Safe harbor statement

- This factbook may contain forward-looking statements with respect to DSM’s future (financial) performance and position. Such statements are based on current expectations, estimates and projections of DSM and information currently available to the company. DSM cautions readers that such statements involve certain risks and uncertainties that are difficult to predict and therefore it should be understood that many factors can cause actual performance and position to differ materially from these statements. DSM has no obligation to update the statements contained in this factbook, unless required by law.

- A more comprehensive discussion of the risk factors affecting DSM’s business can be found in the company’s latest Annual Report, which can be found on the company's corporate website, www.dsm.com.
Accelerating & supporting innovation

Innovation at DSM is fostered at business group level, but also through a separate Innovation Center

The Innovation center has two main objectives:

1. Enable and accelerate innovation power and speed in core businesses as a center of excellence.
   - Protect DSM’s intellectual property
   - Focus on adjacent technologies and business opportunities for growth through DSM’s Corporate Research Program and Venturing & Licensing activities

2. Focus on areas outside the current scope of the business groups, investing in new and innovative growth options through the DSM Business Incubator and by developing and extracting value from the company’s Emerging Business Areas (‘EBAs’) in promising end-markets that provide strong long-term growth platforms which are based on the company’s core competences in health, nutrition and materials

- Chief Technology Officer
- Excellence in innovation
- Intellectual Property
- Venturing & Licensing
- Emerging Business Areas
  - Biomedical
  - Bio-based Products & Services
  - Advanced Solar
- Business Incubator
Emerging Business Areas

Long-term growth

**Biomedical**

- Partner with the medical industry worldwide to develop innovative biomaterials and regenerative medical devices that improve patients’ lives
- Develop innovative materials, components and full medical devices based on biomedical polyurethane and polyethylene, resorbable polymers, ceramics, collagens, extracellular matrices, silicone hydrogels, device coatings, and drug delivery platforms
- Aim to outpace market growth in high-growth segments of the medical device market including cardiology, neurology, ophthalmics, diabetic care, and orthopedics

**Bio-based products & services**

- Pioneer advances in biomass conversion and seek to demonstrate the commercial viability of sustainable, renewable technologies in collaboration with strategic partners in the value chain (e.g. POET in cellulosic 2nd generation bioethanol)
- Leverage the expertise and products DSM has built up in enzymes and yeasts for bio-fuels to create new businesses and make the production of all generations of bio-fuels more efficient and sustainable
- License technology and expertise, enabling future partners to convert biomass in a commercially viable and sustainable way

**Advanced solar**

- Aim to accelerate the uptake of photovoltaic energy by focusing on the development and commercialization of technologies and materials that increase the efficiency of solar modules, reducing the cost of energy delivered
- Strong position as a multi platform solution provider for high-performance solar PV materials, driven by market-leading anti-reflective coatings, co-extruded conventional backsheet technology with a superior cost performance ratio and an innovative new type of backsheet fueling electroconductive solar module architecture
**Innovation**

*Large programs supporting growth*

- **Bovaer/Clean Cow**: feed additive that reduces methane emissions from ruminants by ~30%
- **Veramaris**: natural marine algal oil rich in omega-3 (high concentration of both DHA and EPA)
- **Balancius**: feed ingredient that promotes gut health & drives antibiotics reduction
- **Avansya**: fermentative stevia that drives sugar reduction/replacement in F&B
- **Niaga**: process technology & material science enabling healthy & recyclable carpets, mattresses and furniture
- **Advanced solar**: coatings & backsheets
- **New Biomedical**: tissue repair / ophthalmology
- **Bioethanol**: enzymes / yeasts for 1.5-2G

Expected Sales/Adj. EBITDA in 2021 and 2025 of large projects: ~€350m/€100m rising to ~€1bn/€0.4bn

Total innovation sales (at higher margins) remain at 20% of sales
Veramaris
Omega-3 from fermentation

- Marine algae-derived oil rich in EPA and DHA fatty acids, essential for human and animal health (brain + heart), with a concentration exceeding 50%
- Addresses the decline in omega-3 levels in salmon (∇ fish oil), help sustainable farming
- Large range of applications: early life nutrition, animal (incl. pet, shrimp & fish)

- Sugar and algal strains – GMO-free - are used in the fermentation process
- Fermentation bypasses the food chain providing a highly-concentrated, stable and reliable supply of algal oil that can attain 15% of the current market demand for the salmon industry
- Similar to fish oil, but exempt from its price fluctuations & free from seaborne contaminants

- One ton of algal oil conserves 60 tons of wild-caught fish, reducing the pressure on over-fishing and enabling the aquaculture industry to grow sustainably
- A waste-free production process

- JV combines DSM bio-tech & Evonik operational knowledge of large-scale manufacturing for fermentative amino acids. Plant in Blair (Nebraska) opened in Jul’19.
- Production expected to ramp up in 2020/2021; estimated €175-200m sales at full operation
- Salmon enriched with Veramaris’ Omega 3 already available to DE, FR & UK retailers via Norwegian commercial partner
Veramaris
How does it work?

A waste-free fermentation process

The production steps

1. Sugar is fed to the algal strain seeding the fermentation in Blair (Nebraska, US); both GMO-free

2. The algae multiply exponentially and convert sugar into omega-3

3. Centrifugation separates oil from water, resulting in a highly concentrated oil & a liquid co-product

4. The co-product can be used for cattle feed or converted into bio-gas for energy production

5. The algal oil, rich in EPA and DHA fatty acids is a natural, stable product with a concentration >50%.
Bovaer® - One burp at a time
How cows can help us fight climate change

Ruminants contribute significantly to the world’s methane emissions

- In a cow’s stomach, microbes help food break down. This releases hydrogen and carbon dioxide. An enzyme combines these gases to form methane. Bovaer® is a feed additive that suppresses the enzyme, so less methane gets generated.

- Like carbon dioxide (CO2), methane is a greenhouse gas. Its warming effect is shorter lived, but much more potent than CO2. So eliminating it begins to pay off right away.

Bovaer® - (Clean Cow) inhibits methane production by ~30%

Feeding Bovaer® to 1 cow saves the equivalent of 127,000 smartphone charges

Feeding Bovaer® to 3 cows is like taking 1 family-sized car off the road

Feeding Bovaer® to 1 million cows is like planting a forest of 45 million trees
Bovaer® - Farm wise & climate friendly

Significant reduction of methane emissions from cattle

- Feed additive that blocks enzyme responsible for the methane emissions in cows (↓ 30%)
- Safe, doesn’t leave traces in milk, stable, its effect stops as soon as the additive is not fed
- Increases cow productivity by freeing-up energy from the digestive process: 1 cow generates 3 tons of CO2e every year in the form of enteric methane

- The molecule in the inhibitor, 3-NOP hampers an enzyme responsible for the methane production in the rumen: A quarter of teaspoon powder per cow a day is needed
- The additive will break down into compounds already naturally present in the stomach

- Ruminants (mainly cows) emit about 20% of all methane gasses globally. Reducing global methane emissions from cows will thus result in immediate impact and therewith help slow the pace of global warming in the next decade already, to facilitate society taking longer-term action on CO2 reduction. Bovaer® could therefore significantly contribute to various UN Sustainable Development Goals, including Climate Action.

- Data collection completed, 26 studies published. Bovaer® has recently been filed for registration in Europe where it will be available as soon as market authorization is granted with a launch in the region anticipated in late 2020/early 2021. Registrations of the feed additive in other regions will follow
- Commercialization will follow the registration phase: estimated market of €1-2b
- Further expansion in beef market with different forms
Key innovations

**Fermentative Stevia – Avansya**

*Next generation of great tasting Stevia Sweeteners!*

- Consumer interest and awareness on ways to improve their health has also increased the demand for “healthier foods” with reduced fat, sugar and salt. Main objective is to reduce overall calorie intake, yet not to compromise on taste.

- To meet this demand, Cargill and DSM combined their efforts to create the joint venture Avansya, to deliver zero-calorie great tasting sweeteners to the market. This partnership combines DSM’s leading biotech know-how and fermentation expertise with Cargill’s global commercial footprint in sweeteners and large-scale fermentation capacity, making sugar reduction a sustainable and affordable reality. Avansya offers a more scalable, more sustainable and low cost-in-use, zero-calorie solution.

- Avansya (JV with Cargill) launched in March 2019. Commercial production started in Blair (Nebraska, US) end of 2019. Avansya has commercial volumes available and is already supplying EverSweet to various customers. Further consumer products will launch in the coming months across multiple market segments. Total market for fermentative high-intensity sweeteners is forecasted to be >€3bn by 2025.
Sustainable, high quality stevia sweetener branded as EverSweet™
- Best taste profile and mouthfeel compared to current solutions in the market
- 200x sweeter than sugar and zero calories with taste that closely resembles sugar
- Large range of applications: soft drinks, cereals, confectionery, dairy, baking, etc.

Fermentative stevia sweetener provides a more scalable, sustainable and lower cost-in-use solution than any other available technology

Addresses the issue of sugar overconsumption and responds to shifts in consumers’ preference to non-artificial products
- More sustainable production compared to fully plant-based alternatives
- Stevia products will not accumulate in the environment

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Key innovations

Balancius™
Improving gut health

- Alliance with Novozymes since 1998

- Balancius™: feed enzyme improving gut health, enabling removal of antibiotics from animal feed
**Key innovations**

**Balancius™**
*Improving gut health*

- Broiler feed ingredient that breaks down the dead bacterial cells debris in the gut responsible for nutrients malabsorption in the bloodstream, reduced diet’s digestibility & feed efficiency
- Dust free, mixable and thermostable
- Supports digestion, gastrointestinal functionality and improves animal performance
- Addresses the issue of antibiotic use in animal farming

- The enzyme (muramidase) targets and hydrolyzes bacterial cell debris (peptoglycans) along the whole gastrointestinal tract
- The addition of Balancius to the diet of broiler chickens consistently improves feed conversion ratio, demonstrating a significant improvement in digestibility and feed efficiency.

- Growing population drives global demand for healthy, affordable poultry meat that puts additional pressure on natural resources
- Balancius reduces the environmental footprint of poultry production: GHG emissions as well as enabling removal of antibiotics from animal feed

- Balancius is the latest innovation from the Alliance of DSM with Novozymes, reflecting the strength of its scientific capabilities and ongoing leadership in animal nutrition and health.
- Product is registered and available in North America, LatAM and Europe for poultry markets
- Swine market solutions available next
CanolaPRO™
Providing enough protein for 500 million people

- CanolaPRO™: Turning inedible byproduct of rapeseed oil into: highly nutritious neutral-tasting protein ingredient for food & beverages
- Reducing the footprint of our food consumption
CanolaPRO™
Proteins from rapeseed oil

- Plant-based protein with high-nutritional value, balanced taste profile, highly soluble & great emulsification functionality, sustainable
- Non-GMO, non-gluten, non-dairy and hypo-allergenic
- Diverse applications: beverages, protein bars, bakery, meat analogs, cereals

- New technology that turns an inedible agricultural byproduct of rapeseed oil extraction into valuable plant protein for a wide range of uses in food
- It takes rapeseed meal (byproduct of the cooking oil extraction process) normally fed to animals and makes it edible by isolating the protein from the meal

- Addressing the issues of feeding an increasing world’s population, fight protein deficiency and shifts in dietary preferences
- Low-carbon footprint
- Repurpose by-product of rapeseed extraction

- DSM-Avril collaboration announced in Jul’19
- Industrial production facility fully dedicated to be established at Avril’s Dieppe site
- Commercial availability as early as 2021
Hello Niaga®. Goodbye waste.
Redesigning everyday products from scratch

- Niaga® Technology: a 100% recyclable carpet, produced with up to 90% less energy

niaga®
alive. again and again.

- Design for recycling of mattresses
- Circular furniture panels
Niaga®
Recyclable products

**KEEP IT SIMPLE**
- Redesign: reconsider everyday things to make them healthier for people and planet
- Philosophy: keep it simple, clean materials only, use reversible connections
- Idea: design products so all materials can be brought back to life, again and again
- Transparency: radical openness to materials, suppliers, manufacturing and teammates

**INSPIRED TECHNOLOGY**
- Process technology to bind fibers and laminate materials to each other
- Reversible “click-unclick” adhesive portfolio to enable material separation
- Novel solutions for product use, reuse, refurbishment and recycling

**SUSTAINABLE**
- Carpet is one of the big contributors to landfill waste today, due to complex combinations of materials glued together. Niaga® found ways to meet all performance demands of a carpet using only one material. This allows for easy recycling after use, back into carpet
- Transparency is a key value, and you can always know what is inside a Niaga® product design

**READINESS & POTENTIAL**
- Showcase production line for carpets operational in Geleen (NL), supplying EU manufacturers
- In NA, Mohawk’s Air.O carpet and Empire’s HomeFresh carpet utilize Niaga® technology
- Partnerships with Auping (mattresses) and ECOR (furniture panels) extend the Niaga® design philosophy to other industries
Advanced Solar

*More power from same sun*

- DSM has developed coating technologies that boost (5-10%) the power generated by solar PV systems and make solar more competitive
  - Our Anti-Reflective coating for solar glass squeezes out an all-important 3% power gain compared to non-treated equivalents
  - Our Anti-Soiling feature is specifically for solar parks in dry, desert climates where sand and dirt is blown onto the solar panels.
  - Our 100% recyclable backsheets for solar panels to boost power gain even further - while reducing carbon footprint by 30% compared to conventional backsheets.
BRIGHT SCIENCE. BRIGHTER LIVING.