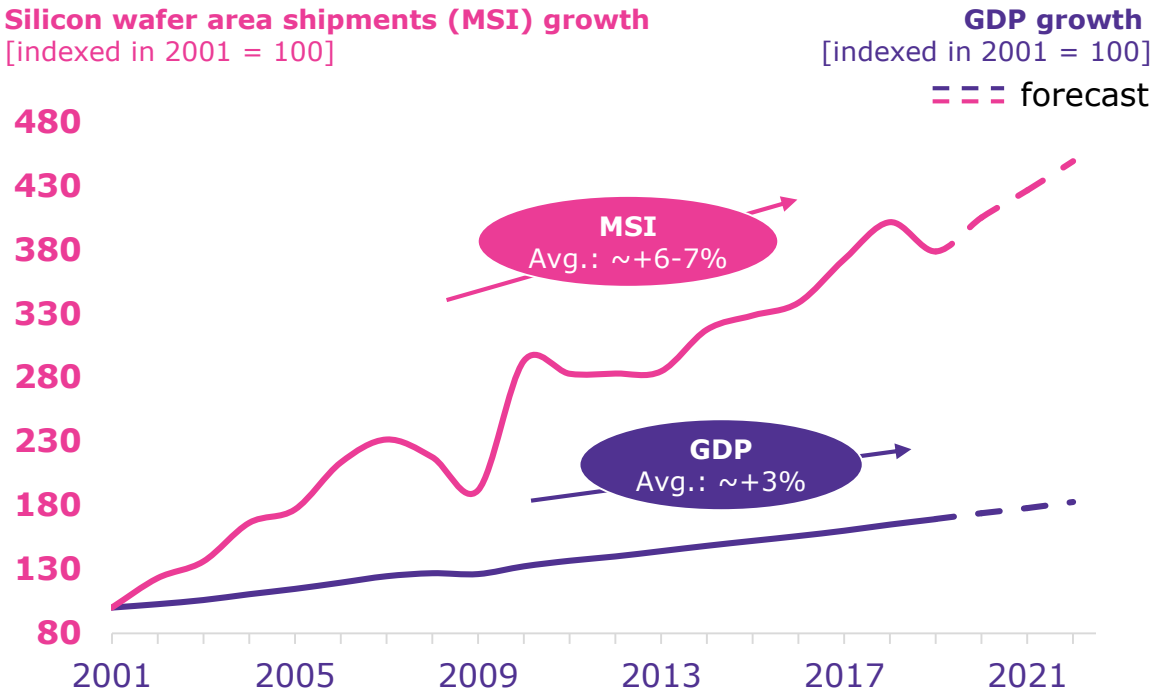
End-market – Data driving growth of electronics industry[1]

Size of global data sphere in zettabytes[1]



- Data **volumes growing at >30% annually**
- **Driving the digital revolution** as semiconductors are required for data processing and storage

Silicon wafer area shipments– Sustainable long-term growth[2]

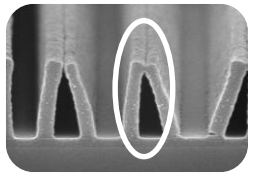


- Silicon wafer area shipments (MSI) **strongly correlated with semiconductor market growth**
- **MSI expected to return to growth as of 2020**

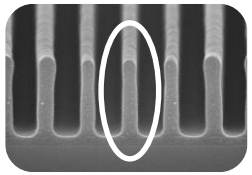
[1]IDC DataAge 2025 Whitepaper; [2]SEMI Silicon Manufacturers Group; Semi.org; ESF July 2019; Prismark; Linx June/July 2019, Silicon wafer area shipments are for semiconductor applications only and do not include solar applications; Acronyms: GDP = Gross Domestic Product, MSI = Million of Square Inches

Expanding the limits of how small you can go

Pattern collapse

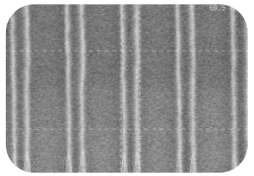


AZ FIRM® rinse materials



As lines get narrower and closer together in advanced chip generation, lines tend to "stick" due to surface tension.

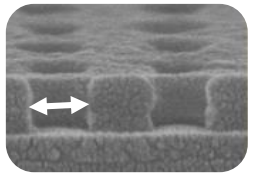
Lithography limitation



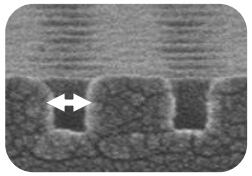
Directed self-assembly (DSA)

Block copolymer can generate small lines or contact holes by self-assembly. This allows miniaturization without expensive new equipment.

Wide features



AZ Relacs® shrink materials

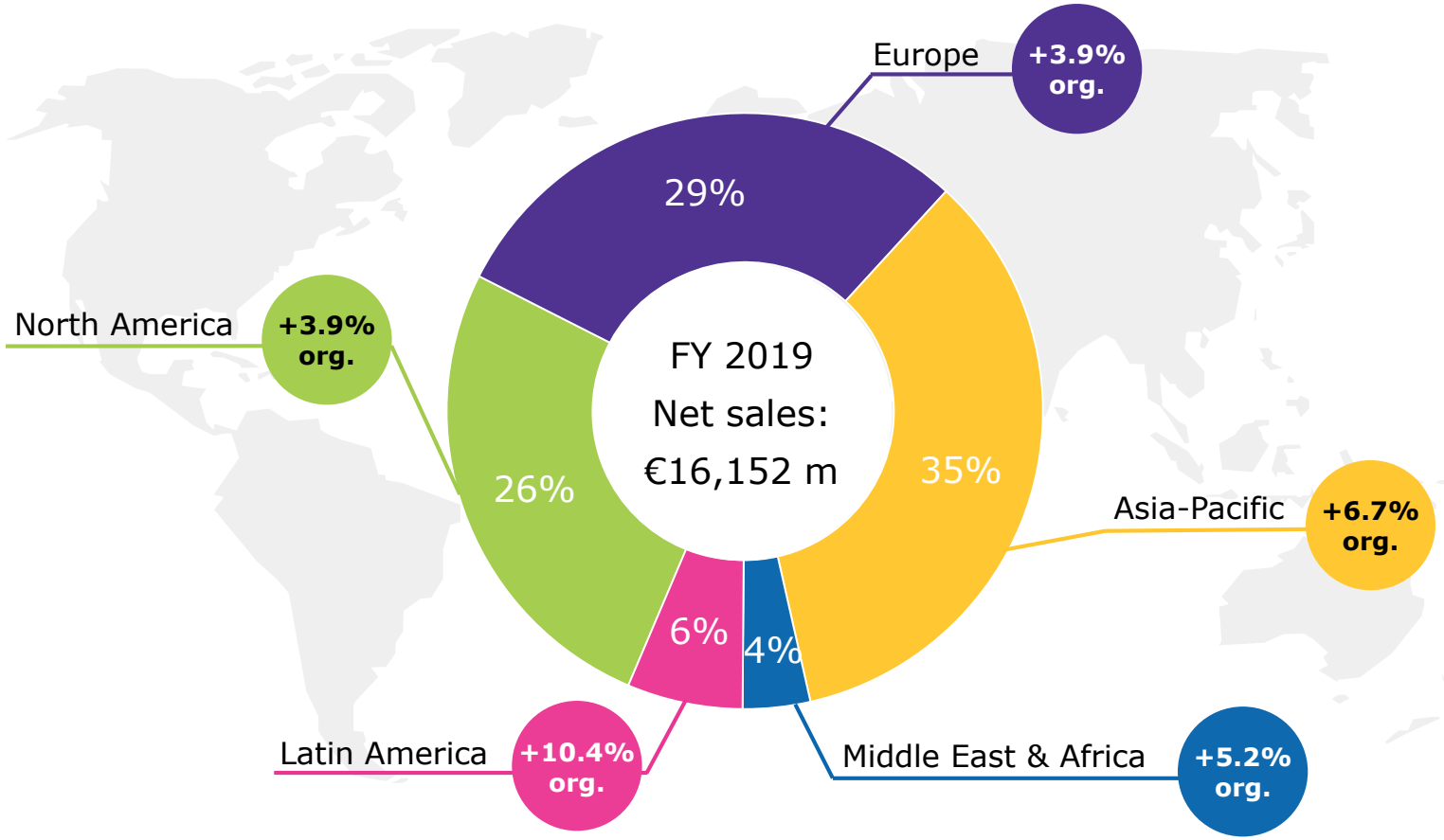


Shrink materials "shrink" the gap between lines and, hence, allow the manufacture of narrower features otherwise not possible.

Merck KGaA, Darmstadt, Germany delivers highly innovative solutions for complex customer problems

All regions drive organic growth

Regional breakdown of net sales [€m]



Regional organic development

- Europe with solid growth driven by strong Life Science; Mavenclad® ramp-up offsetting Rebif® decline
- North America reflects strong Life Science; Mavenclad®, Fertility and Bavencio® mitigate ongoing Rebif® decline
- Strong APAC fueled by double-digit growth of Life Science and Healthcare, especially Glucophage® and Erbitux®; OLED mitigating liquid crystals decline
- LATAM with double-digit growth reflecting strong demand in Healthcare's core business and Life Science
- Middle East and Africa driven by solid demand in Neurology & Immunology and Fertility

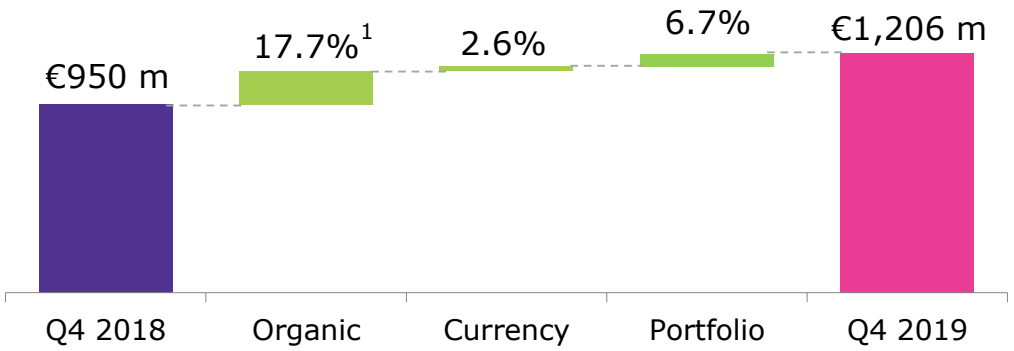
Acronyms: APAC – Asia-Pacific; MEA – Middle East & Africa; LATAM – Latin America

Life Science and Healthcare fuel organic growth of top- and bottom-line, supported by Versum Portfolio and FX tailwinds

Q4 2019 YoY net sales	Organic	Currency	Portfolio	**Total**
Healthcare	8.4%	2.0%	0.0%	**10.4%**
Life Science	7.8%	2.3%	-0.6%	**9.5%**
Performance Materials	-15.2%	2.3%	39.7%	**26.8%**
Group	4.3%	2.2%	6.2%	**12.7%**

- Strong performance in Healthcare reflects growth of core business and strong uptake from pipeline products
- Life Science fueled by ongoing strong demand in Process Solutions despite last year's high base
- Performance Materials as expected, reflecting decline in liquid crystals despite strong demand in OLED; ongoing weak market demand in Semiconductor and Surface Solutions

Q4 YoY EBITDA pre



- Increased organic EBITDA pre due to solid top-line growth and cost consciousness in Healthcare; Life Science with sustained strong performance
- Positive FX impact on EBITDA pre due to US dollar and Argentine peso
- Positive portfolio effect driven by Versum, partially offset by Intermolecular

[1]Thereof IFRS 16 effect with +4.5 percentage points (~ €40 m);
Totals may not add up due to rounding

Q4 2019: Overview

Key figures

[€m]	Q4 2018	Q4 2019	Δ
Net sales	3,888	**4,381**	12.7%
EBITDA pre *Margin (in % of net sales)*	950 *24.4%*	**1,206** *27.5%*	27.0%
EPS pre	1.22	**1.54**	26.2%
Operating cash flow	741	**690**	-6.8%

[€m]	Dec. 31, 2018	Dec 31, 2019	Δ
Net financial debt	6,701	**12,363**	84.5%
Working capital	3,486	**3,944**	13.2%
Employees	51,749	**57,071**	10.3%

Comments

- All business sectors drive net sales growth
- EBITDA pre & margin reflect strong top-line growth, GSK deferred income, milestone payments, cost consciousness, strong operating leverage in LS and Versum contribution
- Working capital driven by increased inventory levels, Versum acquisition and FX
- Higher net financial debt and increased headcount reflect Versum acquisition

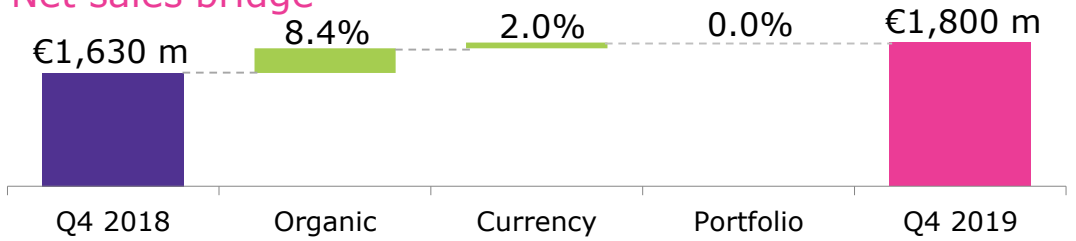
Totals may not add up due to rounding

Healthcare: Mavenclad® and Bavencio® deliver guidance; moderate growth of core business

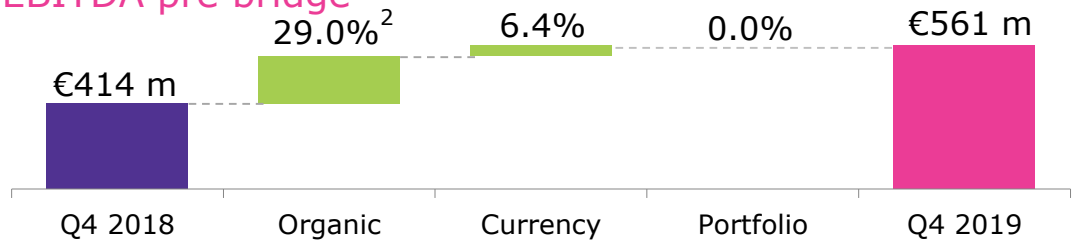
Healthcare P&L

[€m]	Q4 2018[1]	Q4 2019
Net sales	1,630	**1,800**
Marketing and selling	-634	**-595**
Administration	-89	**-90**
Research and development	-493	**-462**
EBIT	190	**351**
EBITDA	403	**541**
EBITDA pre	414	**561**
Margin (in % of net sales)	*25.4%*	***31.2%***

Net sales bridge



EBITDA pre bridge



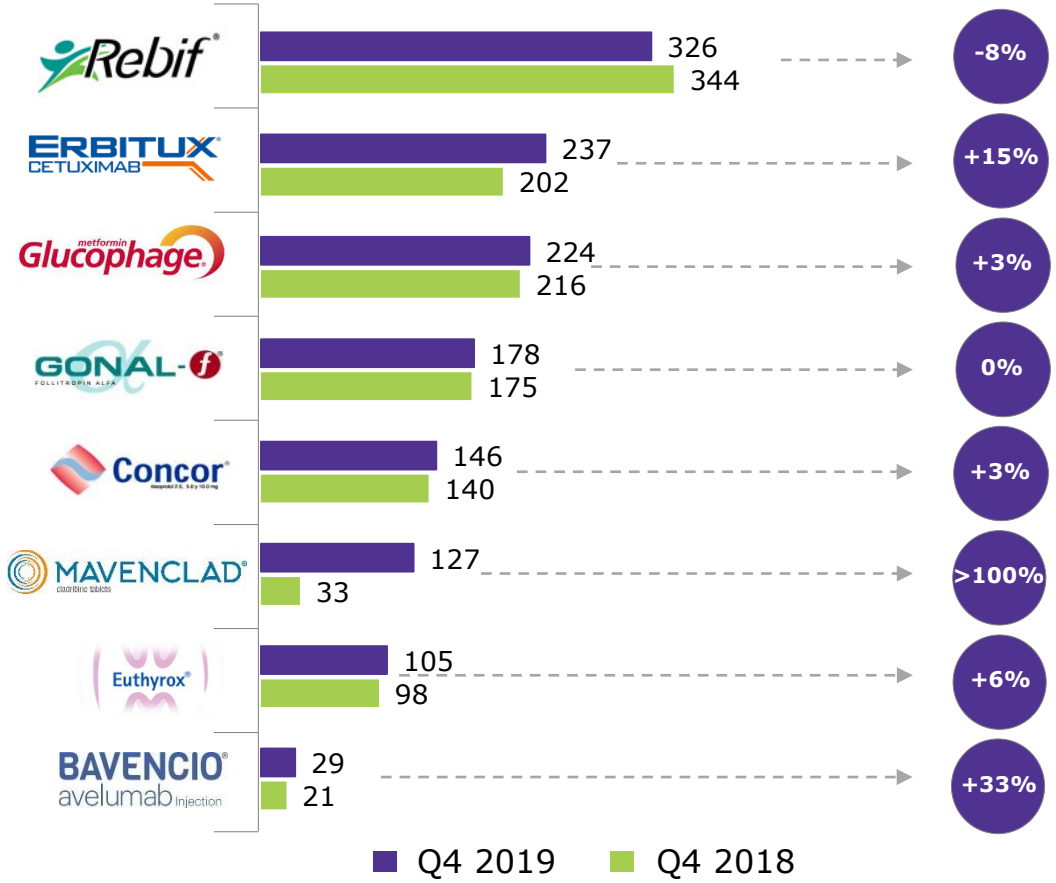
Comments

- Strong growth in Healthcare reflects growth of core business and acceleration of Mavenclad® uptake
- Rapid uptake of Mavenclad® (+43% vs. Q3) across all regions, especially in the U.S. and Europe
- Double-digit growth of Erbitux® mainly driven by China reimbursement (NRDL); Bavencio® as expected
- M&S decrease due to stringent cost management and resource prioritization across franchises
- Lower R&D due to rigorous project prioritization
- Higher EBITDA pre driven by strong top-line performance, cost consciousness, deferred income, milestone payments [Bavencio®(~€55 m)] and IFRS 16

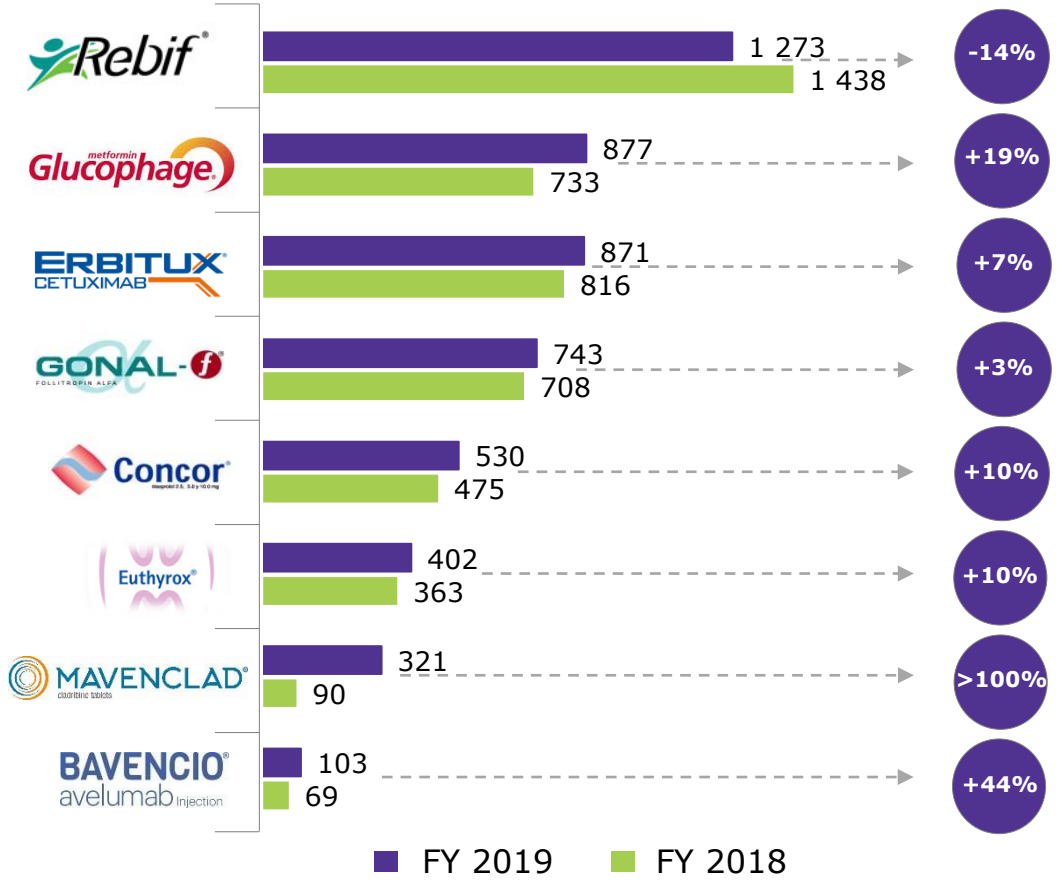
[1]LY numbers have been modified due to disclosure changes of adjustments; [2]Thereof IFRS 16 effect with +3.7 percentage points (~ €15 m); NRDL = National reimbursement drug list; Totals may not add up due to rounding

Healthcare organic growth by franchise/product

Q4 2019 organic sales growth [%] by key product [€m]

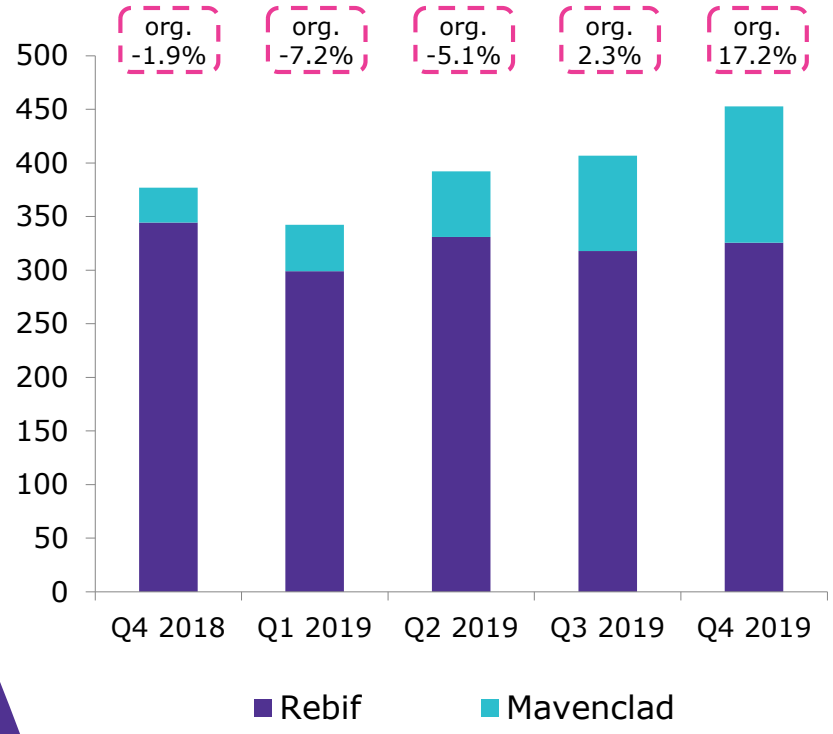


FY 2019 organic sales growth [%] by key product [€m]

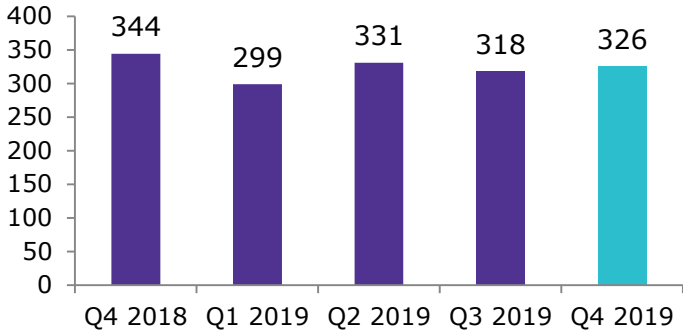


Neurology & Immunology: Strong ramp up of Mavenclad® more than offsets Rebif® decline

Sales development NDI, [€m]



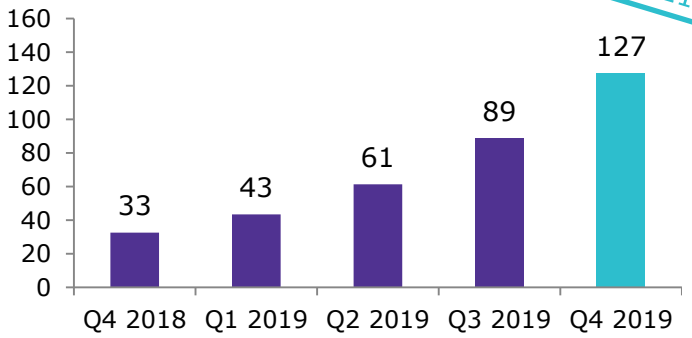
Rebif® net sales, [€m]



- Rebif® sales of €326 m in Q4 2019 reflect organic decline of -7.6%, mitigated by FX effect of +2.2%
- U.S. and European volume decline mainly due to competition
- Temporary deceleration of U.S. decline due to price increase and provision releases related to rebates

Mavenclad® net sales, [€m]

FY 19 net sales: €321 m



Mavenclad® ramp up accelerating across all regions

FY 2019 guidance of ~€300 m achieved

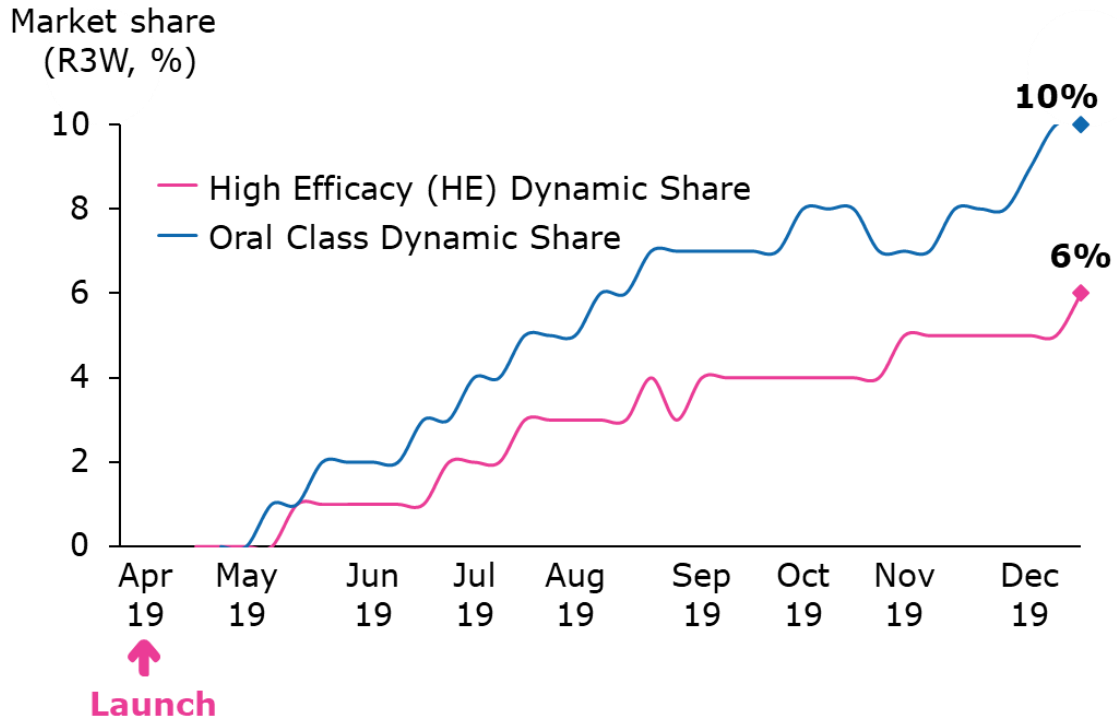
NDI = Neurodegenerative Diseases & Immunology; IFN = Interferon

Merck KGaA
Darmstadt, Germany

Neurology & Immunology: Mavenclad® Launch Update
Triple digit YoY growth (+ €230 m, x3.5 vs FY 2018)

MAVENCLAD® (cladribine) tablets 10 mg

USA: Continued growth within High Efficacy and Oral market[1]



Increased patient access exceeding recent oral benchmarks:
3 out of 4 US patients have access to MAVENCLAD with no NDC blocks[4]

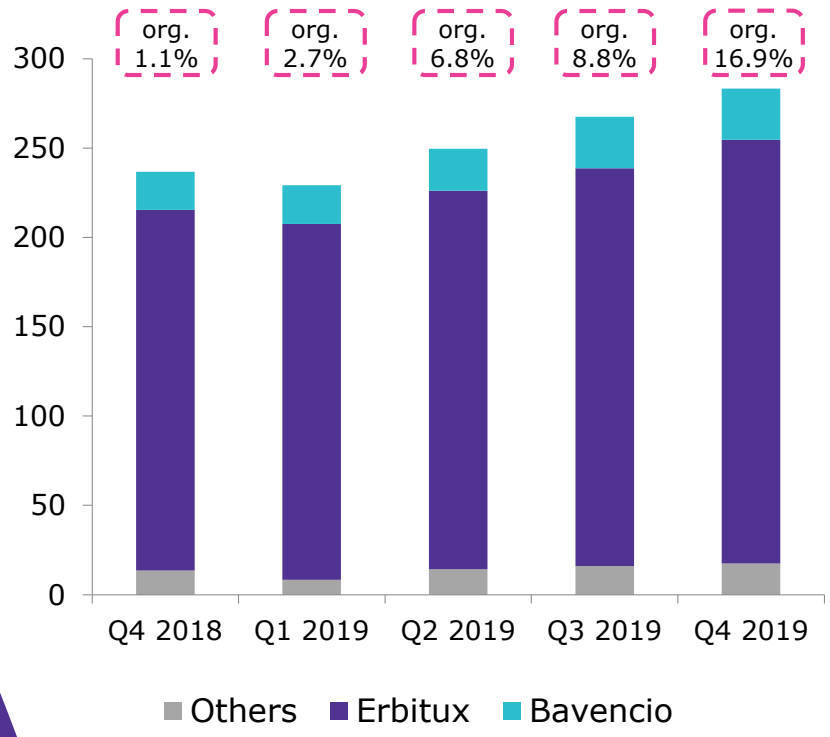
Ex-USA: Strong launch progress globally

- Approved in **75 countries**[2]
- **Leading clinical perception** among oral class in key markets (Germany, UK, Italy and Spain)[3]
- 2020 ex-USA growth to be driven by **continued demand acceleration and FY impact of H2 2019 market access wins**

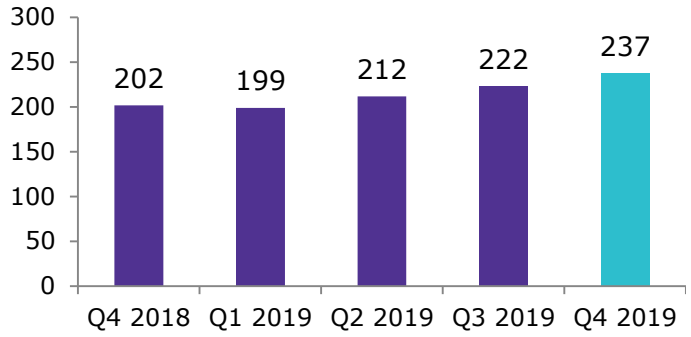
[1]IQVIA Projected National Claims weekly data; R3W = Rolling 3 Weeks; HE market comprises Ocrevus®, Tysabri®, Gilenya®, Lemtrada® and Mavenclad®; Dynamic High Efficacy (HE) market describes share of patients starting on/switching to HE treatments; [2]Internal data on file; [3]Global MAVENCLAD HCP Awareness, Trial, Usage, panel of ~140 physicians in EU4; [4]Driven by major plans incl. Prime Therapeutics and Optum PBM including United Healthcare

Oncology: Double-digit growth reflects strong demand for Erbitux® in China

Sales development Oncology, [€m]



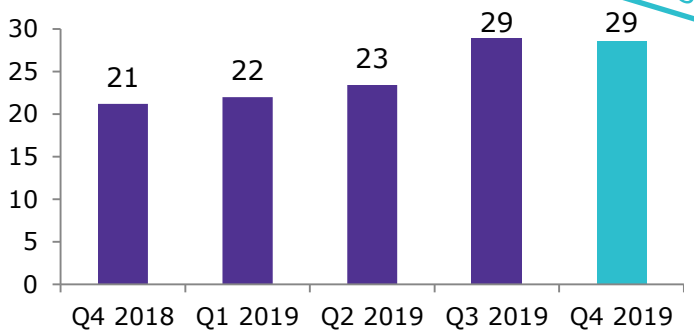
Erbitux® net sales, [€m]



- Absolute sales of €237 m reflect double-digit growth in Q4 (org. 14.5%; FX 3.1%)
- Strong APAC fueled by China reimbursement recognition
- MEA reflects tailwind from tender phasing
- Flat Europe amid ongoing competition, price reductions and declining market size

Bavencio® net sales, [€m]

FY 19 net sales: €103 m

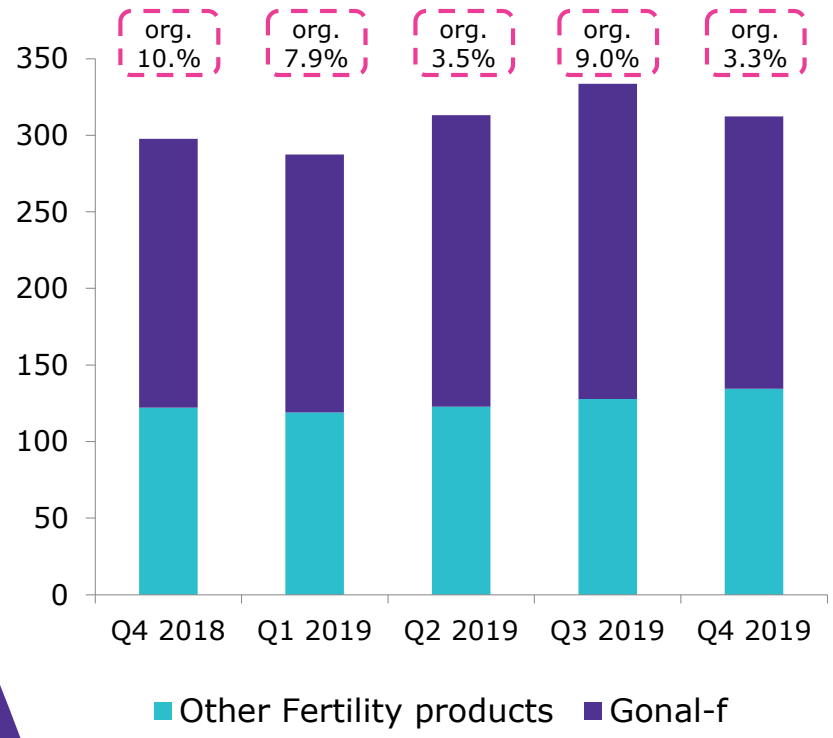


Bavencio® approved for RCC in U.S., Europe and Japan

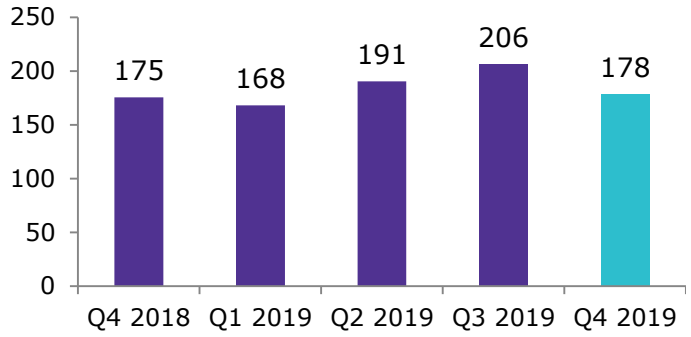
FY 2019 guidance of ~ €100 m achieved

Fertility: Organic growth driven by other Fertility products

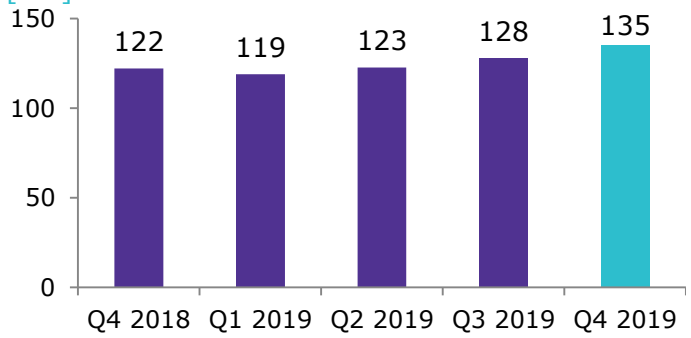
Sales development Fertility, [€m]



Gonal-f® net sales, [€m]



Other Fertility products net sales, [€m]

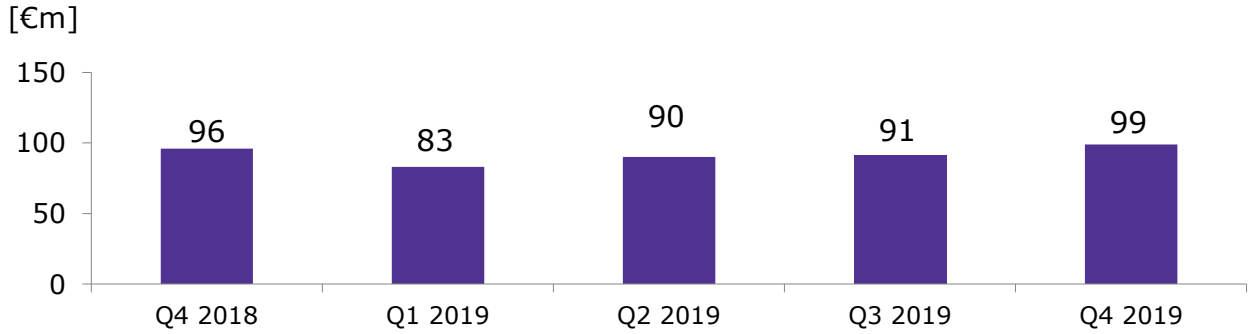


- Fertility posts moderate organic growth driven by Europe and North America
- Flat Gonal-f® results in €178 m absolute sales (org. -0.4%; FX 1.7%)
- Gonal-f® driven by ongoing strong demand in the U.S. overcompensated by price cut in France and tender phasing in Italy
- Other Fertility products with strong organic growth mainly driven by APAC and LATAM

Ongoing strong demand for Euthyrox® drives General Medicine growth

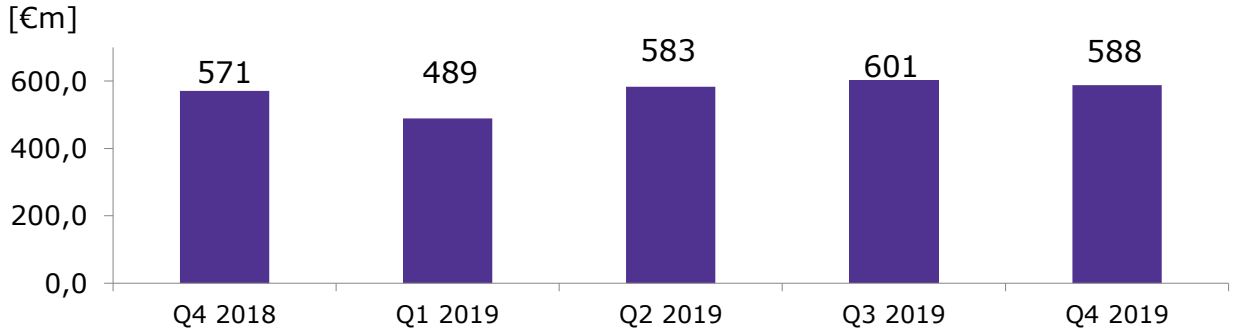
Sales evolution

Endocrinology



Organic
+0.1% org.

General Medicine*



Organic
+2.0% org.

Q4 2019 organic drivers

- Endocrinology reflects strong demand in South Korea, offsetting weaker North America and Europe

- Moderate growth of GM driven by Euthyrox® demand; implementation of new ERP system in China paused growth of Glucophage® and Concor®

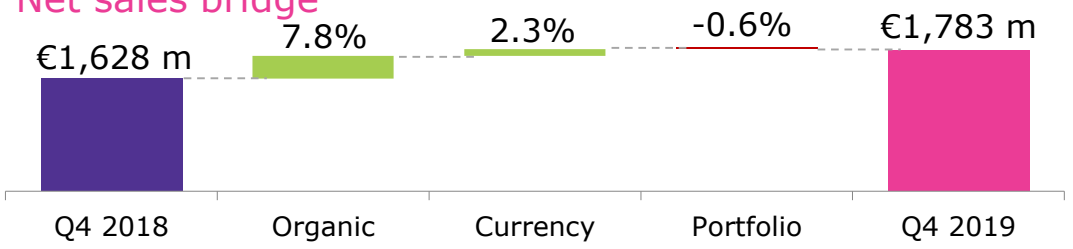
*includes CardioMetabolic Care & General Medicine and Others; ERP = Enterprise resource planning;

Life Science with strong operating leverage

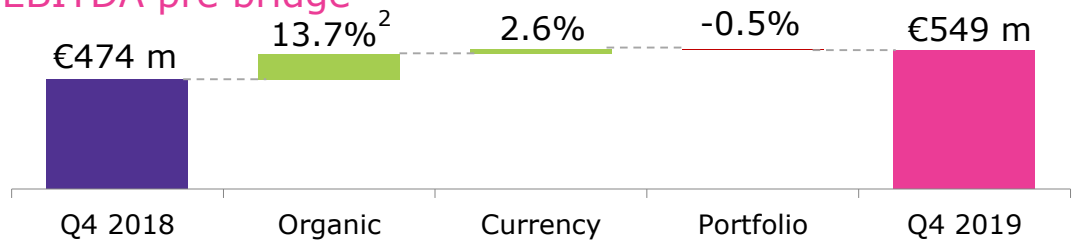
Life Science P&L

[€m]	Q4 2018[1]	**Q4 2019**
Net sales	1,628	**1,783**
Marketing and selling	-473	**-490**
Administration	-106	**-102**
Research and development	-71	**-78**
EBIT	232	**329**
EBITDA	422	**534**
EBITDA pre	474	**549**
Margin (in % of net sales)	*29.1%*	***30.8%***

Net sales bridge



EBITDA pre bridge



Comments

- Process Solutions with ongoing strong demand, BioProcessing as main contributor
- Solid organic growth for Applied Solutions - all businesses contributing, especially lab water
- Moderate organic growth of Research Solutions driven by all businesses, especially China
- Higher M&S reflects strong volume growth and continued investments in eCommerce
- EBITDA pre and margin increase driven by sustained strong top-line, operating leverage and IFRS 16

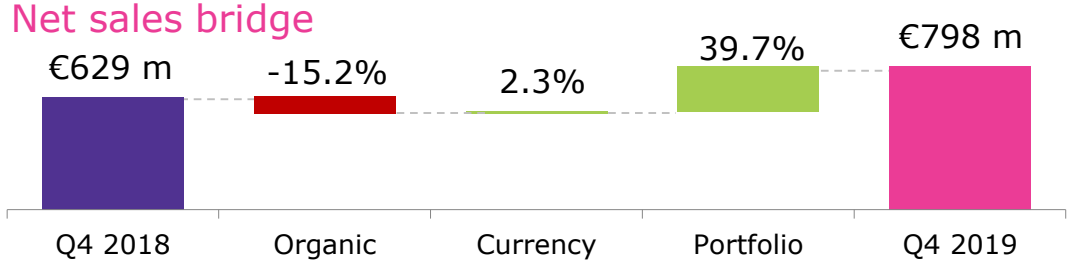
[1]LY numbers have been modified, due to disclosure changes of adjustments; [2]Thereof IFRS 16 effect with +3.9 percentage points (~ €20 m);
Totals may not add up due to rounding

Performance Materials: Expected LC decline has materialized amid continued market slowdown in Semiconductor and Surface

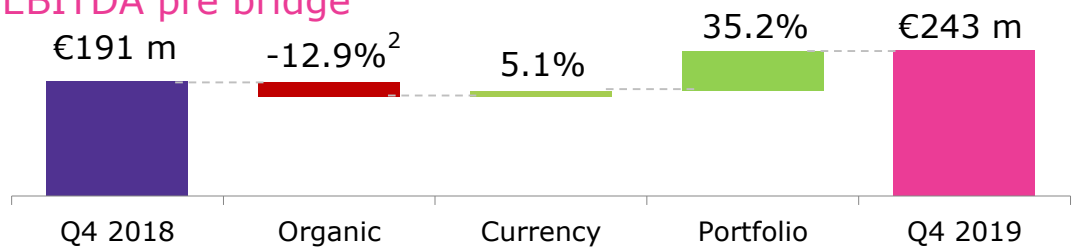
Performance Materials P&L

[€m]	Q4 2018[1]	**Q4 2019**
Net sales	629	**798**
Marketing and selling	-72	**-136**
Administration	-34	**-39**
Research and development	-59	**-73**
EBIT	98	**14**
EBITDA	183	**149**
EBITDA pre	191	**243**
Margin (in % of net sales)	*30.3%*	***30.5%***

Net sales bridge



EBITDA pre bridge

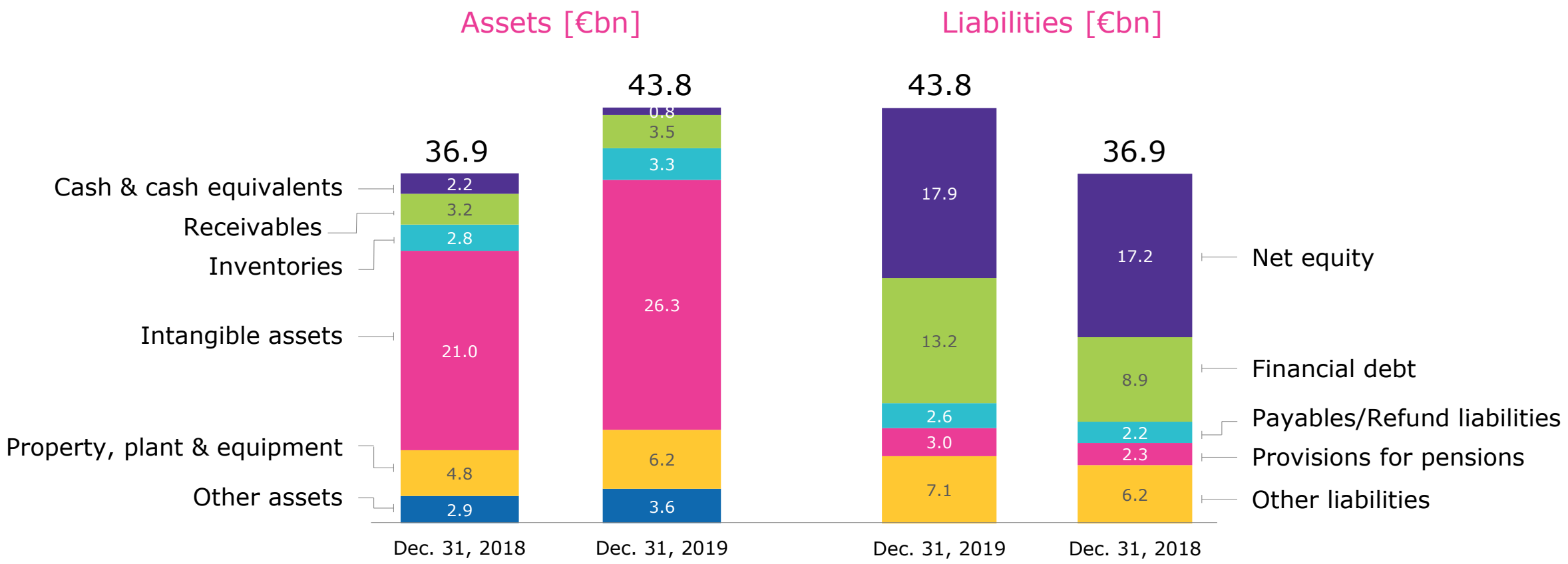


Comments

- Display Solutions as expected: LC returns to negative underlying trajectory against last year's high base, OLED again strong
- Semiconductor Solutions continues to perform above weaker market
- Surface Solutions reflects ongoing weak demand in automotive market
- M&S reflects Versum acquisition, while underlying diligent cost management continues
- Provisions related to Bright Future program and Versum drive R&D increase; underlying reduction reflecting strong cost control
- Organic EBITDA pre decline from reduced organic top-line and negative business mix mitigated by Bright Future measures; absolute EBITDA pre reflects Versum acquisition

[1]LY numbers have been modified, due to disclosure changes of adjustments; [2]Thereof IFRS 16 effect with +1.6 percentage points (~ €5 m);
Totals may not add up due to rounding

Balance sheet – Reflecting Versum acquisition

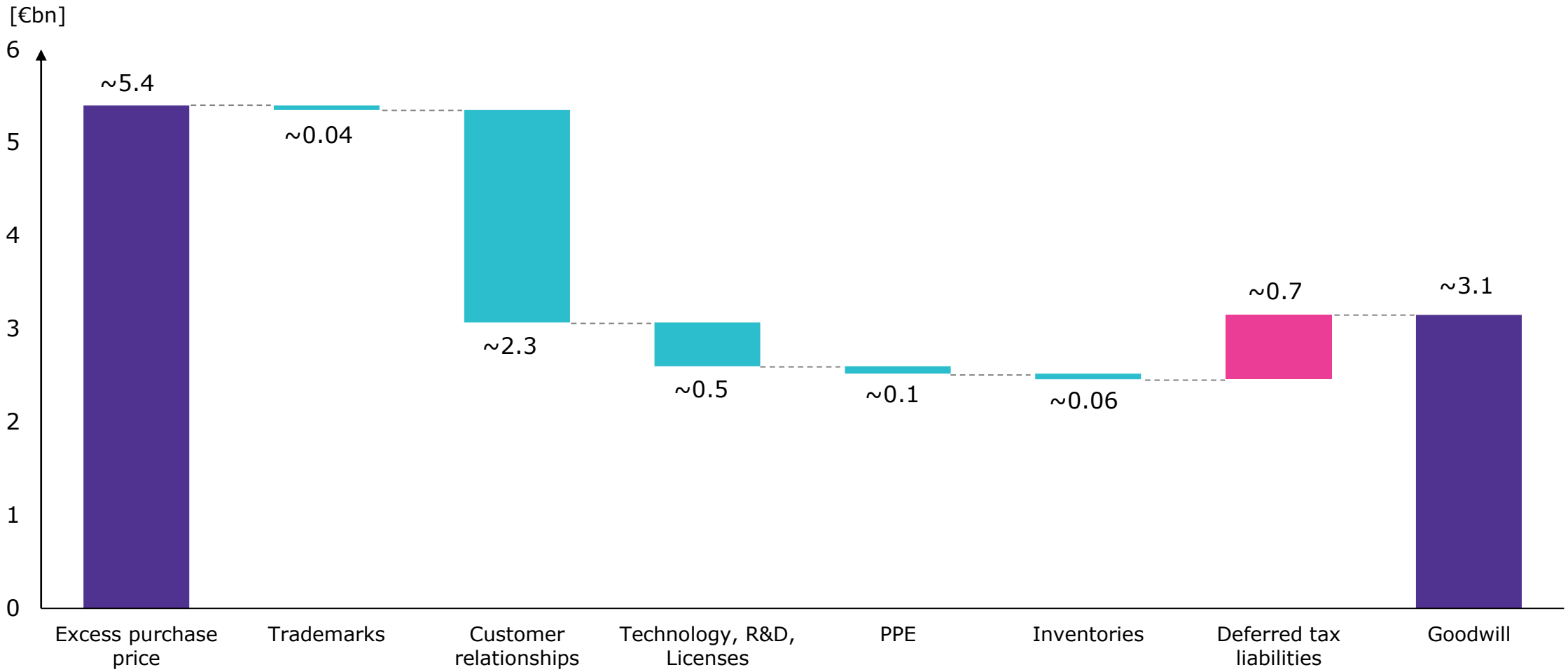


- First-time consolidation of Versum impacts balance sheet
- Intangible assets contain €17.1 bn goodwill, €7.0 bn customer relationships and trademarks

- Increase in equity mainly driven by profit after tax and FX translations, partially offset by dividends and actuarial loss (equity ratio of 40.9%)
- Financial debt increase reflects Versum financing

Totals may not add up due to rounding

Versum balance sheet effects



Amortization of intangible assets from Versum PPA*: ~€230 – 250 m p.a.

Totals may not add up due to rounding; Preliminary numbers (in line with IFRS3); no major changes expected;
*Purchase price allocation

Reported Figures

Reported results

[€m]	Q4 2018	Q4 2019	Δ
EBIT	341	**515**	51.0%
Financial result	-84	**-76**	-9.7%
Profit before tax	257	**439**	70.8%
Income tax	-64	**-103**	60.1%
Effective tax rate	*25.0%*	***23.4%***	
Net income[1]	2,446	**318**	-87.0%
EPS [€]	5.63	**0.73**	-87.0%

Comments

- Higher EBIT due to strong top-line contribution from Life Science and Healthcare as well as cost consciousness
- Last years net income and EPS reflect Consumer Health disposal

[1]From continuing and discontinued operations;
Totals may not add up due to rounding

Cash Flow Statement

Q4 2019 – cash flow statement

[€m]	Q4 2018	Q4 2019	Δ
Profit after tax	2,458	**321**	-2,137
D&A	508	**552**	45
Changes in provisions	80	**19**	-61
Changes in other assets/liabilities	184	**-405**	-589
Other operating activities	-2,727	**42**	2,769
Changes in working capital	238	**161**	-78
Operating cash flow	741	**690**	-50
Investing cash flow	2,822	**-4,744**	-7,567
Thereof CAPEX on PPE	-290	**-221**	68
Financing cash flow	-2,240	**-273**	1,967

[1]LTIP = Long-term incentive plan;
Totals may not add up due to rounding

Cash flow drivers

- Last year's profit after tax driven by Consumer Health disposal, neutralized in other operating activities
- D&A increase mainly due to IFRS 16 reclassification
- Changes in provisions reflects last year's LTIP[1] adjustment
- Changes in other assets/liabilities driven by neutralization of non-cash relevant tax provisions, mitigated by milestone payment
- Investing cash flow driven by Versum acquisition and last year's Consumer Health divestment
- Higher financing cash flow due to last year's repayment of bank loans and commercial paper

Adjustments in Q4 2019

Adjustments in EBIT

[€m]	Q4 2018		Q4 2019	
	Adjustments	thereof D&A	Adjustments	thereof D&A
Healthcare	23	11	**21**	**1**
Life Science	54	2	**15**	**0**
Performance Materials	28	20	**93**	**-1**
Corporate & Other	34	0	**10**	**0**
Total	138	33	**139**	**1**

Totals may not add up due to rounding

ESG

We are working on ambitious goals

environment

Climate

We endeavor to reduce direct and indirect emissions to mitigate our impact on the climate.

Waste

We consider it fundamental to both prevent and recycle as much of our waste as possible.

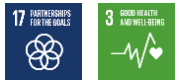
Water

For us, sustainable water management means not negatively impacting the aquatic ecosystems

social

Product safety

Product safety is one of our top priorities: From safe handling of hazardous substances to ensuring patient safety.



Employees

We aim to be an attractive employer, encouraging creativity and development under ideal working conditions.

Access to Medicine

We support a variety of initiatives that improve access to health particularly for people in low- and middle-income countries.

governance

Growth & Profit sharing

Our growth results from innovations and acquisitions strengthening our position in important markets, supported by strong cash-flow, long-term margins of >30% and a conservative but reliable dividend.

Risk management

We are focusing on a diversified business model: Our 3 sectors have pioneering knowledge to develop products to improve life for patients, further the success of our customers and meet global challenges.

Steering

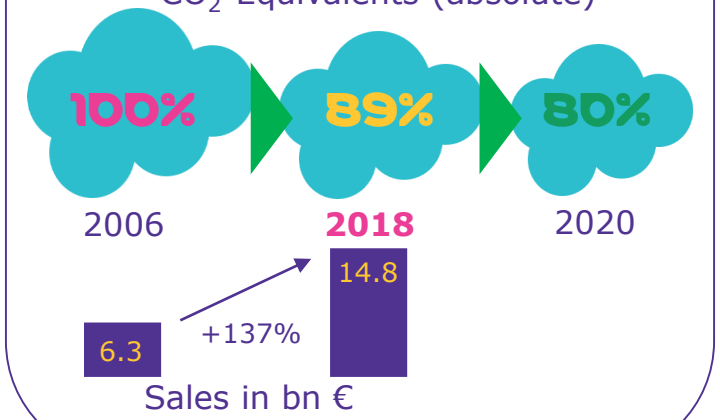
Our core values along with the external regulations lead to business-guiding charters and principles for our responsible governance, documented in our Corporate Responsibility strategy and report.

Emissions, Water, Waste reduced despite growing business

Emission-Target:

- Growth-independent reduction of Group's greenhouse gas emissions of 20% until 2020 vs. 2006
- Despite sales growth of 137% 2006 vs. 2018 we achieved a 11% reduction of CO_2 equiv.
- We still confirm our goal for 2020 expecting positive impact from latest initiatives, e.g. process optimizations and change to renewable energy

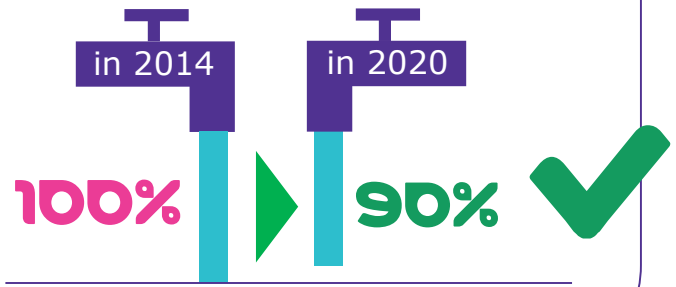
CO_2-Equivalents (absolute)



Water-Target:

- At 24 sites with relevant water use in areas of high water stress we aim to cut water consumption by 10% until 2020 vs. 2014
- 2018, we lowered our water consumption by 11% resulting from sustainable water management and re-usage
- All pharmaceutical manufacturing facilities have wastewater treatment plants

Water consumption
in water stress areas



2018: -11%

Waste-Target:

- We reduce waste and recycle as much as possible - we aim to reduce the environmental impact of our waste by 5% until 2025 compared to 2016
- The Company Waste Score allows us to compare the amount of waste our sites are producing
- We ensure that raw materials are recycled and that unrecyclable waste is discarded

Merck KGaA, Darmstadt,
Germany Waste Score

ESG
External stakeholders valuate our engagement

In 2018, **Our share was again included in STOXX Global ESG Leaders Index**, a sustainability index that assesses companies based on key environmental, social and governance criteria.

Merck KGaA, Darmstadt, Germany was confirmed as a constituent of the **Ethibel Sustainability Index (ESI) Excellence Europe** in 2018, calculated and managed by Standard & Poor's.

We were ranked on **4th place at Vigeo Eiris** among its peer companies and is a **Euronext Vigeo Europe 120** member since 2015, including companies with high performance in 38 sustainability drivers.

We received **Gold status in 2019**, among the **top 1% of companies.**

EcoVadis examines 45,000 suppliers from 150 countries. The rating focuses is highly valued by customers and suppliers.

Since 2008, Our shares have been included in the **FTSE4Good Index**, measuring the performance of companies demonstrating strong ESG practices

In the **2018 Access to Medicine Index** we maintained **4th place** (9th in 2012, 6th in 2014 and 4th place in 2016).

The ranking appreciates us supporting low and middle income countries.

In 2018, **Oekom** research AG gave us a "B-" rating which means we have once more achieved **prime status.**

Participation in CDP (formerly Carbon Disclosure Project) since 2008.

CDP Climate: In 2018, we scored "C" (2017: B).

CDP Water: In 2018 we received a "B-" (2017: B).

2018, **Sustainalytics** awarded us 79 out of 100 points, putting us among the **leading pharmaceutical companies:** high marks in CG, community outreach, and environmental performance.

Financial calendar

Date	Event
March 5, 2020	FY 2019 Earnings release
April 24, 2020	Annual General Meeting
May 14, 2020	Q1 2020 Earnings release
August 6, 2020	Q2 2020 Earnings release

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