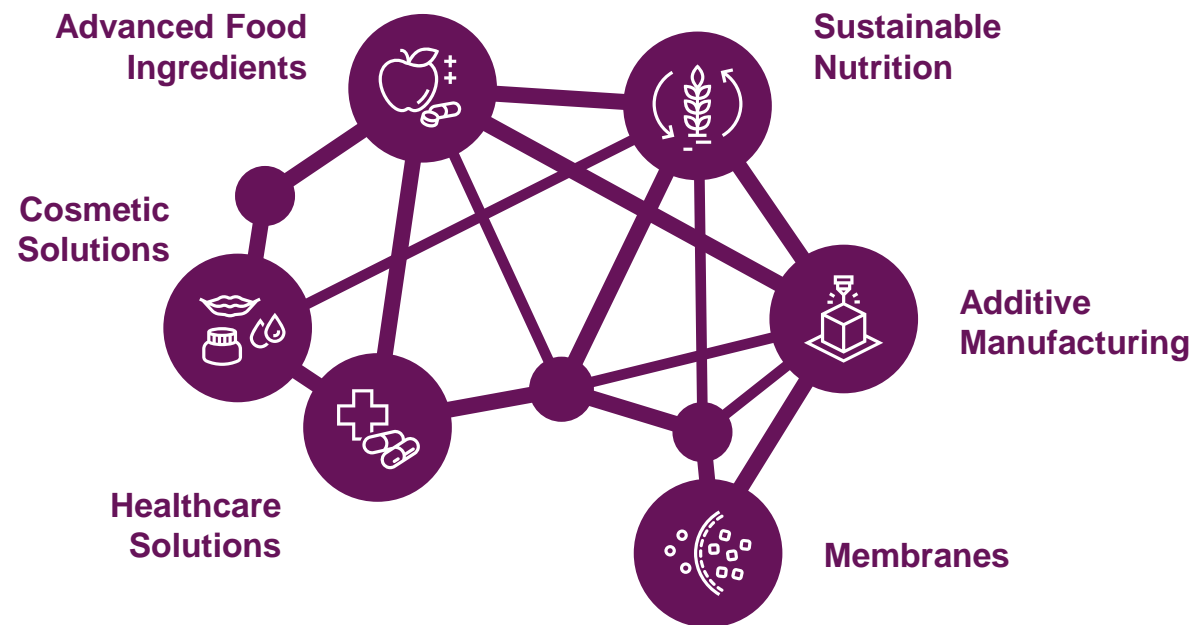


Innovation at Evonik

Evonik Innovation Growth Fields Overview

2023

NEXTGEN 



Six Innovation Growth Fields are on track to achieve target of >€1 bn sales

Innovation Growth Fields



Advanced Food
Ingredients



Additive
Manufacturing



Sustainable
Nutrition



Cosmetic
Solutions



Membranes



Healthcare
Solutions

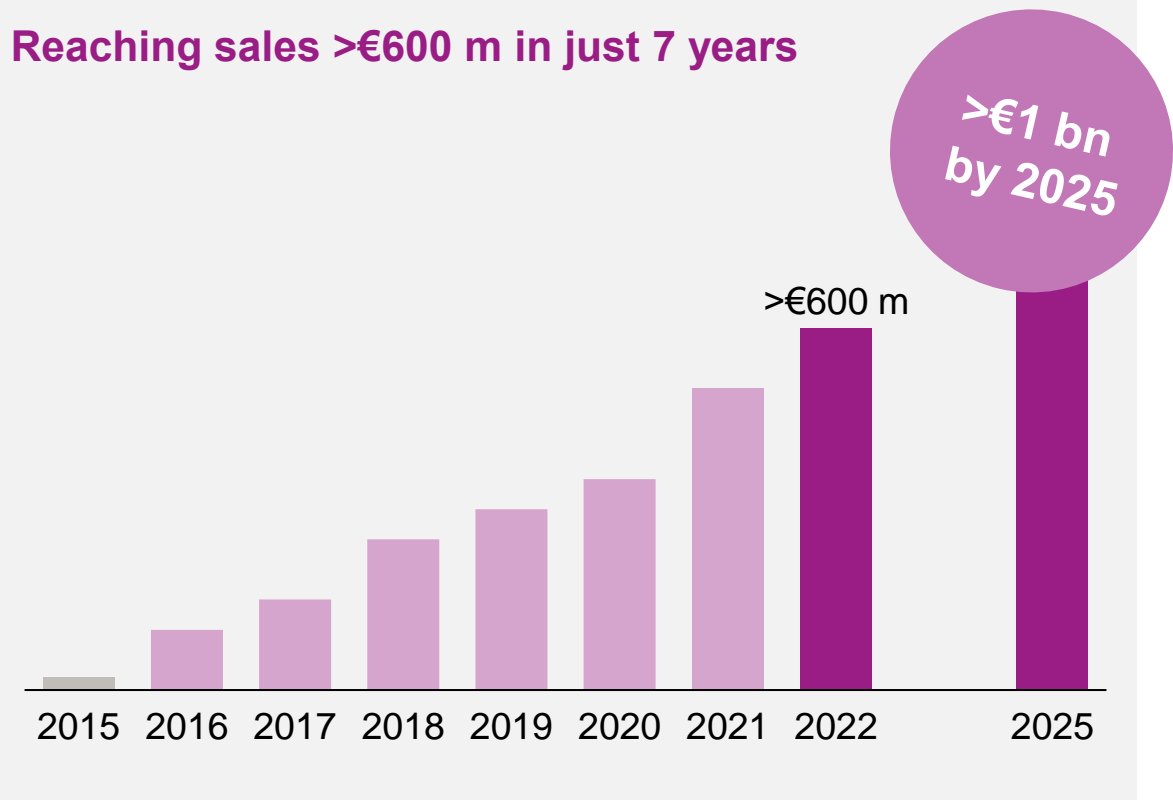


Sizeable sales base established in all growth fields

Above-average margin contribution

Sales contribution Innovation Growth Fields

Reaching sales >€600 m in just 7 years



Innovation Growth Field

Membranes

Innovation Growth Field: Membranes

Superior gas separation efficiency enabled by tailored polymer properties

Technology / USP

High performance hollow fibre membranes for efficient gas separation

Advantages

- Low energy consumption
- No waste, no emissions
- Flexible & easily expandable
- High yield & purity
- Robust & durable

Market size:

~€800 m

Market growth:

> 10%



Status quo

**Innovation leader
by backward integration
into membrane polymer chemistry**

2010: Market entry: biogas upgrading

2014: Roll-out with process gases (like Helium & Nitrogen)

2018: Diversification into Natural Gas, Hydrogen and Aviation

Now: 1,000 membrane plants supplied already today

Potential going forward

Future growth driver: **Hydrogen**

Today: **H₂ extraction membranes**

- **Using** membrane technology to **extract hydrogen from** existing **natural gas pipelines**

Future: **Anion Exchange Membranes**

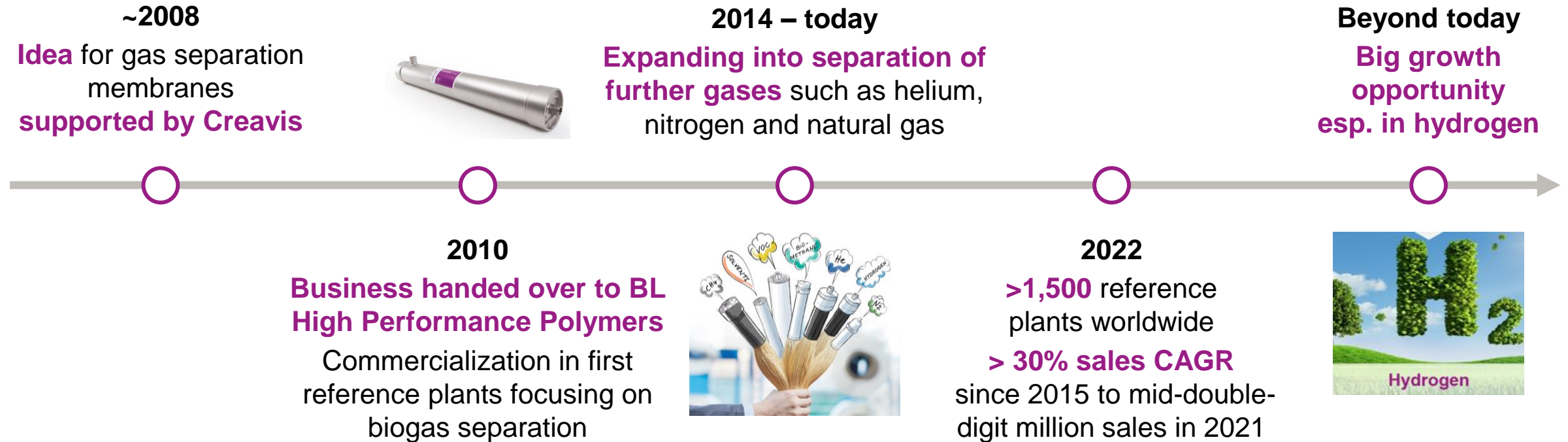
**Breakthrough of electrolytic
production of green hydrogen**

- 30% lower CAPEX
- 10% lower OPEX

(vs Proton Exchange Membranes)

A blueprint for future innovation

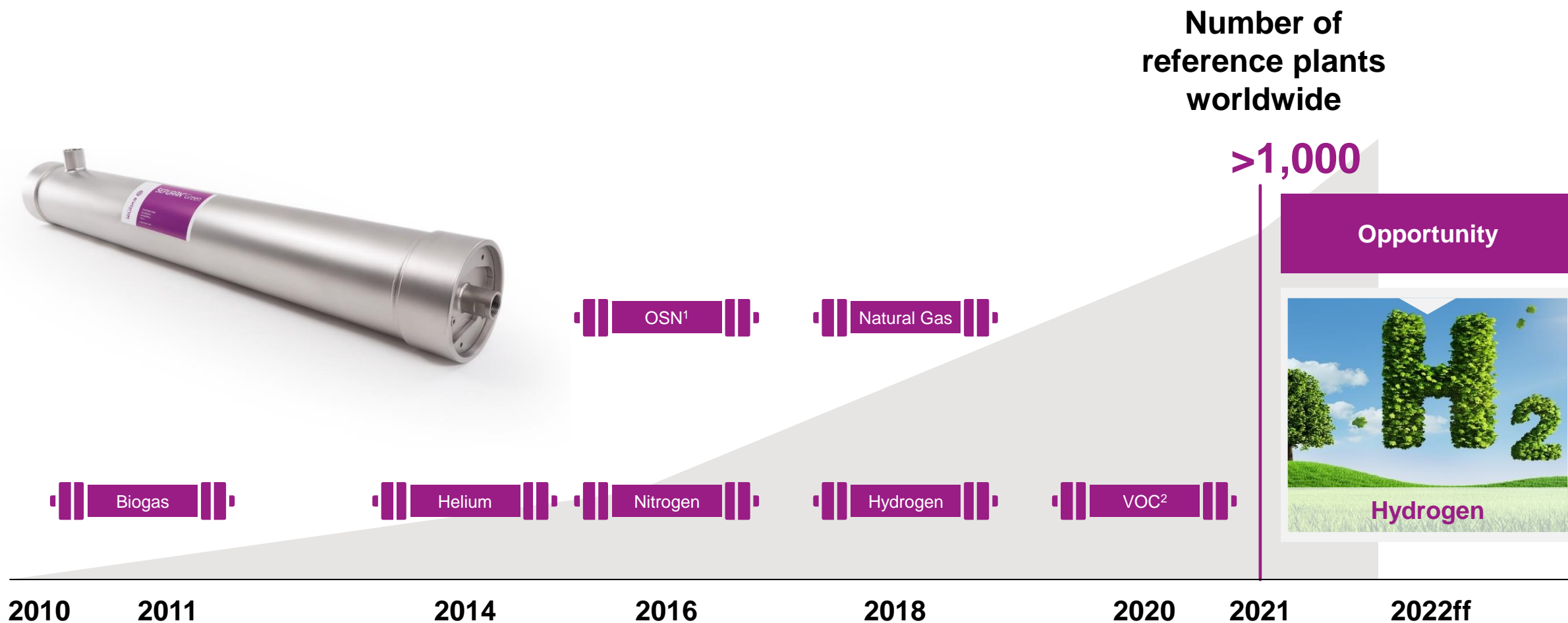
Evonik with strong growing niche position for gas separation membranes



Continuous RD&I efforts to improve product characteristics and scope of application

From startup to global innovation leader within 10 years







Product diversification into multiple gas separation membrane markets



1. OSN – Organic Solvent Nanofiltration, 2. VOC – Volatile Organic Compounds

Membranes: Overview of different gas separation markets

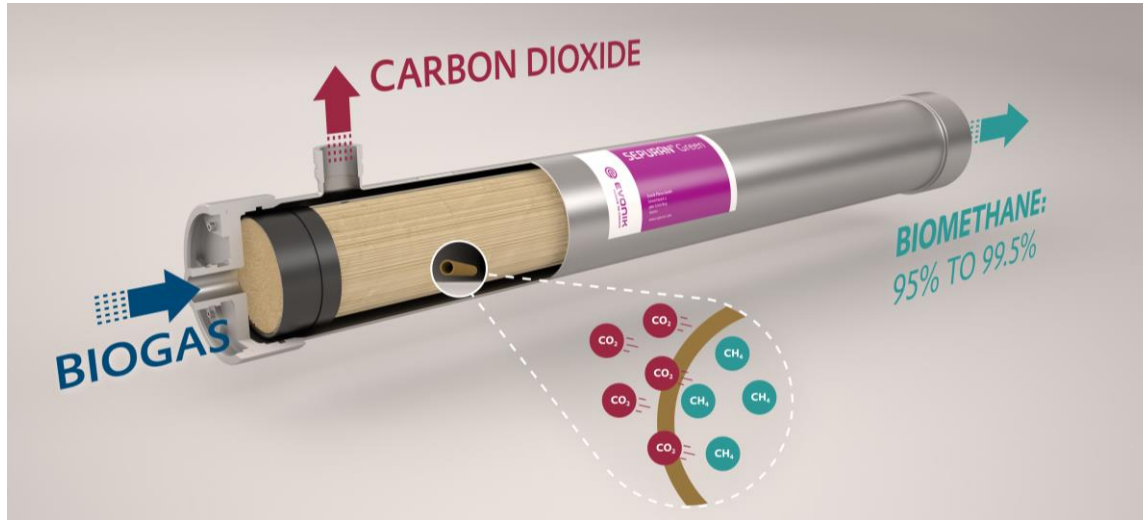
Portfolio built on strong technology platforms, innovation, global partner network

Membranes						
	Green gases		Process gases		Oil & Gas	
Market segment	Green Hydrogen	Biogas	Hydrogen/Helium	Nitrogen	Natural Gas	VOC
						
	Heat & Power – Transportation	Heat & Power – Transportation	Oil & Gas – Petrochemicals – Food & Beverage	Aircraft	Oil & Gas	Oil & Gas
Evonik brands	DURAION®	SEPURAN® Green	SEPURAN® Noble	SEPURAN® N ₂	SEPURAN® NG	PURAMEM® VOC

- **Attractive markets with global access:** Growth driven by increasing needs for sustainable energy supply
- **Strong technology platforms:** Backward integration, high-performance polymer expertise
- **Partnerships:** Global partner network to jointly shape further market needs with highly innovative separation technologies

Membrane example: SEPURAN® Green

Gas separation membrane for efficient biogas upgrading



Evonik has developed an innovative membrane technology for upgrading biogas into biomethane. SEPURAN® Green membranes have the highest CO₂/CH₄ selectivity and are therefore a superior technology for upgrading biogas.

- Biogas passes through hollow fibre membrane made of **high performance polymers: Carbon Dioxide** (permeate) as CO₂ and water vapor can pass through while **Biomethane** (CH₄) remains inside
- Evonik with **3-stage patented process** ensures **lowest energy consumption** (< 0.2 kWh per Nm³ raw biogas)
- Advantages are:
 - + Methane-yield of **up to >99%**
 - + **Flexible & modular** installation
 - + Highest **energy efficiency**
 - + No additional ancillary materials needed
 - + **Easy installation** (plug-in container solution)

Source: <https://www.membrane-separation.com/en/upgrading-of-biogas-to-biomethane-with-sepuran-green>

Our Membranes Vision: Smart enabler to the sustainable gas economy

Contributing to the transition with superior membrane technology



With our **membrane technology**, we significantly contribute to the transition to a sustainable gas economy:

1 SEPURAN® Green

- Raw biogas from organic waste is converted into **sustainable biomethane** and "green" CO₂

2 SEPURAN® Noble

- Our **hydrogen extraction membranes** enable to **use existing natural gas pipelines** to transport and extract green hydrogen
- In the **production of synthetic biomethane** from CO₂ and green hydrogen, we ensure efficient product separation

3 Anion Exchange Membrane

- With our ion-conducting AEM membranes, we contribute to the **breakthrough of electrolytic production of green hydrogen** in the future

Innovation Growth Field

Cosmetic Solutions

Innovation growth field: Cosmetic Solutions

Leading sustainable system solution provider for cosmetic ingredients

Unique selling point

Full-service provider for our customers from an idea up to a claimable product

Evonik key success factors

- Wide portfolio of specialty products with scientifically proven & claimable benefits
- Strong customer intimacy
- >30 years of extensive experience in white biotechnology

Relevant market:

>€5-6 bn

Market growth:

Functional ingredients and Actives ~5.5 %



Status quo

Highly specialized **System Solutions**:



Active ingredients

- Novel Active ingredients with focus on derma-cosmetics
- Expertise in Ceramides



Delivery Systems

- 2021 acquisition of Infinitec adds 7 novel delivery systems



Botanicals

- 2021 acquisition of Botanica adds sustainable botanicals



Sustainable Functionals

- Unique sustainable Biosurfactants and Emollients

Potential going forward

Future growth driver:

Fully bio-based solutions

- Our **100% bio-based surfactants** are made from plant-based sugar
- Applicable in **Care Solutions** as well as **Cleaning Solutions**
- Market growth **>50%**

Latest launch:

RHEANCE® One finding new markets in a variety of cosmetic applications

- 100% bio-based rinse-off application
- USP of good foam & no bitter taste is ideal for applications in toothpaste



Spotlight – Active Ingredients

Transforming cosmetic solutions into
tailor-made innovative products

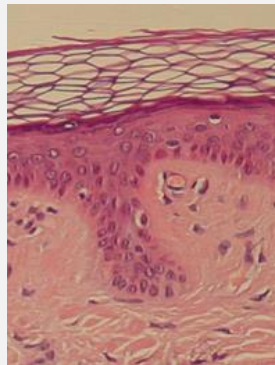


Active Ingredients – Evonik as a strong partner from idea to market

Broad integrated toolbox with scientifically proven benefits

Deep understanding of human skin biology

- Strong expertise in analyzing skin conditions to develop actives from idea to product



Epidermis

Stratum corneum
Stratum granulosum
Stratum spinosum
Stratum basale

Dermis

Scientific toolbox for claim substantiation

- Experimental design with cell cultures, skin models and in vivo human skin
- Screening of novel active ingredients
- Scientific proof of benefits

SimDerma® Platform
CosmetlCoS™



Active Ingredients with proven benefits

- Novel Active ingredients focusing on derma-cosmetics
- Attractive claims to differentiate in the marketplace

Moisturization

Rebalancing
and purifying

Skin defense

Anti-aging

System Solutions for Personal Care

Full-service provider for our customers from an idea up to a proven product

System solution SK-INFLUX®



**Functional and
Preservation**

Active Ingredients
Essential Ceramides (I, III, VI)

Formulation

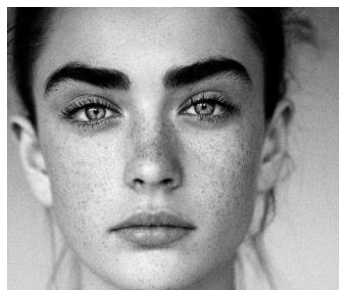
Ready-to-Use

Emulsion of
Essential
Ceramides

Cosmetic Claims

- Restores the protective skin barrier function
- Enhanced delivery and exchange of skin lipids
- Enhances skin moisturization

System solution InuMax® Advanced Retinol



**Functional and
Preservation**

Active Ingredients
Retinol

Formulation

**Active
Delivery Systems**

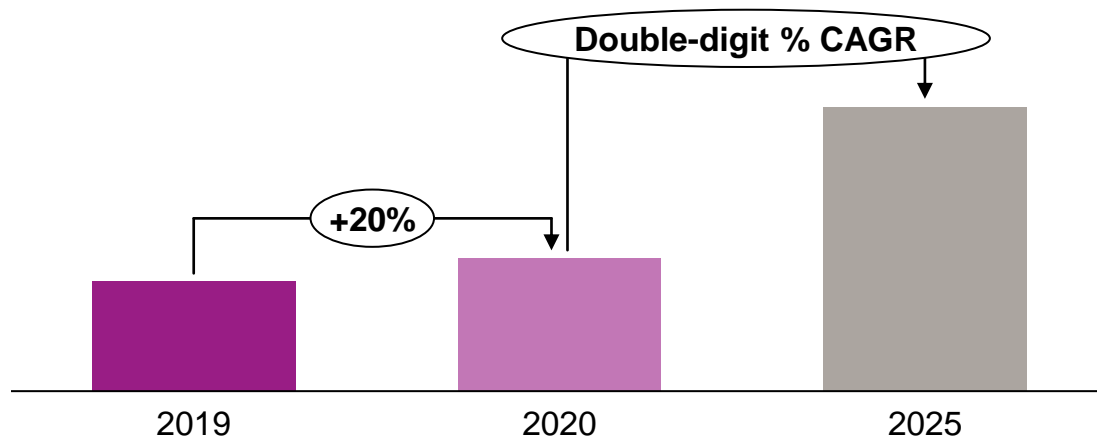
Cosmetic Claims

- Uses an advanced delivery technology to enhance the epidermal bioavailability of retinol
- Counter skin aging

Systematic expansion of the „Actives“ portfolio

Building on strong past track record and high growth ambitions

Sales with Active Ingredients & Delivery Systems



- Double-digit % growth track record over last 20 years
- Critical mass of triple digit million € sales
- Majority of future sales growth secured via contracts
- Asset-light and attractive EBITDA margin

Shaping & growing the portfolio

- Organic growth via **internationalization** and **value selling**
- **Strong innovation engine** to generate new products with scientifically proven claims
- Well positioned to spot and integrate **attractive M&A opportunities** with significant growth and value potential
- **Leverage synergy potential** of acquisitions across cosmetics, cleaning, food & pharma portfolio

Spotlight – Biosurfactants

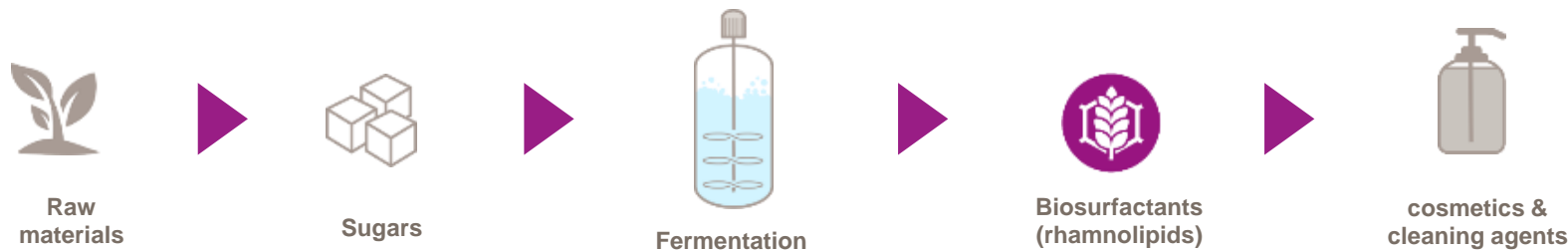
Setting new standards for sustainable
and versatile bio-based surfactants



Biosurfactants are the next game changer in Evonik's innovation portfolio

Leading the way for a sustainable ingredient portfolio transformation

A unique process resulting in a unique product



Fulfilling today's and tomorrow's consumer needs

Origin	Sensorials	Performance	Environmental
<ul style="list-style-type: none">100% renewableNo tropical oilsNatural ingredient	<ul style="list-style-type: none">Mild to skinPleasant skin feelCreamy foam	<ul style="list-style-type: none">Excellent foamingHigh cleansing/degreasingHard water resistant	<ul style="list-style-type: none">Bio-processed100% bio-degradableLow aquatox



Next generation of surfactants

Biosurfactants vs. biobased surfactants

Evonik Biosurfactants (Rhamnolipids)

Natural surfactants produced by fermentation



Derived from plant-based sugars



Bio-processing (fermentation)
No hazardous feedstocks



Nature identical structures



Consumer perceivable mildness benefit



Best in class environmental profile

Biobased surfactants

Synthetic surfactants from renewable raw materials



Derived from (tropical) oils



High temperature/pressure involved
May use hazardous raw materials



Synthetic structures

Examples: Alkyl polyglucosides, Glucamides, nonionic surfactants made from biobased ethylene oxide

Geared for growth following a successful series of launches

Large-scale production of world's first "green" biosurfactant (rhamnolipids)

2018

Pilot launch



- **Launch** in selected **personal care** applications
- Personal Care ingredient "RHEANCE® One" **awarded at "in-cosmetics"** 2018
- Several commercial personal care products followed

2019

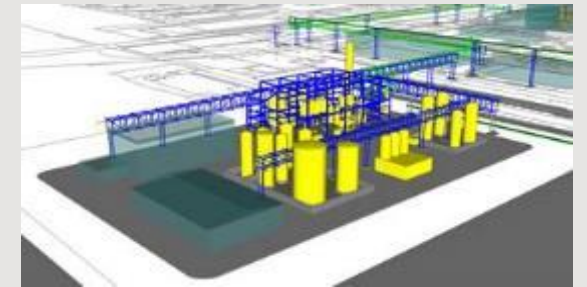
Expansion into Home Care



- **Leveraging volume potential** with home care applications
- **Unilever** with successful market launch of a dishwashing product in 2019

Planned
for 2023

Industry-scale investment



- Commercializing **Evonik's leading biotechnology capabilities:**
 - Evonik will be the **first company to produce biosurfactants on industrial scale**
 - Basic engineering finalized
 - Ramp-up expected for 2023/24

Innovation Growth Field

Healthcare Solutions

Innovation growth field: Healthcare Solutions

Attractive portfolio with high level of synergies and access to fast-growing markets

Unique selling point

An integrated system solutions portfolio of **Advanced Drug Delivery, Functional Excipients, and Contract Manufacturing** serving the pharmaceutical and medical device markets

Advantages

- Track record of reliable, high quality **specialized products, technologies** and **services**
- **Shared competencies** and **technology platforms** across the portfolio

Market size:

~€200 bn

Market growth:

4 to >8%



Status quo

Strong market position in



Drug Delivery Systems:

Focused on system solutions that transport an active agent in the body to safely provide the desired therapeutic effect



Cell Culture Solutions¹:

- Focused on providing system solutions for biological drug production and next-generation biological constructs



Medical Device Solutions:

- Focused on providing biomaterials and services for mechanic support or enhancement of biological structures

Potential going forward

Future growth driver:
mRNA-based solutions for

- **Vaccines**: e.g. cancer immunotherapy, COVID-19, Malaria
- **Protein therapeutics**: treating hereditary diseases
- **Gene therapies**: offering the potential for curative therapies at the genetic level

Market potential:

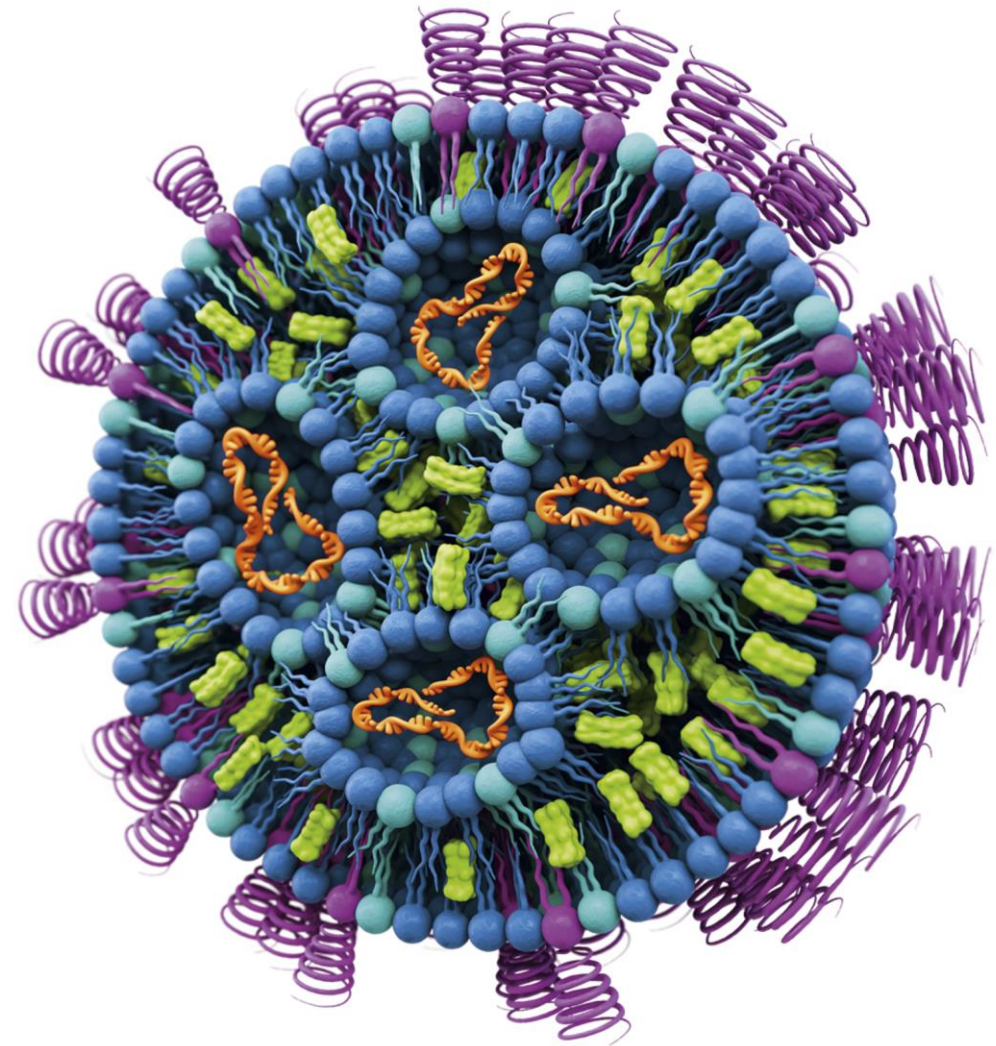
Accessible market of

≥ USD5 bn
by 2026

1: Growing cells in controlled conditions outside its native environment

Spotlight – mRNA Lipid Nanoparticle Systems

Strong growth potential in gene
therapies



Drug Delivery System Solutions

Fully integrated portfolio across both platforms of oral & parenteral drug delivery

Value chain



Evonik System Solutions: Advanced oral drug delivery

EUDRAGIT® portfolio of functional polymers

Oral drug delivery systems, formulation & applications services

Clinical manufacturing of oral dosage forms



Evonik System Solutions: Advanced parenteral drug delivery

RESOMER® and LACTEL® portfolio of bioresorbable polymers and lipids

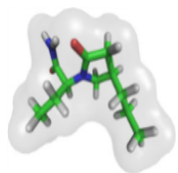
Formulation development and drug delivery technologies, such as micro particles and lipid nanoparticles (LNP)

cGMP manufacturing and aseptic filling of complex parenteral drug products

mRNA technology with potential to revolutionize the pharma industry

Promising market potential as a gene therapy enabler

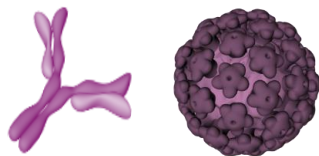
PAST – Chemical



Chemically synthesized small molecules

- Synthetic production utilizing complicated building blocks
- Testing millions of compounds necessary

PRESENT – Biological



Therapeutics like antibodies and vaccines biologically produced outside of the body

- Challenging development for each individual drug
- Production highly specified, cost and time intensive

FUTURE – mRNA



Next
generation
biologicals

mRNA medicines provide the information for the human body to produce its own drug

- Wide range of diseases that can be treated or prevented
- Technology platform with synergies – every product based on same principle
- Fast development process
- Future applications for personalized medicine

Strong growth ambition for drug delivery business

Growth potential for cell & gene therapies far beyond mRNA-based COVID-19 vaccines

Next generations of LNP-based gene therapies

Vaccines

Cancer immunotherapy expected to be the next breakthrough of mRNA therapeutics

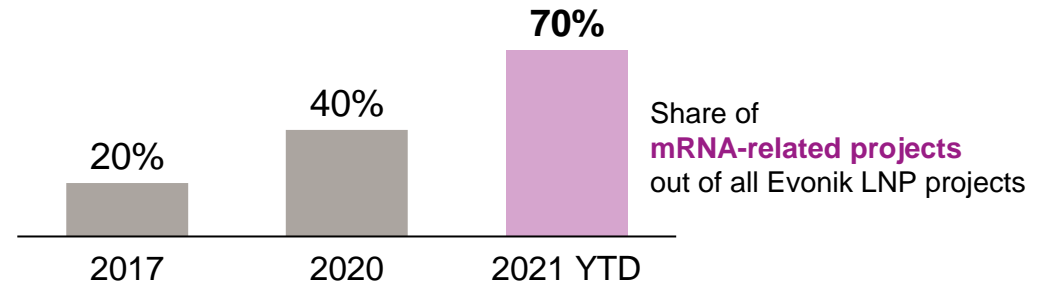
Proteins therapeutic

mRNA-based therapies can potentially **treat hereditary diseases**

Gene editing

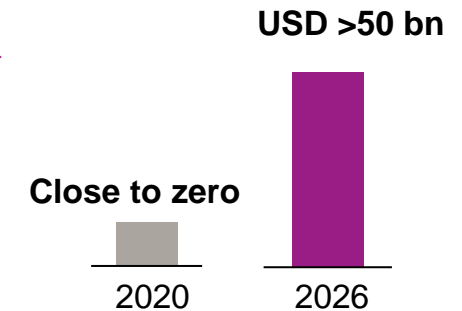
In-vivo modification of genes causing diseases expected to be commercial within the next years

Evonik's LNP solutions enable mRNA-based medicine



Total market for LNP-based cell & gene therapies

Accessible market for Evonik of USD ≥ 5 bn by 2026





Spotlight – Medical Device Solutions

Improving faster patient recovery by
developing custom made medical devices



Medical Devices Solutions

A broad portfolio of biomaterials and application technology services

Biomaterials for Bioresorbable Implant Devices

RESOMER®

The world's leading portfolio of standard, custom and specialized bioresorbable polymers



Biomaterials for Surface Modification

Endexo®

Best-in-class additive technology for surfaces to reduce thrombus, infection and biofouling risk



Other Biomaterials for Medical Devices

Evonik Collagen

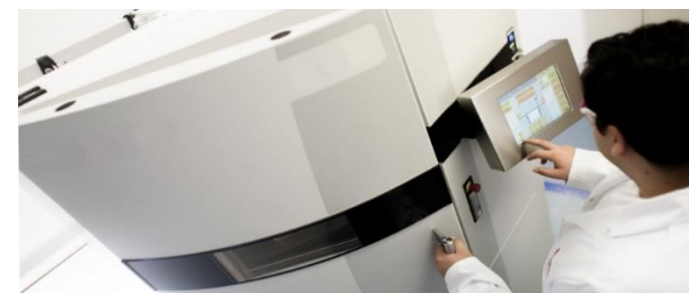
A recombinant collagen platform that is highly soluble, scalable and biocompatible for life science applications



Biomaterial Application Technology Services

A global network

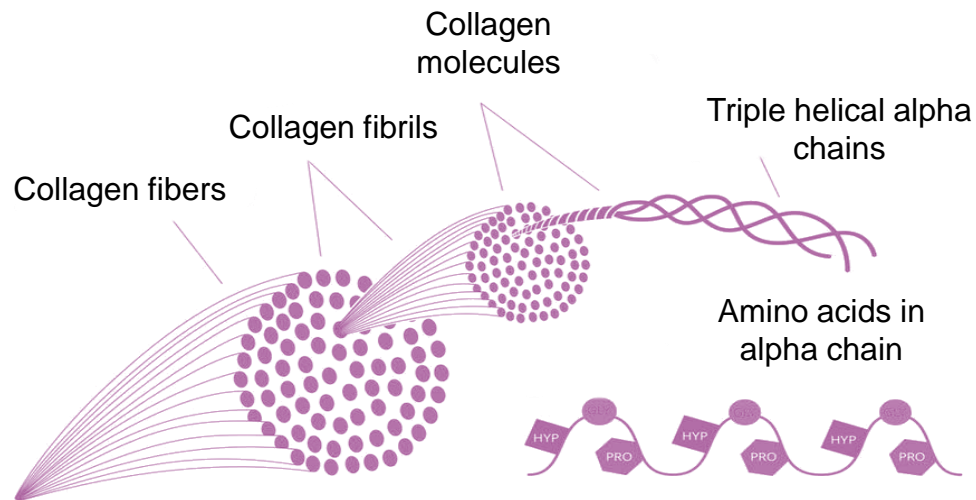
Medical Device Competence Center in the U.S. plus application labs in Germany & China for testing, 3DP & scale-up support



New collagen platform

Non-animal derived collagen based on Evonik's biotechnology expertise

- Collagen contributes between **25% and 35% of the total protein mass** in humans and other mammals
- Critical in the formation and functionality of **tissues, skin, bone, ligaments, cartilage, hair and lungs**
- Provides rigidity, shape and integrity



Evonik's new collagen platform

Highly biocompatible

Fermentation-based process

Non-animal derived

Highly soluble at physiological pH



Reproducible ultra-high purity process

Ideal for hydrogels & other shapes

Commercially scalable

Fully customizable

RESOMER® biomaterials for biodegradable medical devices in modern medical treatments



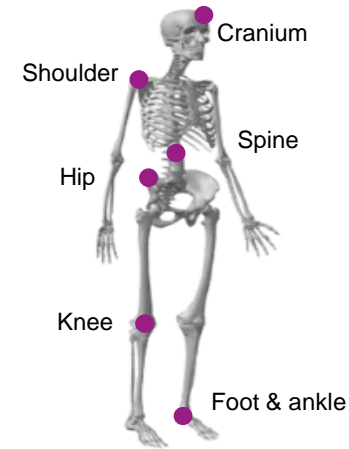
RESOMER®
biomaterials



Processing



Medical devices



orthopedic devices
.....
cardiovascular devices
.....
wound care application
.....
other applications

Value Chain Dialogue

- Partnerships with medical device manufacturers
- Dialogue with medical doctors and research organizations, and focus group interviews

Competencies

- Leveraging our polymer competence with application expertise
- Broad variety of RESOMER® biomaterials to tailor medical devices to specific needs
- Adding API and drug delivery expertise for additional functionality



Innovation Growth Field

Additive Manufacturing

Innovation growth field: Additive Manufacturing

Driving industrial scale 3D printing technology along the entire value chain

Markets and USP

Ready-to-use high-performance materials for infinite 3D applications

INFINAM® advantages:

- Highest quality & highest performance
- Ready-to-use
- Customized for different 3D technologies
- Unique combination of properties

Market size:

~€1 bn (polymer powders & photopolymers)

Market growth: >15%



Status quo

**Market leader for PA12 –
Innovation leader for new materials**

- Evonik as market leader in PA12 powder materials for powder-based 3D printing technologies¹
- World's 1st PEEK filament for medical implant applications in 2020
- New product line for INFINAM® Photopolymers established in 2021
- Targeted external technology investments

STRUCTURED
POLYMERS 

UnionTech
Create your Imagination

Medvance

CASTOR

Potential going forward

From prototyping to manufacturing

Substitution of plastic machining and injection molding through:

1. **Close partnerships** with major printing players and innovators










1. **Scaling** the broadest portfolio of **ready-to-use high-performance materials** for all key 3D printing technologies **to large volumes**



1: SLS: Selective Laser Sintering; HSS: High-Speed Sintering; MJF: Multi-Jet Fusion

Polyamide 12 powder for Additive Manufacturing

Fueling the transition from low-volume prototyping to industry-scale production

Strong base established		Expand strong position			
<ul style="list-style-type: none">▪ Evonik as market leader in PA12 powder-based 3D printing materials▪ Several platforms available to serve all major powder-based printing technologies▪ Close partnerships with major printing players and innovators:		<p>1st company which launched on Hewlett Packard material platform</p>		<p>Powder Bed Fusion (SLS/HSS/MJF)</p> <p>Expand polymers beyond PA12</p>	
		<p>Unique technology position with focus on Asia</p>		<p>Photopolymers (SLA/DLP)</p> <p>New Reactive Monomer Solutions</p>	
		<p>Developing with OEMs to enable transition to series production</p>		<p>Industrial scale AM</p> <p>Substituting plastic machining and injection molding</p>	

Strengthened by targeted external technology investments

STRUCTURED
POLYMERS

Medvance

CASTOR

UnionTech
Create your imagination

SLS: Selective Laser Sintering, HSS: High Speed Sintering, MJF: Multi Jet Fusion, SLA: Stereolithography, DLP: Digital Light Processing, Other AM technologies are under evaluation within RD&I.



Evonik's brand for ready-to-use 3D printing materials

Powders (SLS/HSS/MJF)

INFINAM® PA

Polyamide 12
Polyamide 613

INFINAM® TPA

Elastomer polyamide

INFINAM® TPC

Elastomer copolyester

INFINAM® eCO

Polyamide 12
mass balanced



Resins (SLA/DLP)

INFINAM® FL

Flexible photopolymer

INFINAM® RG

Rigid photopolymer

INFINAM® ST

High strength photopolymer

INFINAM® TI

Impact resistant photopolymer



Filaments & Systems (FDM/FFF)

INFINAM® PEEK

Polyether ether ketone

INFINAM® PMMA

Polymethyl methacrylate

VESTAKEEP® 3DF

Implant grade PEEK

VESTAKEEP® Fusion 3DF

Implant grade osteo PEEK

VESTAKEEP® Care 3DF

Care grade PEEK



SLS: Selective Laser Sintering, HSS: High Speed Sintering, MJF: Multi Jet Fusion, FDM Fused Deposition Modeling, FFF: Fused Filament Fabrication, SLA: Stereolithography, DLP: Digital Light Processing, DLS: Digital Light Synthesis. Other AM technologies are under evaluation within RD&I.

Innovation Growth Field

Advanced Food Ingredients

Innovation growth field: Advanced Food Ingredients

Portfolio of high-value functional nutritional products

Market

Nutraceutical system solutions provider for supplements in human applications

Evonik strengths:

- Fast-growing market driven by health-conscious consumers
- Differentiation through scientific evidence and formulation capabilities
- High level of synergies within Nutrition & Care (e.g. biotech, delivery systems)

Market size:

~€25 bn

Market growth:

5 - 10%



Status quo

Business transformed from
only human amino acid business
towards
portfolio of high-value functional nutritional products, e.g.:



AvailOm®:

- Omega-3 fatty acid powder
- >5 times higher bioavailability than traditional liquid soft-gels
- 100% sustainable sources (algae)



IN VIVO BIOTICS™:

- Product portfolio of synbiotic solutions launched, addressing gut, metabolic, and mental health, beauty from within and gluten intolerance

Potential going forward

7 products launched until today

Geographical expansion

B2B: **AvailOm®** new registrations in Brazil, India & Australia

B2C: **Medox®** high double-digit growth in China

5 new launches in 2022 (e.g.

GuardCap™, new capsule generation for delayed release)

Future growth drivers:

Expanding existing competencies into additional markets (e.g. Nutricosmetics)

Leverage strong N&C expertise in fermentation to participate in fast growing alternative proteins market

Under the brand name IN VIVO BIOTICS™, Creavis has developed and introduced a portfolio of innovative synbiotic supplements into the market

Why Evonik



Synbiotic system solutions: synergistic combination of probiotics plus additional health ingredients



Evidence-based development: building on vast biotech & formulation expertise supported by valuable consumer insights



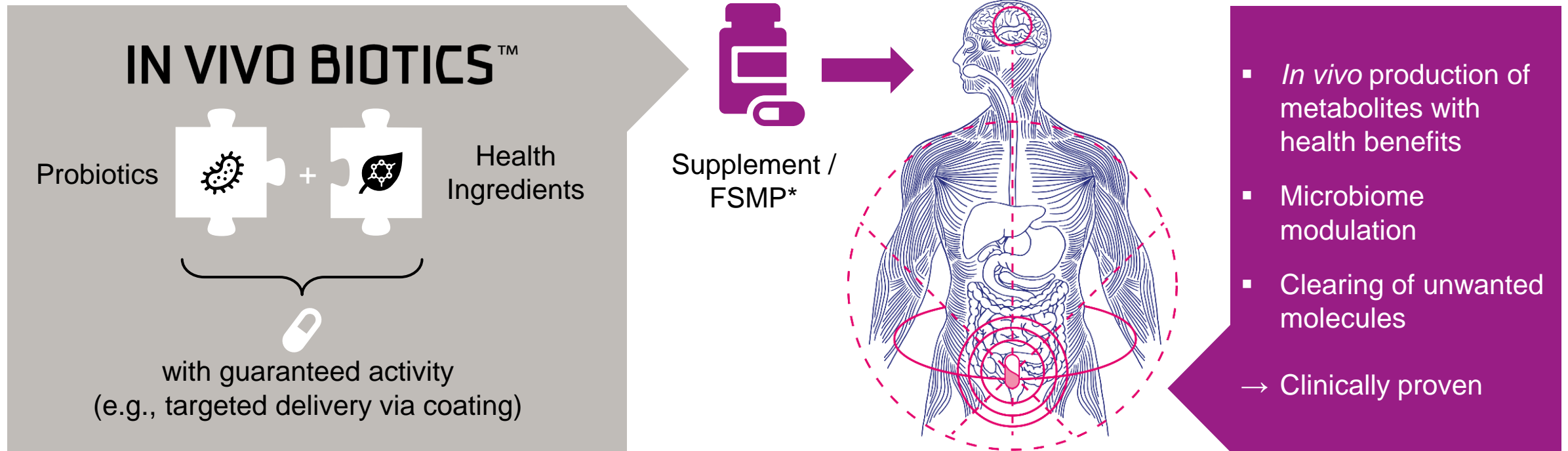
Bio-inspired mechanisms of action: harnessing the inherent health potential of the gut microbiome



Guaranteed activity: by targeted delivery (e.g., via unique EUDRAGUARD® coating) and pinpointed formulation



Our synbiotic approach harnesses the intrinsic health potential by *in vivo* microbial metabolization and microbiome modulation



* Food for special medical purposes

Innovation Growth Field

Sustainable Nutrition

Innovation growth field: Sustainable Nutrition

Transform Animal Nutrition into system solutions for sustainable protein

Markets and USP

System solutions addressing demand for sustainable & healthy food chain with reduced environmental footprint

Evonik ideally positioned:

- Strong nutritional know-how and services
- Global customer reach through Evonik's brand recognition in Animal Nutrition
- Key capabilities in R&D and innovation (in vivo, in vitro, gut model)

Relevant market: ~€800 m

Market growth: ~7%

Status quo

Established product portfolio for:



Non-antibiotic livestock
via Gut Health Solutions
(e.g. probiotic "GutCare")



Dairy eco footprint
improved via delivery system
"Mepron"



Fighting overfishing
via omega-3 from natural
marine algae

Potential going forward

Future growth driver:



Sustainable Livestock Farming

Coherent portfolio of differentiated products, services and solutions for poultry, swine and ruminants



MONITOR livestock farming



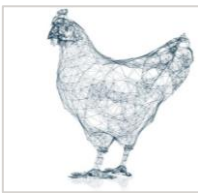



SOLUTIONS formulations,
digital Services

Industry Value Potential: ~€5 bn

Potential for product, service & digital revenues

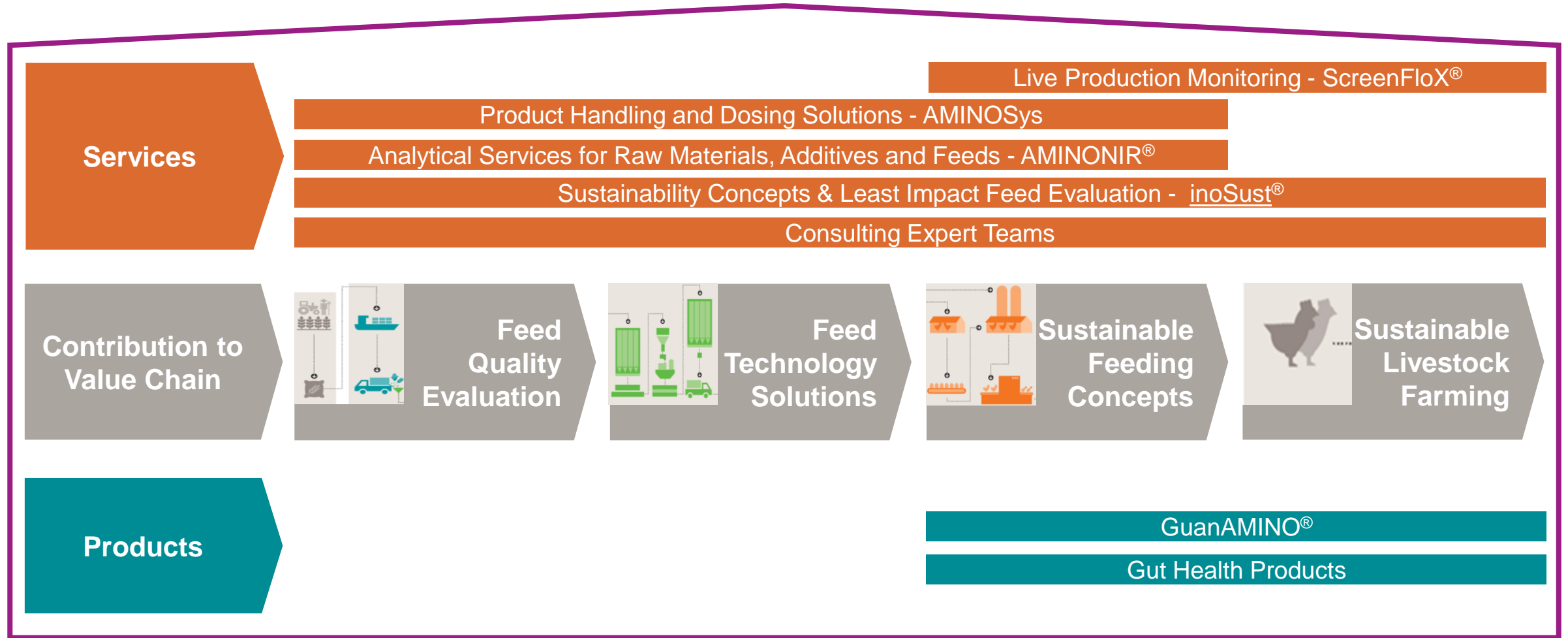
Strong growth with attractive portfolio of sustainable system solutions, enabled by biotech-innovation and global customer access

Sustainable Livestock Farming								
Market segment	Livestock Health & Performance		Ruminants	Precision Livestock Farming		Aquaculture		
		Antibiotic-free livestock farming and protein quality		Eco-footprint reduction		Healthy protein by efficient livestock farming		Reduced wild caught fish in aquaculture
	Gut Health & Performance Solutions		Delivery Systems in Dairy Cows		Digital Services	Health monitoring	Natural Algal Oil (VERAMARIS)	Low Protein Diets
Market Growth	>7%		>5%		New market		>5%	

Global customer access to attractive markets with focus on most important industry needs

- **Attractive markets with global access:** Robust growth driven by increasing needs for sustainable livestock farming
- **Innovative System Solutions:** Combining products, digital services, nutritional know-how, new Go-to-Market-models
- **Strong synergies:** Shared technology platform competencies: nutrition research, microbiome modelling, biotechnology

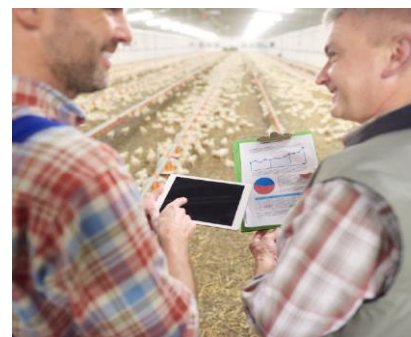
Products and Services along the Value Chain define the Evonik Animal Nutrition System Solutions





Spotlight – Sustainable Livestock Farming

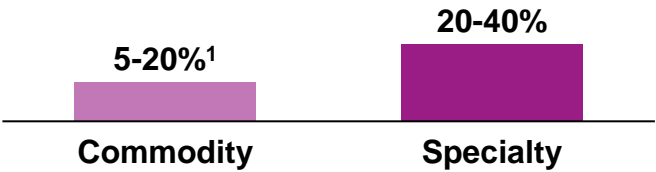
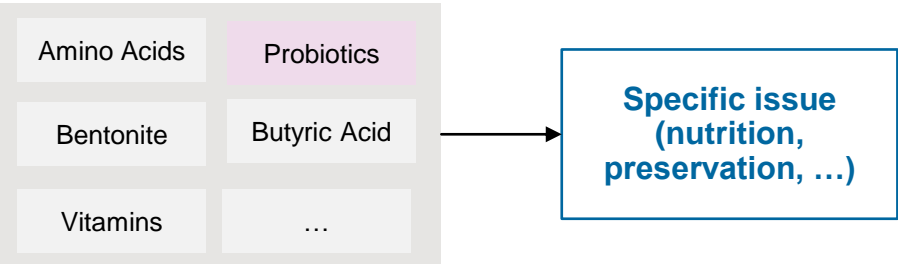
Healthier and more efficient livestock farming
to reach genetical potential of animals



Sustainable Livestock Farming will transform towards selling solutions via building up a differentiated formulation business

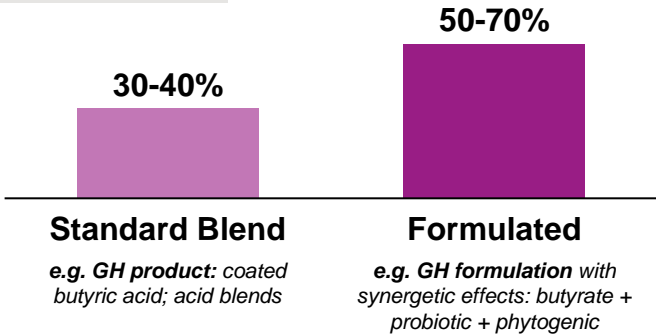
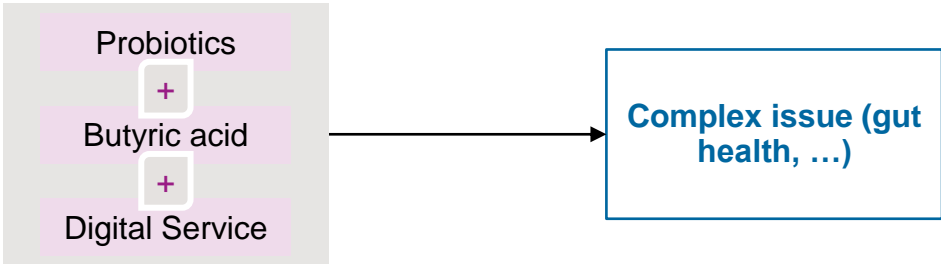
1 SELLING INGREDIENT

Single product for specific needs: either very differentiated ingredient or commodity



2 SELLING SOLUTION

Multi-MOA formulations for complex issues difficult to tackle with one ingredient: differentiation from synergetic combination

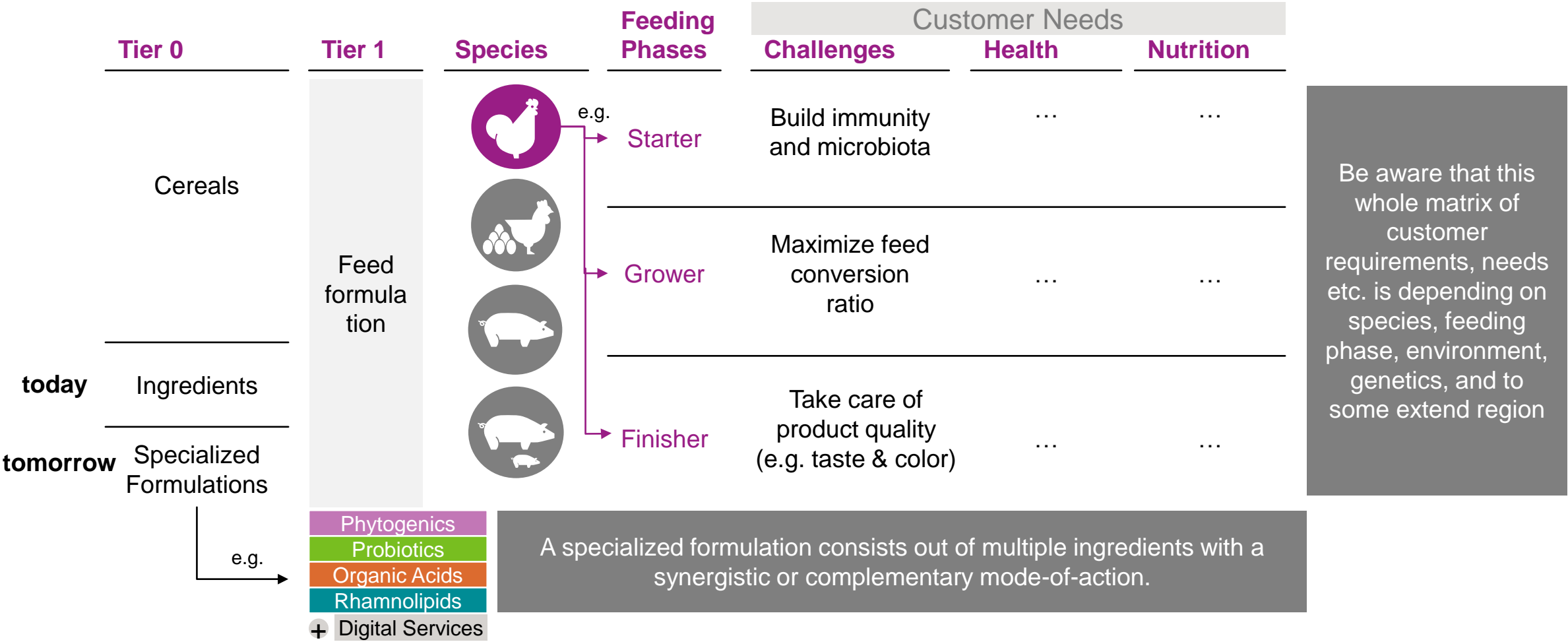


Key Success Factors	Cost efficiency, differentiated in-house developed ingredient	Formulation science, sales push & marketing
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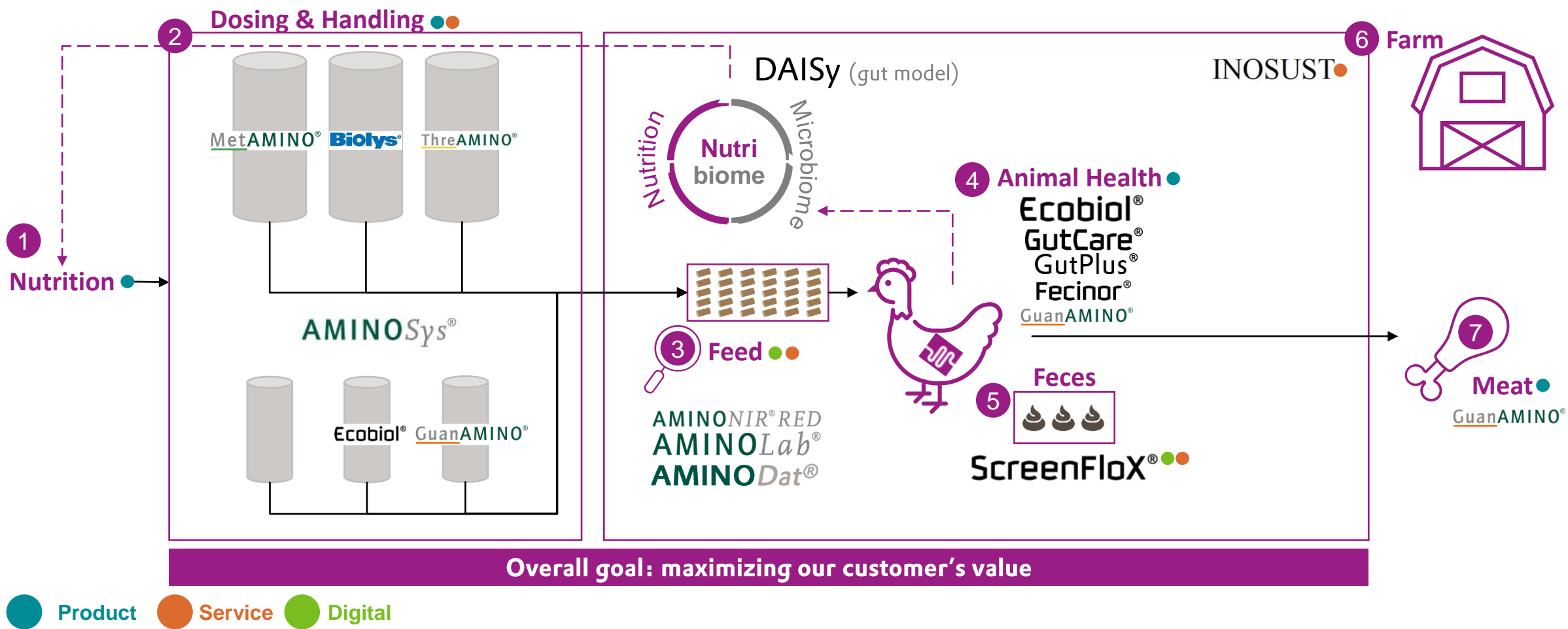
1) Contribution Margin

Introduction to specialized feed formulations

A specialized feed formulation targets a very specific customer need

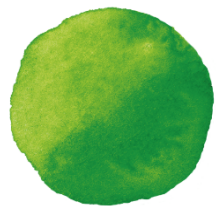


Evonik's system solution portfolio in broiler value chain shows tremendous potential for tackling customer needs broadly



Spotlight – Veramaris®

Harnessing the power of nature to change
current practice in aquaculture



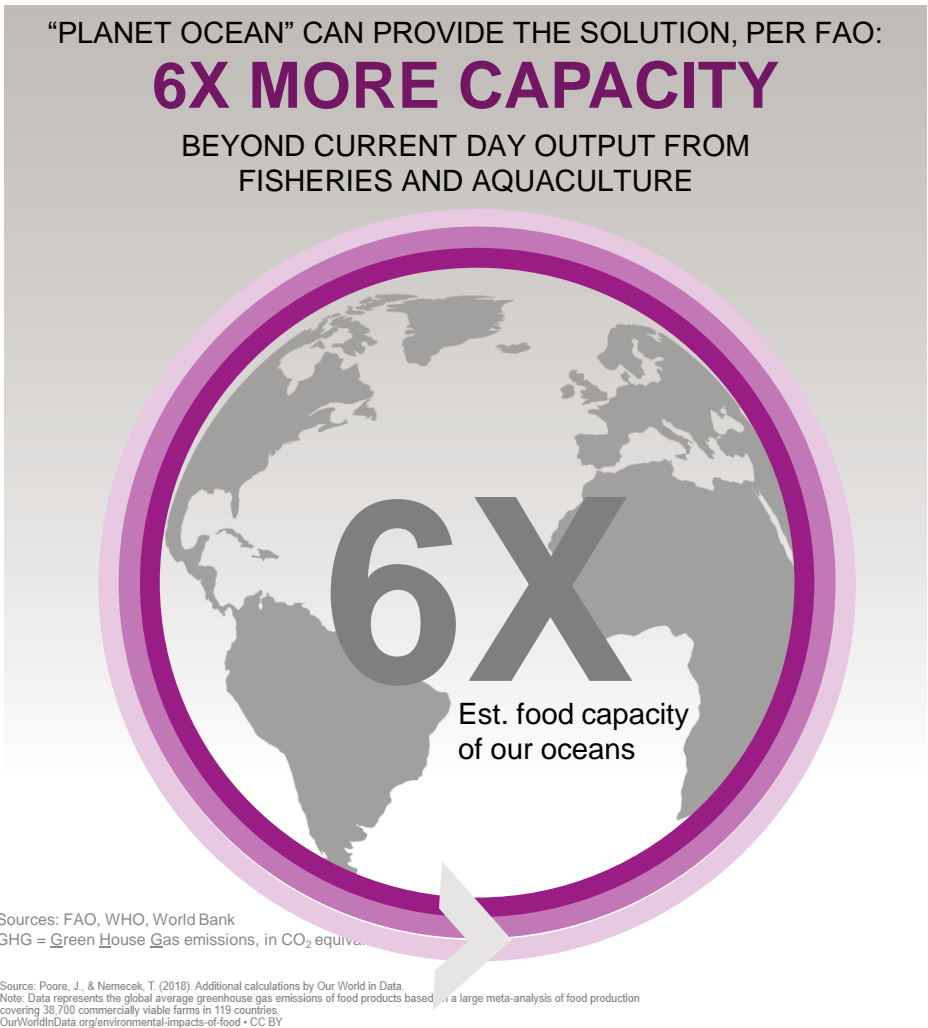
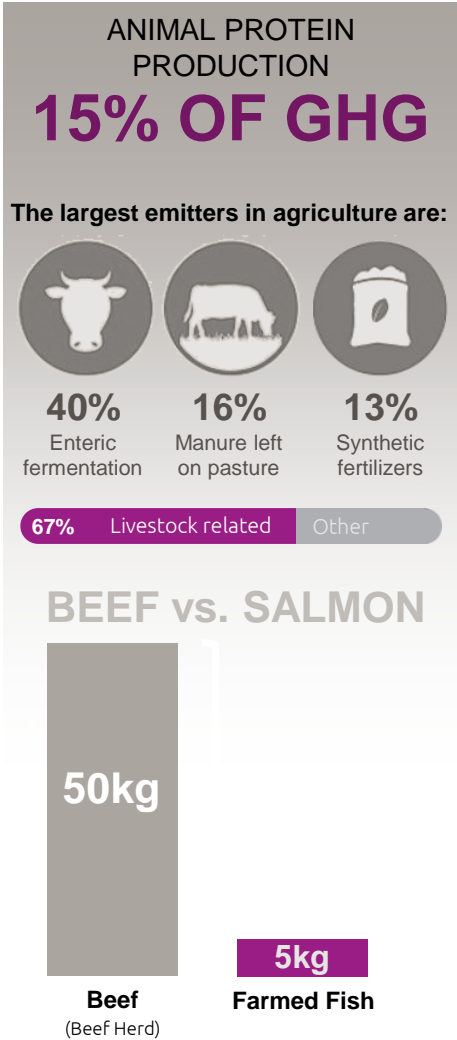
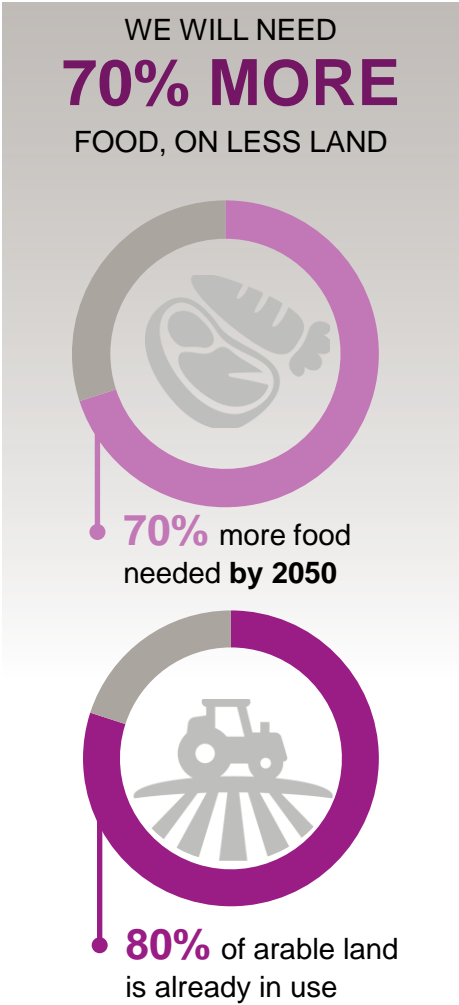
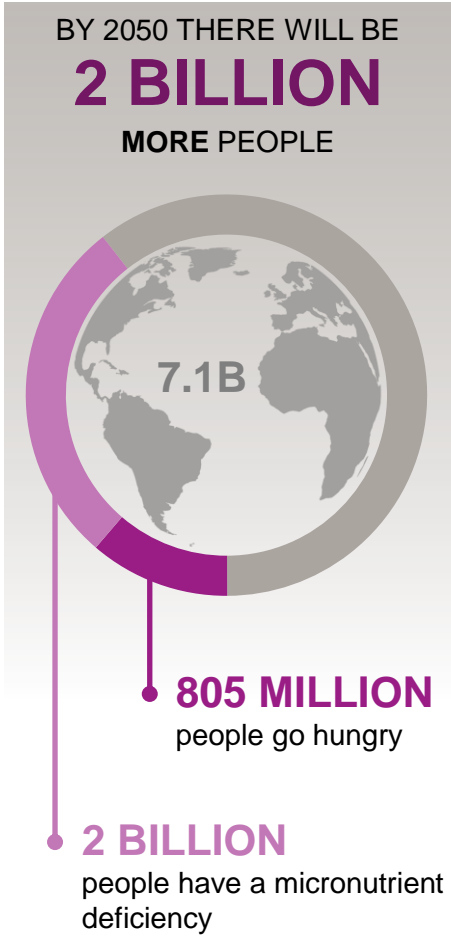
veramaris

A JOINT VENTURE OF DSM AND EVONIK



Our Challenge is feeding the world while massively reducing GHG

Aquaculture is the answer, but it takes another 45 million tonnes of feed

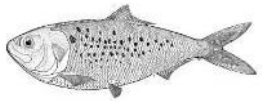


Overfishing of global fish stocks

Wild fish are used on an industrial scale to produce fish oil and fishmeal



Anchovy



Menhaden



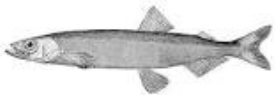
Sprat



Blue Whiting



Herring



Sand eel

16,000,000 tons wild fish



~17% of global wild catch is consumed for the production of fish oil and fishmeal

Sources: IFFO, FAO



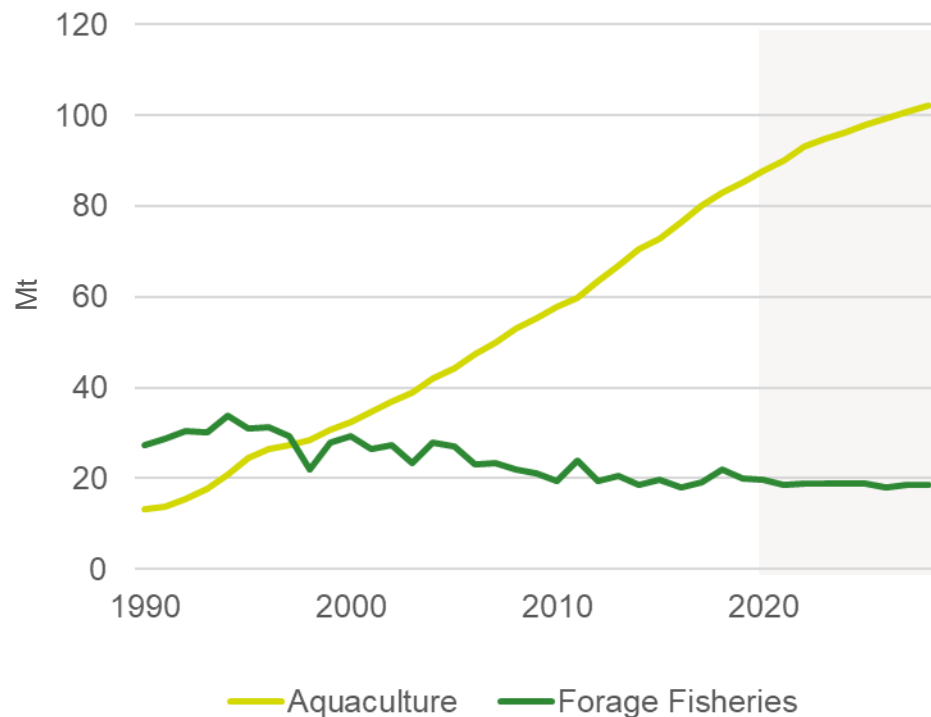
~ 5 million tons
fishmeal



~ 1 million tons
fish oil

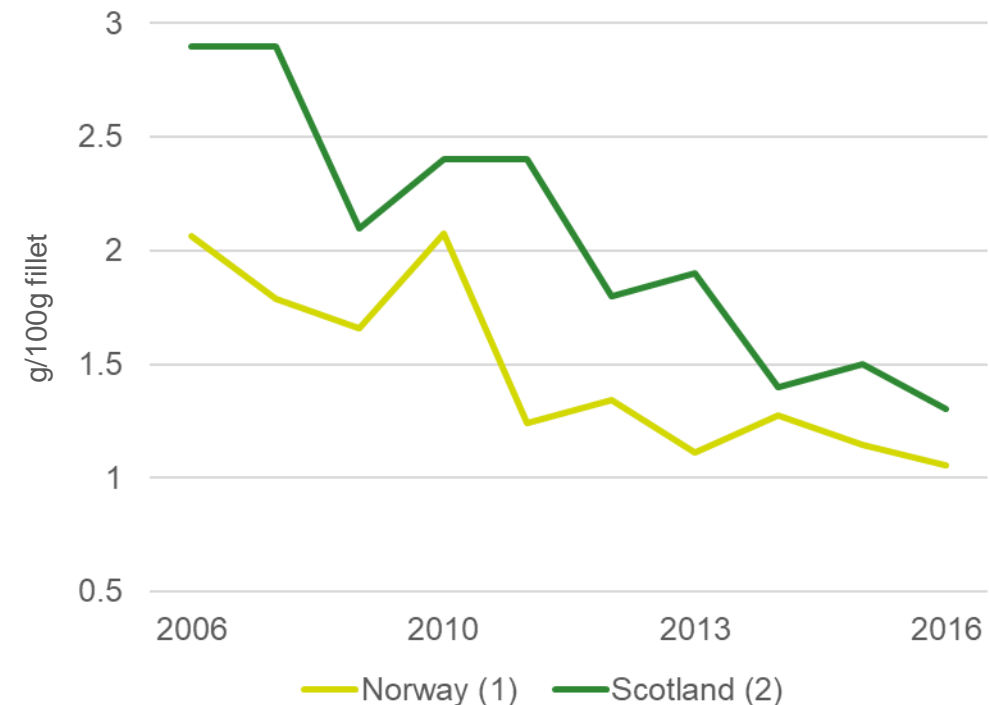
Demand for seafood drives expansion of the aquaculture industry, but traditional supply of omega-3 dilutes EPA & DHA content in farmed salmon

World Aquaculture and Forage Fisheries
1990- 2028



Source: OECD/FAO (2019)

Levels of EPA + DHA in farmed Atlantic Salmon
2006 to 2016

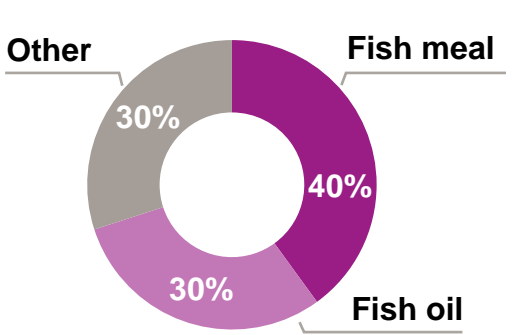


Sources: Seafood Data, NIFES; Sprague et al. (2016)

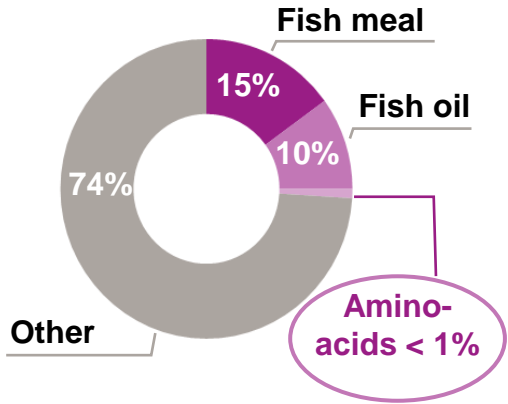
Evonik offers key components for the development of sustainable salmon diet

Start of evolution towards sustainable salmon diet Target: “vegetarian” diet without fish meal and -oil

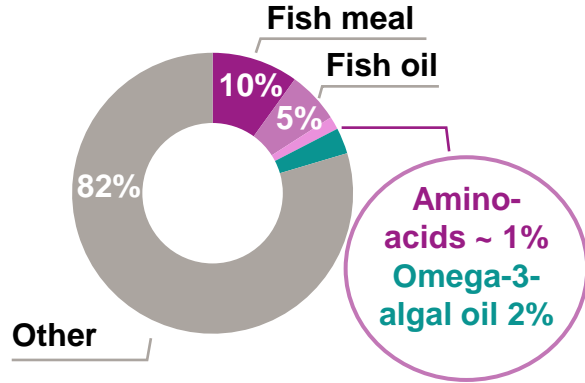
Traditional diet



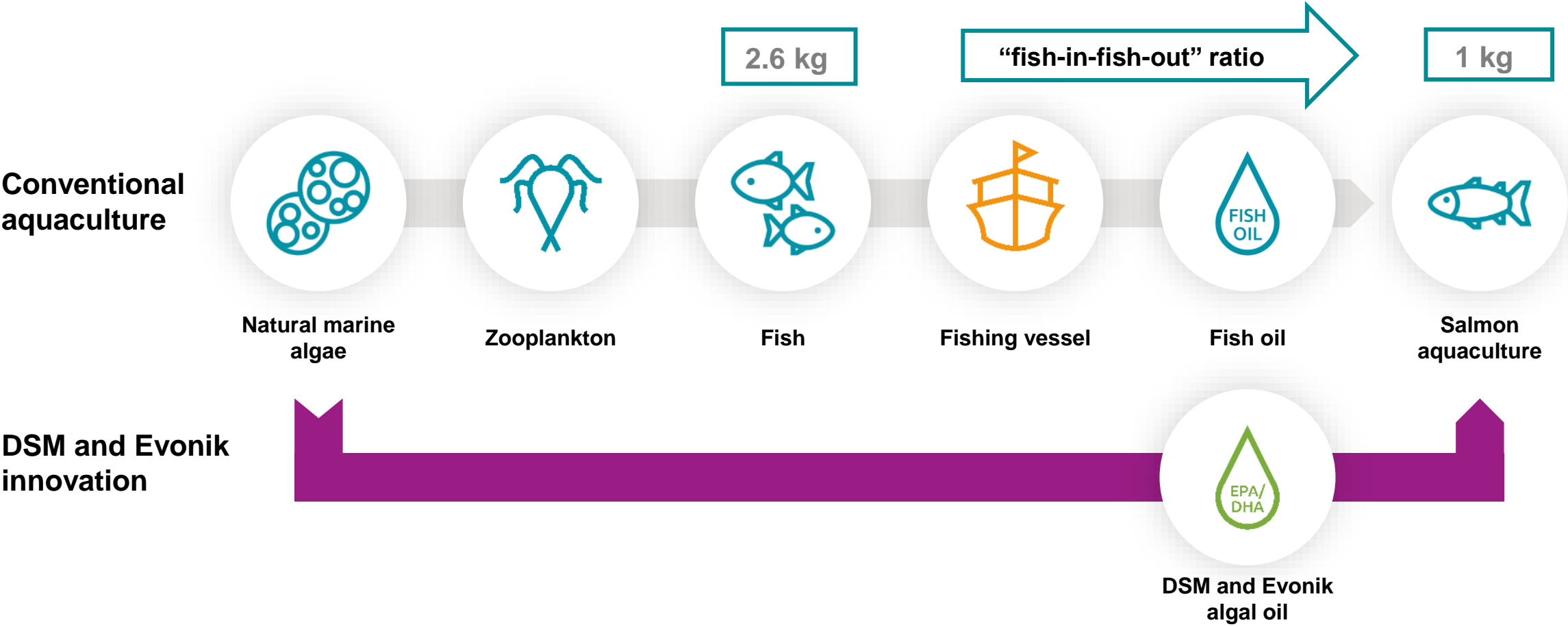
More sustainable diet enabled by amino acids



Further reduction of fish input enabled by omega-3 algal oil



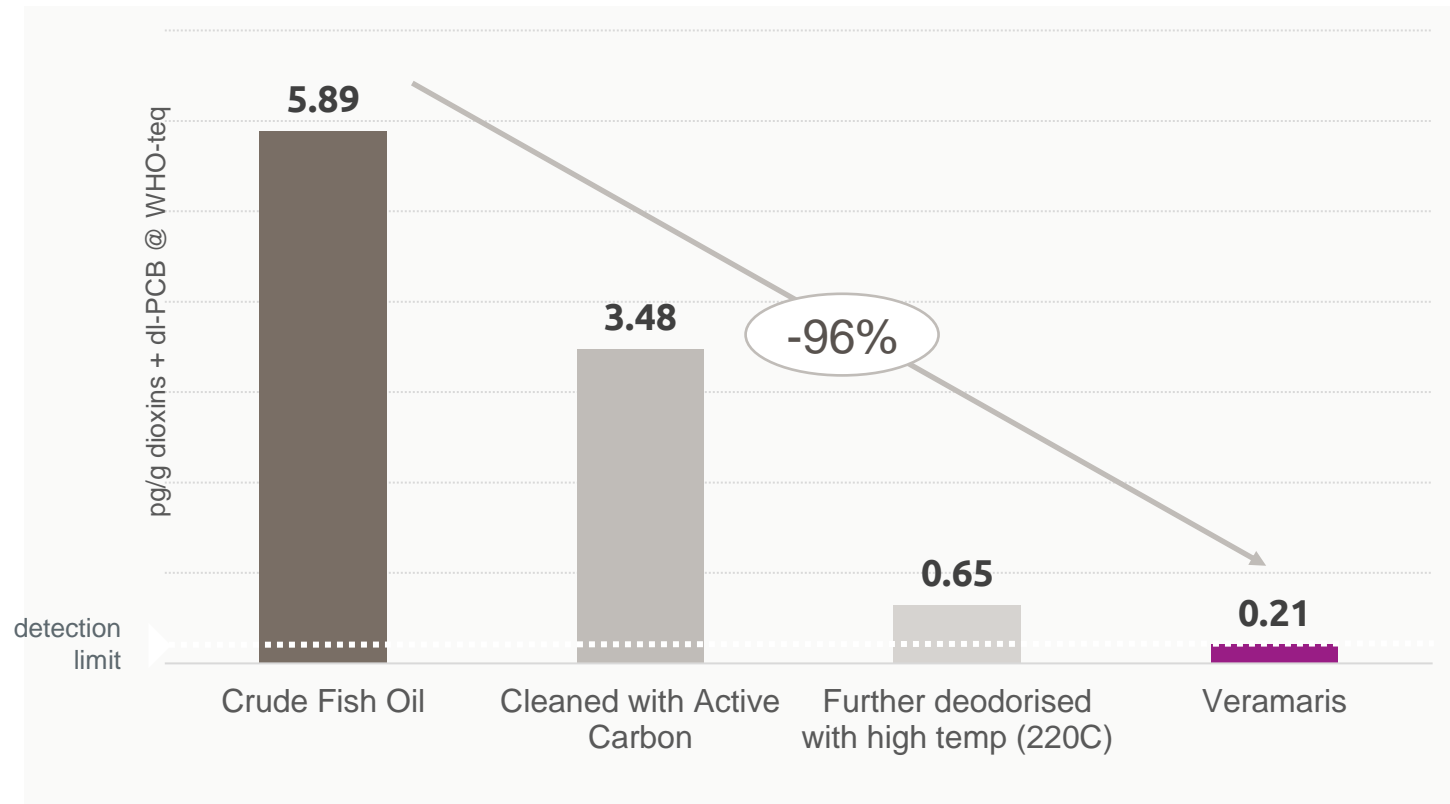
Natural marine algal oil is a sustainable alternative solution for EPA and DHA



DSM and Evonik breakthrough – shortening the natural food chain

Veramaris® Algal oil is naturally the cleanest source of EPA & DHA omega-3

Dioxins + PCBs in fish oil and Veramaris algal oil

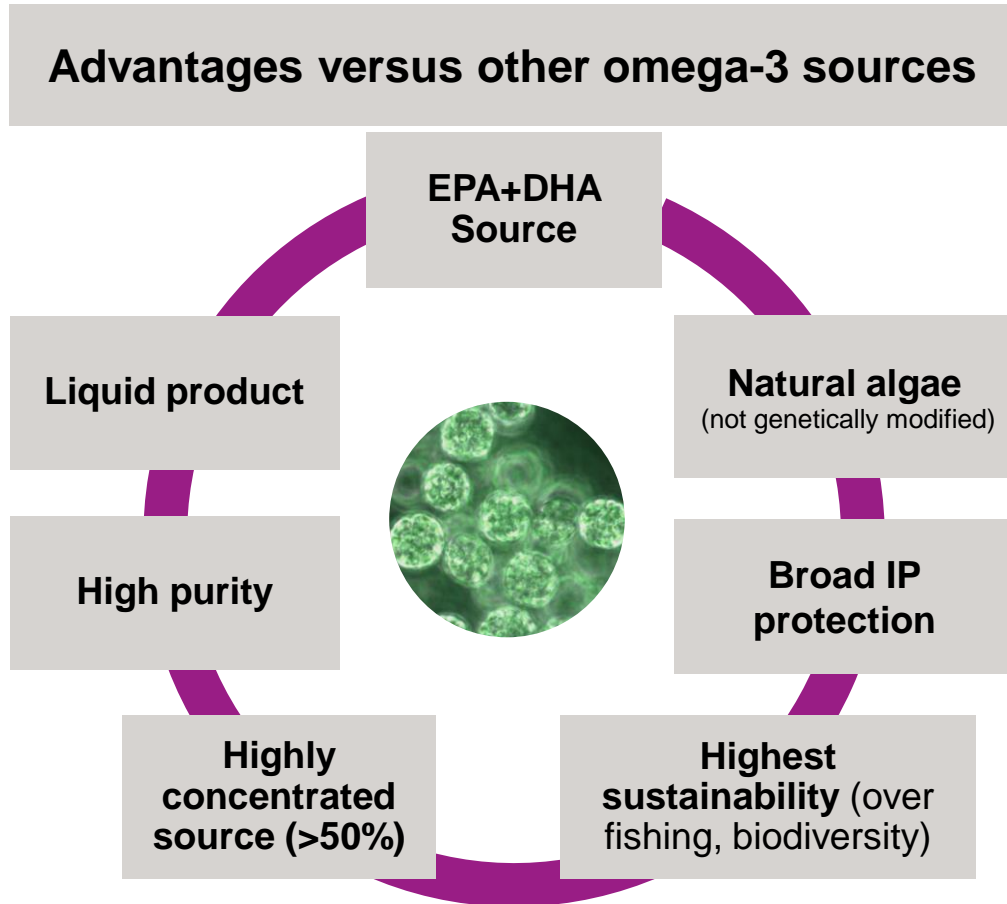


At least
-96%
less
Dioxins & PCBs

Shows the large potential to reduce pollutants in farmed seafood

Sources: Hadfield (Mowi) at IFFO 2014 (fish oil). Eurofins 2019 (algal oil, upper-bound)

Algal oil as a high-quality source of omega-3 for the use in animal nutrition has many advantages



1 kg of our EPA and DHA algal oil
can replace **66 kg** wild catch fish



Meeting roughly **15%** of the EPA and DHA
demand of the **global salmon industry**



Veramaris® - Strong alliance of Evonik and DSM

Partnerships with stakeholders along the value chain are key to success

Partnering for a purpose



200

US\$ 200 million investment in algal oil facility in Blair, Nebraska, USA

15%

Initial production capacity will meet 15% of the global demand for omega-3 EPA and DHA in the salmon industry

+

Veramaris® algal oil is the only product on the market containing EPA + DHA

x 2

Evonik and DSM are experts in this industry

Engaging along the value chain

By talking to all stakeholders along the value chain and facilitating round tables we help to create market pull.

Influencers

Regulatory
bodies

NGOs

Governments

Industry
organizations

Health
associations

Value Chain

Feed producers

Farmers

Processors

Retailers

End consumers

Innovation at Evonik

Additional Materials

Video Content

Innovation Growth Fields

Additive Manufacturing

<https://www.youtube.com/watch?v=CWu0EjCcJsM>

Sustainable Nutrition

Digital Farming

<https://www.youtube.com/watch?v=nor8hTiViuk>

<https://www.youtube.com/watch?v=ZJHr0oUk5Fo>

Veramaris

https://www.youtube.com/watch?v=Es4lUi_a0kc

<https://www.youtube.com/watch?v=5G6P2D5bKiQ>

Cosmetic Solutions

Active Ingredients

<https://www.youtube.com/watch?v=v-12auLQo4k>

Biosurfactants

<https://www.youtube.com/watch?v=SchMK3gB83Y>

Healthcare Solutions

Lipid Nano Particles

<https://www.youtube.com/watch?v=J8kqAoSzeNE>

<https://www.youtube.com/watch?v=lhhc7Ydbrsq>

Cell culture Solutions – cQrex®

<https://www.youtube.com/watch?v=0m5FxJTrFMo>

RESOMER® Biomaterials

<https://www.youtube.com/watch?v=pBxIQulqadM>

Membranes

<https://www.youtube.com/watch?v=6kuNBDI-P0A>

https://www.youtube.com/watch?v=eT2_02U0Ze0

https://www.youtube.com/watch?v=Zr_YOXh9l8c

<https://www.youtube.com/watch?v=C2jW0NkCKmw>

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EVONIK

Leading Beyond Chemistry