



**DSM**  
BRIGHT SCIENCE. BRIGHTER LIVING.

**Innovation driven growth**

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Capital Markets Days 2011

HEALTH · NUTRITION · MATERIALS



## Overview

- [Innovation progress](#)
- DSM Bio-based Products & Services
- DSM Biomedical



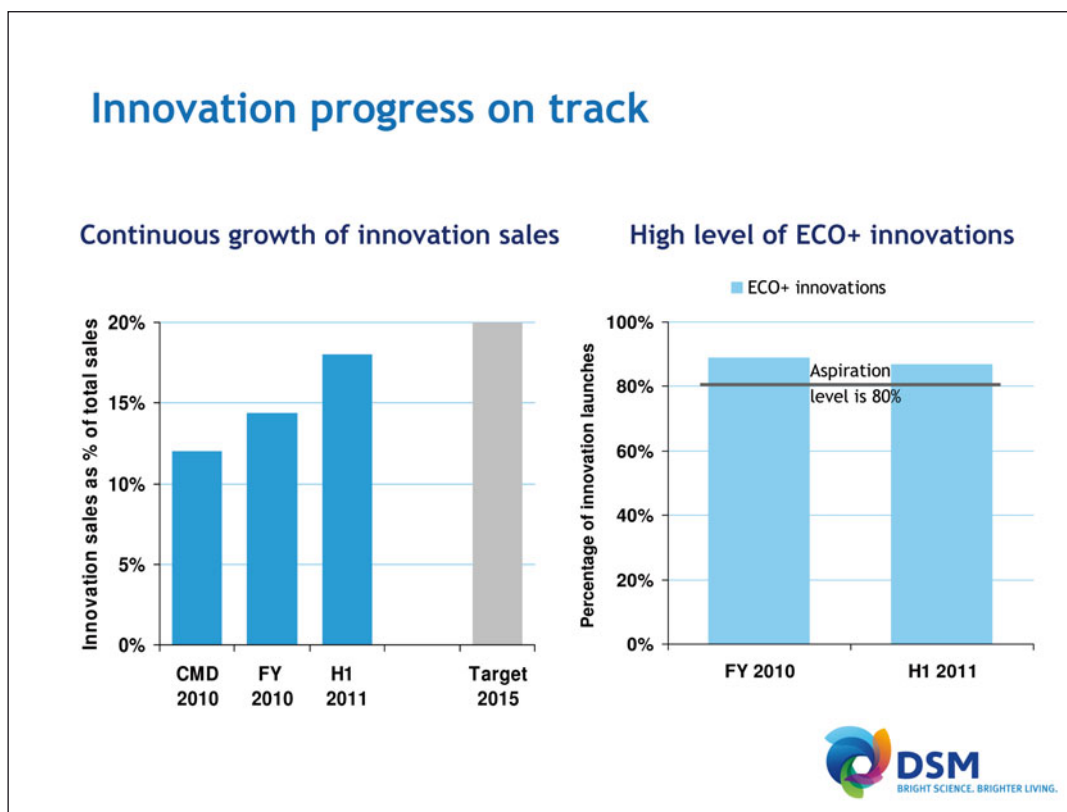
## Profitable growth via Innovations

### From building the machine to doubling the output

- Innovation sales: from 12% to > 20% of total sales by 2015
- Value creation via best practices
- Innovation focus on platforms
- Set up China and India Innovation Centers
- Sales from Emerging Business Areas:
  - > € 1bn total in 2020
    - Biomedical Materials
    - Bio-based Products & Services



- In innovation, DSM's ambition is to go to the next level: from building the machine to doubling innovation output. This will be visible, amongst other things, through
  - an even higher speed of innovation by further implementation of value creation through best practices;
  - the implementation of a company-wide approach of moving from projects to business platforms;
  - a new stretching innovation target whereby DSM aims to increase innovation sales - measured as sales from innovation products of the last five years - from ~12% towards 20% of total sales by 2015;
  - and an ambitious growth perspective for sales from Emerging Business Areas of more than € 1 billion by 2020.
- An important element to bring innovation to the next level is to expanding innovation to new regions. Therefore, we initiated a DSM Innovation Center in India and China.



- DSM is well under way towards achieving its business and sustainability targets for innovation.
- Innovation sales have shown strong and continuous growth since the introduction of an innovation sales target in 2005. During the Capital Markets Days in 2010 the new ambitious goals were presented. Sales growth has continued since then and DSM is now well under way in reaching the 20% innovation sales as % of total target by 2015.
- One of the key sustainability targets DSM set during the CMD 2010 was that at least 80% of its innovation pipeline should be ECO+. Both at the end of FY 2010 and during H1 2011 this target has been amply met, showing the company's commitment towards sustainable business.

## Well defined, result-driven innovation process

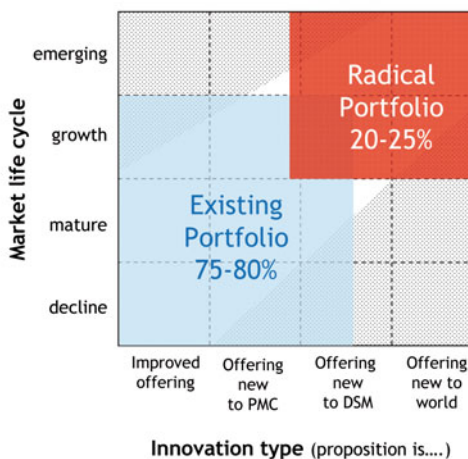
### Innovation is business-driven

- Focus on
  - Top 50 projects DSM wide
  - Emerging Business Areas
  - Business incubator
- Staged process with rigorous selection criteria
- Excellence in innovation program to boost performance

### Resulting in

- Average innovation margin 30-50% higher than running business

### Balanced mix of innovation projects



- To achieve the new innovation targets and bring DSM to the next level of excellence in innovation, the company will increase its focus on the most promising top 50 key projects, the Emerging Business Areas and the business incubator. This will be done by introducing portfolio management at platform level. An innovation platform is a set of related projects from the (often top 50) projects within DSM focused on an identified business area/need. By increasingly focusing on platforms rather than individual projects, the success rate and the impact of the innovation activities is expected to grow further.
- In addition, DSM will use portfolio management to manage the balance between incremental and radical innovation. This will facilitate discussions on the composition of the innovation portfolio and will help optimize the mix between incremental and radical innovation within the company. It allows comparison of different platforms, as such enabling company-wide portfolio management.
- For the radical part of DSM's innovation portfolio a global, company-wide portfolio approach will be adopted which will be tightly managed by yearly evaluation and decision-making by the Managing Board on its composition. This will secure the long-term attention for Life Sciences and Materials Sciences as the key pillars of DSM's strategy and will secure that cross-fertilization between the two fields is actively stimulated.
- This approach and DSM's innovation performance will not only result in an increase in innovation sales as described on the previous pages, but will also leads to an average innovation margin that can be even 30-50% higher than in running business.

## Open innovation milestones & partnerships



DSM and Roquette build Europe's largest bio-based succinic acid facility



Adding a new biotechnology innovation platform based on Algae



Industrial biotechnology for renewable fuels and chemicals



SkySails with Dyneema® optimizes wind power



KhepriCoat™ enhances efficiency of Interfloat solar panels

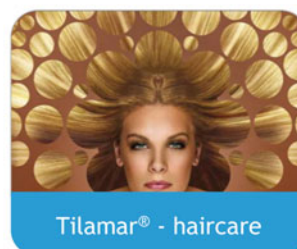
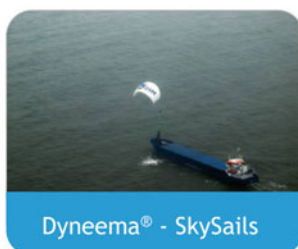


With DSM's Bionate® PCU first and only system for treating degenerative disc disease and Lumbar Spinal Stenosis



- The numerous partnerships, venturing investments, acquisitions and other forms of collaboration (such as licensing) announced in the past few years show that open innovation is becoming more and more ingrained in DSM's innovation approach. The interaction with industry partners and technology thought leaders enables DSM to be active at the forefront of the most promising developments in the areas DSM focuses on.
- One of the existing partnerships, between Roquette Frères (the global starch and starch-derivatives company headquartered in France) and the EBA Bio-based Products and Services, has recently been expanded. This partnership focuses on the production, commercialization and market development of bio-based succinic acid using the most sustainable fermentative technology.
- The acquisition of Martek added the highly versatile algae technology as a new, complementary business platform to DSM's portfolio in the field of biotechnology broadening the toolbox even further. Already several projects are in progress, e.g. in the field of renewable energy.
- The collaboration with SkySails is a good example of successfully developing and commercializing SkySails-Systems. This was made possible by DSM's materials science expertise and innovation. By working closely with its partners, DSM's Dyneema® is enabling the rebirth of wind-powered shipping.
- DSM Advanced Surfaces has signed license and supply agreements with Interfloat Corporation, a leading solar-glass producer. This opens the way for Interfloat to start producing cover glass for solar modules coated with KhepriCoat™, a record-breaking high-transmission/anti-reflective (AR) coating from DSM Advanced Surfaces.
- The venturing unit of DSM, part of the DSM Innovation Center organization, has participated in a financing round for Verdezyne, Inc. (United States), an industrial biotechnology company developing cost-effective processes for the production of renewable fuels and chemicals.
- In addition, several other partnerships have been established in the field of Biomedical materials such as joint development agreements or licensing agreements assisting customers to bring their products to market. An example is the partnership with Interventional spine for the development of new spinal discs.

## Examples of recent innovation launches



- With more than 60 launches in 2010, the portfolio of innovations is extensive and company-wide. A selection of exemplary innovations are highlighted below:
- A KhepriCoat™ layer on solar cover glass reduces the amount of sunlight reflected, thereby allowing more of it to pass through to the solar cells. This significantly boosts the sunlight conversion rate of solar modules.
- To date DSM Dyneema®, SkySails and rope manufacturer Gleistein have been combining their expertise in a unique three party technology partnership which focuses on the development of a special high performance rope that delivers the unique requirements for high strength, light weight and excellent durability for wind propulsion systems. DSM's Dyneema®, the world's strongest fiber™, is a key component in the SkySails Kite System.
- Tilamar® is a new and innovative hair care ingredient that delivers outstanding performance especially for aerosol styling sprays. It has a unique proposition to the market as it combines extra strong hold with natural feel on hair.
- RONOZYME® HiPhos is the most powerful and active phytase in the global market enabling for the first time the possibility to replace all feed phosphate additives in pig and poultry diets. Feed formulations using RONOZYME® HiPhos therefore require considerably less inorganic phosphorus. This noticeably cuts feed costs and environmental impact of livestock farming.
- Aeronite® is a composite resin that fulfills the need for aviation materials that are both light weight and strong. Planes made from this resin are fast, safe and more fuel efficient than conventional carbon fiber planes.
- Cradle2Cradle® manufacturing systems are essentially waste free - they extract raw material, make use of it, and then place it back into the value chain as a raw material again. A leading furniture manufacturer is now adopting Cradle2Cradle® designs and uses Arnitel® - a DSM product that is completely free of toxic compounds and is thermally recyclable.



- The Innovation Center headed by the Chief Innovation Officer (CIO) increasingly fulfills a business development role, with its incubator and Emerging Business Areas accounting for the majority of the attention, resources and results. In addition it continues to have a leading role in enabling innovation within DSM company wide. Approximately 80% of resources are invested in new business creation, whereas approximately 20% are invested to enable innovation throughout DSM. Within the latter category, the Chief Technology Officer (CTO) and the Corporate Technology department act as the technological conscience of the company and provide technological input for the company's strategic choices. The CTO officer also directs the Corporate Research Program.
- Other innovation enabling elements are explained on the following pages.



## Boosting DSM's innovation performance

### Excellence in innovation

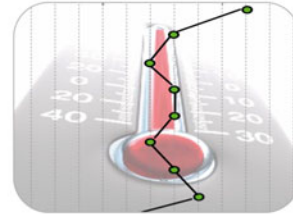
- Stimulate **Business group innovativeness**
- Guarantee **Top project delivery** through strong project management
- Deepen **Market understanding** for successful innovations
- Enhance **Entrepreneurship**
- Increased **Performance orientation** through improved transparency



Training top project owners



Developing entrepreneurs



Tracking performance



- To achieve its innovation ambitions, DSM strives for the next level of innovation performance. One of the ways to further boost DSM's innovation performance is the "Excellence in Innovation" program. This program focuses on:
  - the stimulation of business group innovativeness with the aim of improving innovation strategy & capabilities as well as inspirational leadership;
  - further guaranteeing top project delivery through enhanced project management performance, better team composition and effective behavior;
  - deepening market understanding by extensive market and customer assessments, including the search for innovation partners in the market;
  - creating the right environment for entrepreneurs and enhancing entrepreneurial behavior;
  - driving performance and results orientation by setting and tracking innovation targets throughout the organization and role modeling on performance orientation.

## Initiating innovation centers China & India

### Innovation Centers China & India

- Develop
  - local for local programs
  - local for global programs
  - participate in global incubator
- Support function for EBAs and Venturing & Licensing

### Status / goals by end of 2011

- Implementation of organization in Shanghai & Beijing
- Establish internal and external networks
- Business discovery leading to first set (3-5) of new business platform ideas

### DSM campus in China



- Expanding innovation to new regions, combined with internationalization, will be another important element of DSM's innovation efforts in the coming years. Breakthrough innovation is increasingly happening in the emerging economies (especially in the East). In response to this, DSM is in the process of establishing a DSM China and DSM India Innovation Center to harvest the opportunities in these countries. This will enhance the company's local influence on innovation and unlock the innovation potential in high growth economies.

## Venturing integral part of innovation

### Since 2001

-> Scouted and screened more than 2,500 companies, which provided useful insights and complementary windows on-the-world for our businesses

### Resulting in

- 36 direct investments; 22 still active in current portfolio
- 14 divested or stopped. Net financial result is positive
- Partnerships realized with >30 portfolio companies in various forms and to varying degrees
- Partnerships with > 50 other start-ups which DSM Venturing scouted but did not invest in



- DSM Venturing is an active investor in start-up companies and explores emerging markets and technologies in order to support DSM's innovation and growth strategy by offering financial support and access to DSM's knowledge, resources and networks in order to establish mutual benefits.
- DSM Venturing always works in collaboration with business groups and/or EBAs to support the businesses' mid-to-long-term innovation and growth ambitions. DSM Venturing is an integral part of DSM's open innovation approach, focused on teaming up with innovative players all over the world.
- Our current portfolio of venturing participation and stakes can be found on our website at <http://www.dsm.com/venturing>.

## Additional future growth options

### Incubator

- Create, develop, support and organize new potential EBAs
- Co-develop a future vision for growth through Business Platforms / EBAs
- Focus on new business models and new markets



### EBA Advanced Surfaces

- High efficiency coatings for solar panels (Khepricoat®)
- Specialty picture glass for high-end framing market (@claryl)



- Besides the Emerging Business Area programs and the New Business Development organizations, DSM's Incubator plays an important role in securing DSM's longer term innovative growth. While the business groups dedicate themselves to innovation that lies relatively close to their current activities or at least builds on existing in-house competences, the Incubator focuses on radical innovation.
- The Incubator houses innovation projects for which completely new business models are applied. One example is DSM Neev. This unit focuses on developing sustainable business targeted at the world's four billion poorest people which form the 'base' of the global economic pyramid.
- Another activity in DSM's Incubator is the Climate Change Induced Innovation program. This program was started to tap into the opportunities following from global climate change and energy developments.
- The EBA Advanced Surfaces has only recently evolved from the Business Incubator and has reached the stage of an Emerging Business Area. Its coating technologies enable glass to

look and perform better across a wide range of industries and applications, such as the solar energy market, the framing market, the display market and lighting industry.

## Divesting former EBAs as focus shifts

### EBA Personalized Nutrition

- Divested to Viocare Inc. in September 2011
- DSM will be minority shareholder through Venturing

### EBA Speciality Packaging

- Food related specialty packaging PackAge™ moved to DSM Food Specialties
- Pharma related patient compliance packaging business is in final stage of divestment

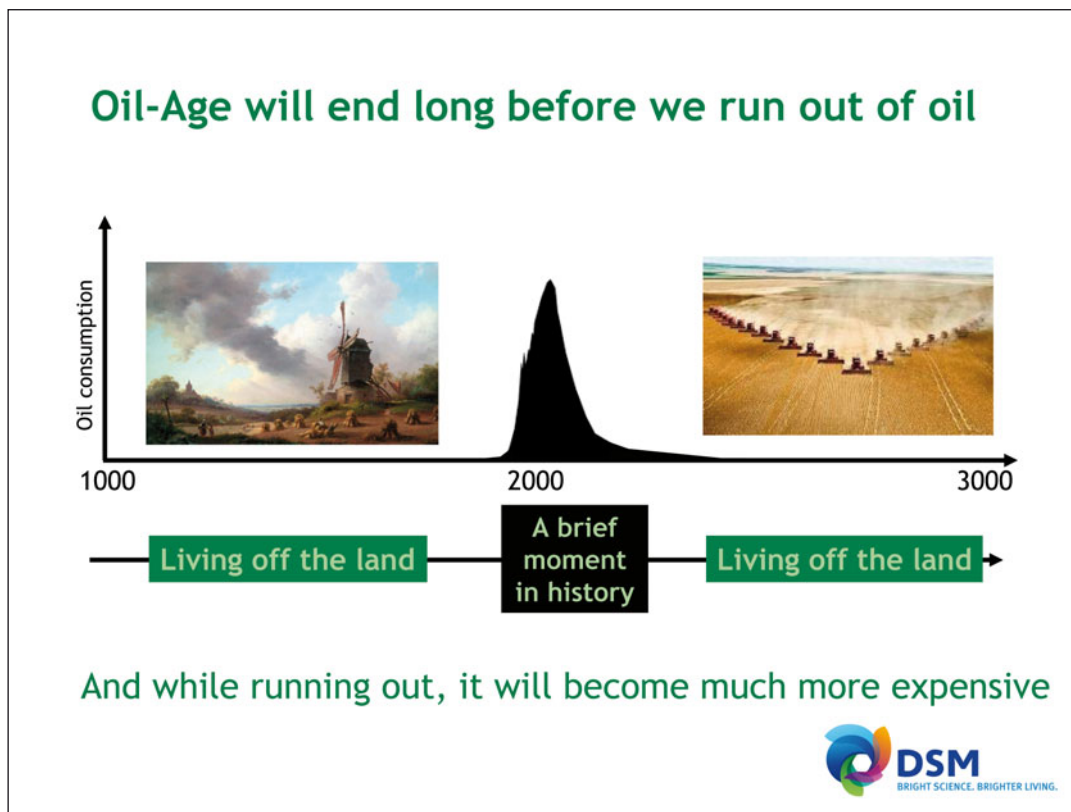


- As a result of a shifting innovation focus the former EBA programs “Personalized Nutrition” and “Specialized packaging” have been earmarked for divestment or transfer to the business groups.
- DSM has announced that it has sold DSM Personalized Nutrition, LLC to Viocare, Inc. (Princeton, New Jersey, United States). DSM will remain involved in the business as a minority shareholder in Viocare Inc. through DSM Venturing. Financial details of the transaction will not be disclosed.
- The food related specialty packaging activities (PackAge™) has been transferred to the DSM Food Specialties business group.
- The pharma related compliance packaging business will be divested to a new owner. This divestment process is in its final stage. More details will be announced in due time.

## Overview

- Innovation progress
- [DSM Bio-based Products & Services](#)
- DSM Biomedical










- Around 1850, the world started to change; we began digging for coal, oil and later on gas. All of this “out of the ground”, and in this way we started to build the fossil based economy, step by step, but fast. For almost all our energy and electricity, transportation, heating, and artificial and processed materials we are today dependent on coal, oil and gas (estimations indicate over 80%). In most western countries, alternative energy sources (like wind, water, solar and bio) supply for around 5% of the total energy need. This era has been characterized by unprecedented economic, technological, scientific and societal advances. But it is slowly coming to an end, or rather: a new era has started.
- The increase in demand for fossil resources has already been driving up prices; it has been predicted that long term oil prices above US dollar 100 per barrel will be the future scenarios. Availability will become limited and, last but not least, one day fossil sources will be exhausted. Coal and gas reserves will last longer, though the arguments of conserving the environment will drive us to use more renewable materials.
- Energy-dense and flexible, crude oil’s success will be hard to replicate. But through cutting-edge biotechnology combined with farming, we envision an economy that can prosper without oil.
- The fossil based industry will last perhaps another 150 or 200 years; we could be halfway. However, the turning point to the bio-based economy is now.
- For thousands of years, mankind used materials from the land for building, heating, transportation, etc. and that will again be the case in the thousands of years to come. So we will go back to doing what we did before the fossil carbon age. Humans have to go back to living with & off nature: the land, the sun, the sea and the wind.
- DSM is working from a fundamental paradigm shift to produce energy from raw materials created anew each year instead of 300 million years ago. And by using agricultural waste or biomass as a feedstock, no new land or new crops are required.

## Global trend of Climate & Energy

### Climate & Energy

<p style="text-align: center; font-weight: bold;">Demand for energy &amp; resources</p>  <ul style="list-style-type: none"> <li>Growing consumption due to population growth and economic development</li> <li>Fossil feedstocks finite and more expensive to extract</li> </ul>	<p style="text-align: center; font-weight: bold;">Energy security &amp; political stability</p>  <ul style="list-style-type: none"> <li>Government interest in energy security &amp; price stability</li> </ul>	<p style="text-align: center; font-weight: bold;">Climate change &amp; environmental awareness</p>  <ul style="list-style-type: none"> <li>Government regulations on climate change</li> <li>Environmental awareness at consumers increasing</li> </ul>	<p style="text-align: center; font-weight: bold;">Valorization of bio-based resources</p>  <ul style="list-style-type: none"> <li>Diversification of agriculture &amp; forestry</li> <li>Job creation &amp; rural development</li> <li>Valorization of residues &amp; waste streams</li> </ul>
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- The topic 'Climate & Energy' is a key global trend that continues to foster the transition from fossil feedstocks to bio-based feedstocks for energy and materials. From this trend we have identified four main drivers for the growing focus on bio-based feedstocks:
  - Demand for energy & resources: The world population has reached 7 billion people and will grow to 9 billion by 2050. They all need energy, transportation, heating and materials, so demand will grow in the coming decades, with Asia taking about 75% of that growth. Living standards will increase, especially due to the global economic shifts. All this will increase energy consumption per capita too.
  - Energy security and political stability: Fossil sources will become more expensive and availability will become limited. In addition, countries like the US and China would like to become less dependent on oil imports.
  - Climate change and environmental awareness: We are facing the issue of climate change. A lot is being said about (the root causes of) the heating of our planet, rain and droughts, but a fact is that the level of CO<sub>2</sub> in the atmosphere has increased substantially.
  - Valorization of bio-based resources: At this

moment we do not upgrade a substantial part of plant derived proteins for human consumption, leaving huge human food opportunities underutilized. At some point in the future it will be possible to produce high quality proteins suitable for human consumption by extracting them before further processing of the plant-materials into bio-ethanol or other bio-based chemicals & materials.

- DSM envisages major challenges for the industry as we work to build the bio-based economy. DSM is, however, confident and excited about its capability to successfully support this transformation. Biotechnology can bring society new health solutions, a more sustainable environment, as well as new materials and even a new source of energy that does not have to compete with food. To put it more strongly: the new biotech solutions can contribute to Food and Fuel solutions.
- Industry and science must support this developments, and governments and NGOs need to build awareness and shape the terms of the public discussion around the bio-based economy.



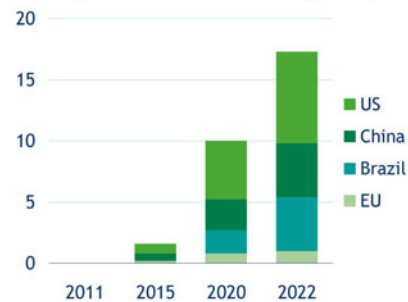


- Biomass has been hailed as a key option to replace fossil feedstocks, mitigate greenhouse gas (GHG) emissions and provide a major opportunity for rural development on a global scale. Ideally, the bio-based industry will use renewable feedstocks that do not compete with the food chain and are certified as sustainable based on internationally agreed standards.
- Current commercial bio-ethanol production is entirely 1<sup>st</sup> generation - based on sugar or starch. It is estimated that in the US about one third of corn is now used for biofuels.
- The use of 1<sup>st</sup> generation feedstocks for biomaterials has a minor impact on the use of crops, perhaps less than a few percent. The quantities used for production of biofuels are much higher.
- 2<sup>nd</sup> generation feedstocks are the best available solution to switch humanity's dependence on non-renewable oil towards non-food-competing bio-based raw materials as 2<sup>nd</sup> generation is based on biomass feed stocks which do not compete with food.
- DSM has identified ways in which we can absolutely demonstrate that we can deliver 'Brighter Living' with biotechnology, and show we are playing our part in solving the challenges and embarking on the bio-based opportunities.

## DSM's leadership in cellulosic ethanol technology

- Global cellulosic ethanol market expected to grow to 18bn gallons in 2022, ~ US\$ 50bn
- Resulting in market value for enzymes & yeasts of ~ US\$ 3-5 bn in 2022
- DSM well-positioned for cellulosic ethanol
  - no. 1 position in yeasts
  - top 3 position in enzymes

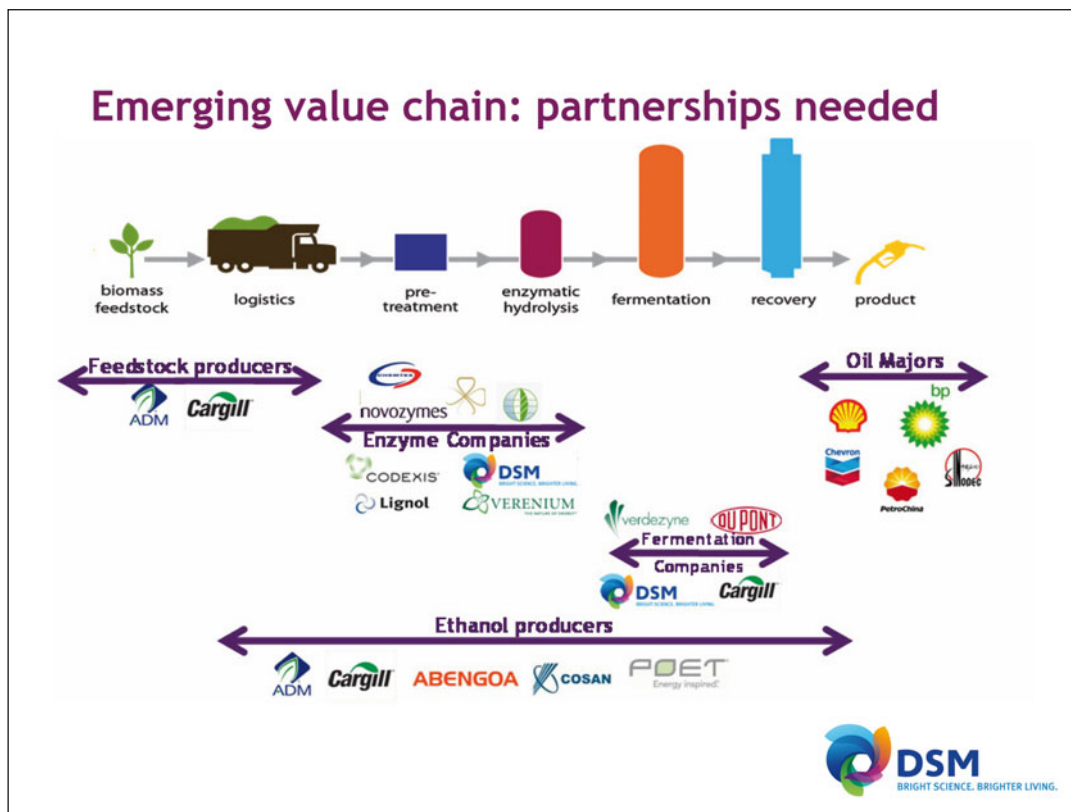
Market expectations(\*) cellulosic ethanol  
(global demand in billion gallons)



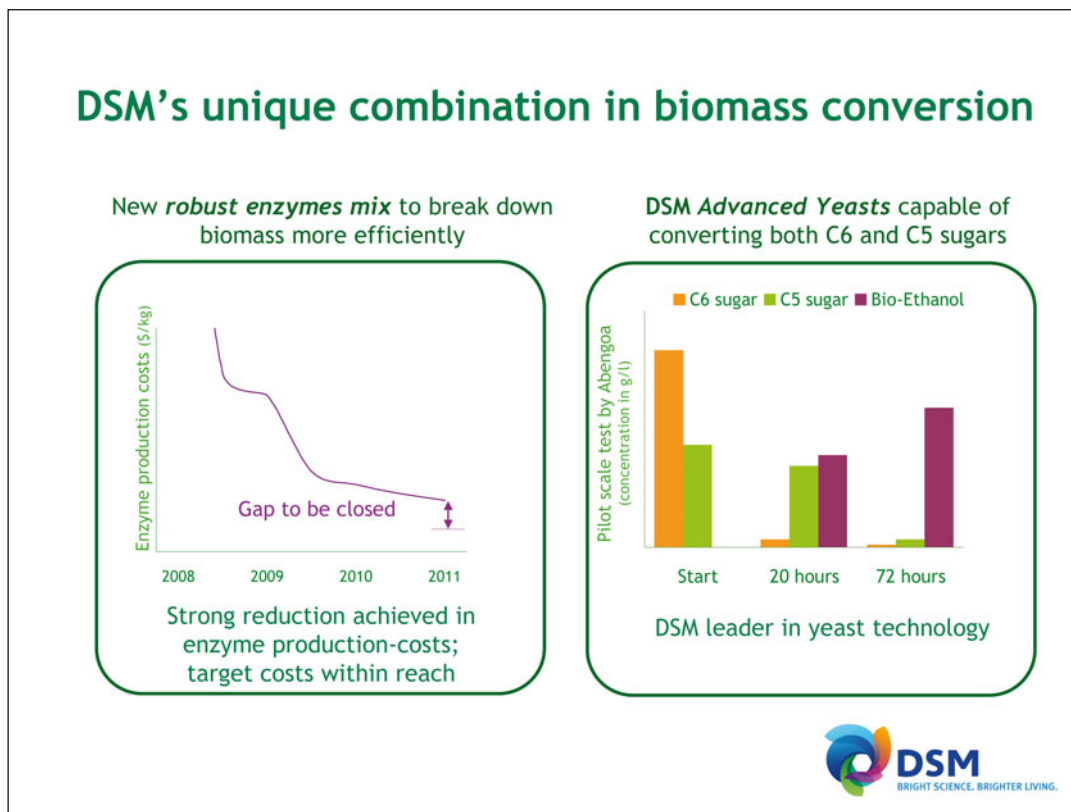
\*: derived from Hart's Global Energy Study



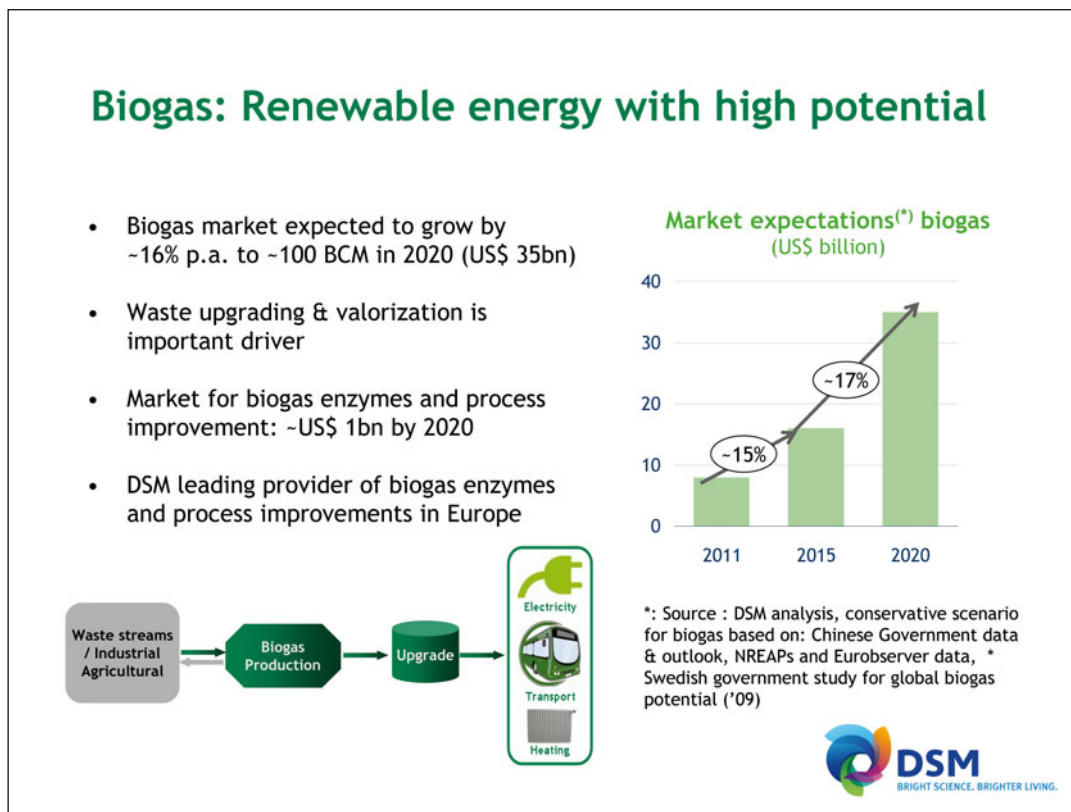
- The global cellulosic bio-ethanol market is expected to grow to 18 billion gallons by 2022, representing a value of around US dollar 50 billion. These estimates are based on the ethanol demand forecast from Hart's Global Energy Study. Versus Hart's forecast DSM has built in a one-year delay, based on its estimate of projects to be operational in 2015 (based on actual project status in 2011 several projected plants will not be delivered and reach operational status by 2015).
- Based on the above estimates for the total cellulosic bio-ethanol market, the total attainable market value for enzymes & yeasts is estimated between US dollar 3 and 5 billion in 2022.
- DSM is unique in that it is active in both yeasts and enzymes. After the recent acquisition of C5 Yeast Company (former Nedalco), DSM undisputedly has strengthened its position as the industry leader in yeast fermentation technologies for conversion of C5 and C6 sugars into ethanol.
- In enzyme technology, DSM holds a top 3 position with Novozymes and DuPont as major players in enzymes.



- The upstream part of the value chain for cellulosic bio-ethanol is owned and controlled by major agri companies like ADM, Cargill, Roquette, Brazilian sugar consortia and many others. Downstream this is expected to be the game of major oil companies like Shell & BP.
- Value chain enablers are key for the valorization of both existing and future agriculture feedstocks at the bio-refineries at the front end of this emerging value chain. These value chain enablers develop key technologies like yeast & enzymes, chemical and biological catalysts, conversion technologies, downstream processing technologies, etc.
- These players are partnership builders. They are very R&D intensive but operate with relatively low capital even though proof of concept requires significant initial investments. Companies like e.g. Novozymes, DuPont, Codexis and many others are actively developing technologies and establishing positions as value chain enabler employing various business models. The expectation is that these companies will generate modest revenues from product volumes but enjoy higher returns on these revenues through first mover advantages and licensing models.
- Finding and safeguarding long-term partnerships will be of the essence to become a successful player in the emerging market for bio-ethanol.
- DSM is in a relatively unique position with its presence in enzyme technology and its no. 1 position in yeasts. We are engaged in ~2/3 of the cellulosic ethanol projects.



- Last year, DSM announced a major breakthrough enabling cellulosic biofuels to become commercially viable through the creation of a new yeast technology and enzyme cocktail. This provides the broad spectrum capability to break down and ferment almost all (C5/C6) sugars from these non-edible (cellulose rich) materials that we need in order to create commercial efficiency of cellulosic biofuels.
- DSM is well on its way to delivering a cost competitive cellulosic enzyme cocktail (target in line with current NREL analysis and assumptions) - well in time for the first commercial cellulosic bio-ethanol plants to start up. DSM's enzyme cocktail has improved heat and acid stability and therefore provides the best fit with prevailing pre-treatment processes.
- DSM has recently completed a series of larger tests with its Advanced Yeast technology in cooperation with Abengoa. We now have a system that actually has shown its efficacy under industrial scale conditions. The test results have now proven that with our unique (and patented) technology we can convert over 90% of the so called C5 sugars (e.g. arabinose, xylose) and C6 sugars (glucose) into ethanol under industrial scale conditions.



- Biogas is produced by anaerobic digestion of organic material, including sewage sludge, industrial waste streams, energy crops, agricultural leftovers, manure etc. Anaerobic fermentation is an efficient technology for waste upgrading to valuable fertilizer and renewable energy.
- The production of biogas is projected to grow with a CAGR of 16% this decade, from ca. 23 BCM bio-methane equivalents in 2010 to ca. 100 BCM CH<sub>4</sub> eq., which equals roughly 3% of the global natural gas consumption.
- Through the acquisition of Biopract in Berlin, Germany two years ago, DSM took a starting position in one of the most developed biogas countries, and created an entrance into the biogas market. With the Methaplus™ enzyme product to improve biogas productivity we have established ourselves as one of the first movers into biogas biotechnology.
- The market for biogas enzymes and process improvements is currently estimated at ~US dollar 1 billion by 2020. Currently, DSM is a leading provider of biogas enzymes and process improvements in the European biogas market. By applying current DSM's technology, an increase in the biogas yield can be achieved of 10% - 15%.
- DSM has taken the approach to find attractive market players: plant builders, plant owners, feedstock owners and/or energy companies that can function as a stepping stone to a larger market or represent a larger market in itself. These players have unmet needs which DSM can help to fulfill with a collaborative approach. For instance a beer brewer would be looking for ways to valorize its brewers spent grain, especially in remote areas, or areas where energy supply is less reliable. Converting brewing side streams to biogas can not only valorize this side stream, it also makes the brewer 'greener', less dependent on external energy supply and can even in some cases preserve their license to operate.
- There are many biogas plant builders and technology development companies with a strong hardware focus, mainly due to their background. The largest biogas builders in Germany have an agricultural and engineering background. They used their existing networks and sales channels to enter this market, however, they could benefit from biotechnology know-how to understand and improve the fermentation part of the process. Other stakeholders are companies active in related fields of waste-water treatment, measurement and automation technology and technology for generating combined heat and power or upgrading biogas.
- DSM is in an excellent position to monetize its biotech and fermentation expertise by developing next generation biogas technologies in this already present and strongly growing global market.

## Business model DSM in bio-energy

- Dual track approach in cellulosic bio-ethanol & biogas:
  - demonstrate technology in a partnership
  - roll-out technology using a licensing model
  - license yeast technology
  - sell enzymes and yeast
- Martek acquisition adds a microbial platform for production of biodiesel

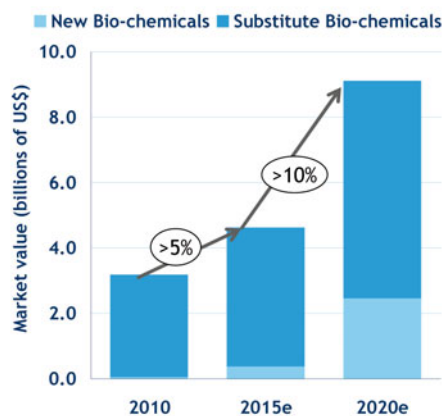


- DSM plans to develop and demonstrate its position in bio-energy in technology partnerships to grow to commercial scale. From there the options are to either engage in rolling out DSM's technologies via licensing models or by further participation in commercial projects/plants.
- In parallel, DSM builds on its own strong position in the technology for the bio-ethanol industry as a supplier of a uniquely positioned mix of enzymes and yeast for bio-refineries. DSM will continue to test and license its yeasts (both DSM Advanced Yeast and C5 Yeast Company yeast) and enzyme technology to interested parties, followed by offering yeasts and enzymes as such.
- For biogas, DSM plans to engage in activities for the development of a 'biogas plant-of-the-future' concept. DSM will explore possible partnerships and/or acquisitions to add engineering and plant design competences required to implement this concept.
- In parallel, DSM continues to develop and sell enzymes and additives to operators of smaller agricultural plants through distributors and to bigger plants/projects through its own sales force.
- Following the acquisition of Martek, DSM inherited an R&D program focusing on developing microbial oils, suitable for biodiesel production at competitive costs.

## Bio-based building blocks have large potential

- Market for renewable building blocks expected to grow to ~ US\$ 9bn in 2020
- DSM focusing on building blocks with:
  - High market potential & high ROI
  - High fit with DSM markets
  - High success rate
  - Technology platforms that can be used for other bio-based molecules
  - Intrinsically better footprint
- Main bio-based building blocks DSM is working on:
  - Bio-based succinic acid
  - Bio-based adipic acid

Growth of renewable building blocks



- Bio-based chemicals are categorized either as large existing chemicals that can be considered “drop-ins” with minimal application development required, or as new building blocks (i.e. succinic acid, levulinic acid, isobutanol to name three) that are relatively small markets today, but have the potential to become competitive substitutes for petroleum based incumbent raw materials. The drop-in chemicals are more popular targets because of the ease of market introduction and therefore typically of more interest by downstream users i.e. terephthalic acid, butadiene, acrylic acid, caprolactam, adipic acid and HMDA.

## DSM's progress in bio-based building blocks

### Bio-based succinic acid

- Est. Market to grow to ~500kt by 2020
- Cost effectiveness creates numerous opportunities (e.g. PBS)
- Reduction of GHG emissions of >60%
- Collaboration DSM - Roquette: Commercial large-scale Biosuccinium™ manufacturing in Italy; start-up in 2012



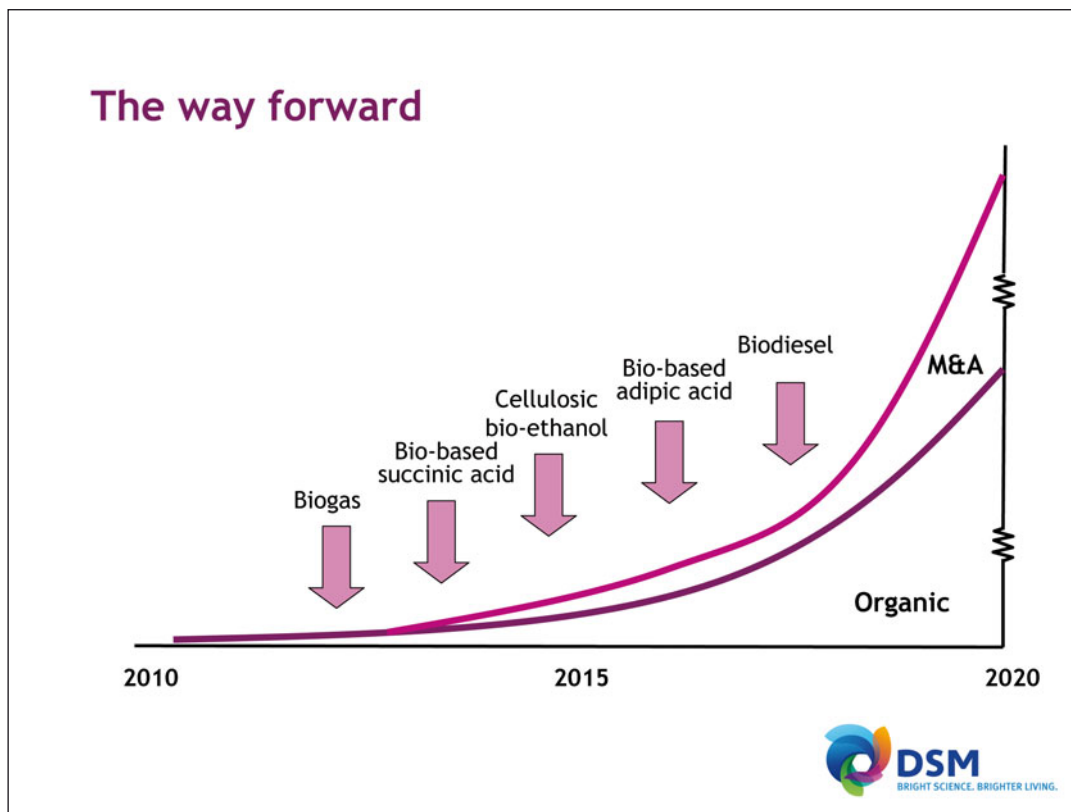
### Bio-based Adipic acid

- Current global market for adipic acid: > US\$ 5bn, expected to grow by ~ 3% / year
- Main application is for polyamide 6.6, polyurethanes, solvents and resins
- On track with R&D; commercialization feasible within 5 years



- Succinic acid is a chemical building block used in the manufacture of polymers, resins, food and pharmaceuticals among other products. Bio-based succinic acid is a renewable alternative to petroleum-derived chemical building blocks such as adipic acid and 1,4-butanediol. As a result of price competitiveness and its renewable nature, bio-based succinic acid is addressing a much larger market (estimated at 500kt by 2020) than fossil feedstock based succinic acid (around 25kt).
- The yeast-based fermentation for succinic acid has the potential of absorbing CO<sub>2</sub> whereas the current chemical process is emitting CO<sub>2</sub>. Furthermore, the yeast-based process eliminates salt waste and other by-products and thus improves the overall eco-footprint of end-products
- With a capacity of about 10 kilotons per year, the plant will be Europe's largest bio-based succinic acid facility. It is expected to come on stream in H2 2012 and will be built on the premises of Roquette in Cassano Spinola (Italy).
- Sample material has been produced in the Lestrem (France) pilot plant of Roquette and has been tested by potential customers. The initial feedback from the market is very encouraging and proves that DSM and Roquette's choice to invest in bio-renewable alternatives for fossil feed stocks by using biotechnological routes is starting to pay off. In case the market develops as DSM and Roquette expect, an even larger facility will be considered in the future.
- It is DSM's ambition to further strengthen its portfolio in bio-based chemicals and materials. Bio-based adipic acid is such a high potential building block. Adipic acid is a US dollar 5 billion existing market serving both the polyamide 6.6 (Nylon 6.6) markets (engineering plastics, textiles) as well as polyurethanes, plasticizers, solvents and resins.
- DSM has established a strong global leadership position in polyamide 6 and is the largest merchant supplier of polyamide 6 precursor caprolactam. As part of its broader polyamide vision, a cost advantaged and more sustainable route for adipic acid is expected to offer significant value in its key markets.
- DSM is currently exploring multiple routes using its competencies in both chemistry and biotechnology. The exciting technology being developed can be used as a platform for the development of other high potential bio-based building blocks.

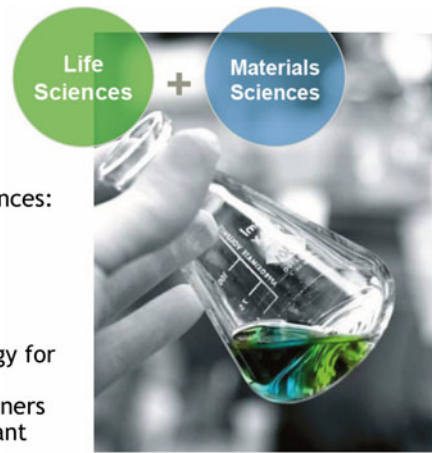




- DSM Bio-based Products & Services continues to see huge opportunities in the move towards a bio-based economy, particularly in bio-energy and bio-based building blocks and materials.
- DSM is confident that the growth of the EBA Bio-based Products & Services will continue at a steep rate, ultimately leading to an aspired combined sales (together with the EBA Biomedical and the EBA Advanced Surfaces), of more than € 1 billion in 2020 with an above average profitability.

## Conclusion DSM Bio-based Products & Services

- DSM in unique & leading position
  - Understanding market needs
  - Knowing the customer
  - Knowing the end-markets
- DSM has unique products & broad competences:
  - Enzymes & Yeasts
  - Chemical / Polymerization / Biotech competences
- Significant progress announced:
  - DSM's C5/C6 advanced yeast technology for cellulosic bio-ethanol
  - Engaged with 2G bio-ethanol front-runners
  - Commercial size bio-based succinic plant
  - Bio-based adipic acid





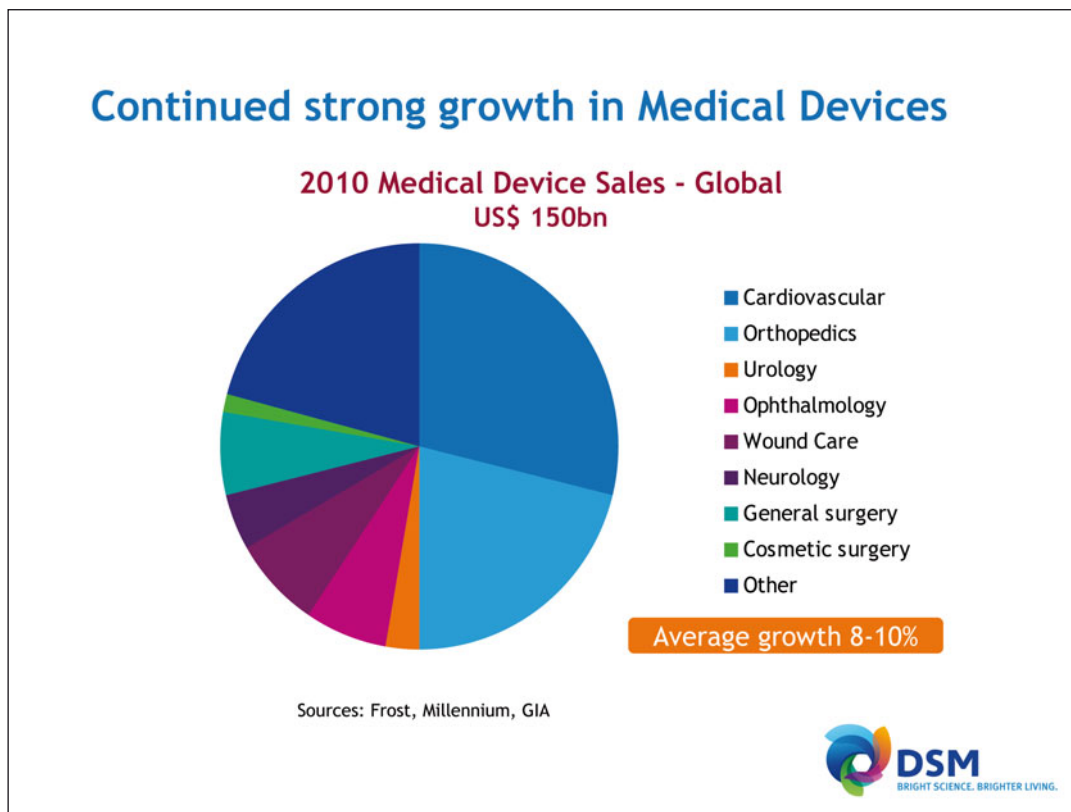
## Overview

- Innovation progress
- DSM Bio-based Products & Services
- [DSM Biomedical](#)





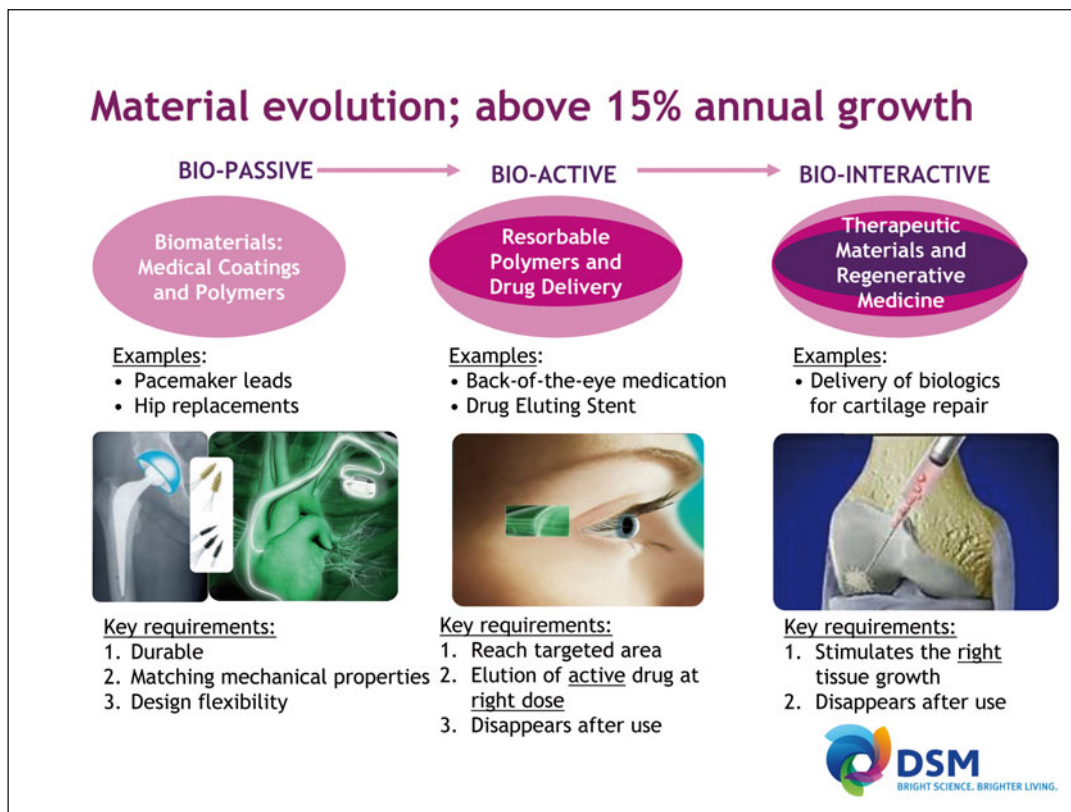
- Worldwide healthcare spending is increasing rapidly, particularly in more developed countries. The US spends over 16% of GDP on healthcare and Europe 9-12%. This is caused by a number of trends, such as the following:
  - Ageing populations in North America, Europe and Japan. Healthcare costs tend to rise dramatically once people have reached their mid sixties.
  - Increased obesity, which is a risk factor for many diseases such as Type 2 diabetes.
  - Patient expectations for a continued active lifestyle at older age increases demand for surgical treatments.
  - As healthcare costs continue to increase, the industry will have to provide solutions that improve patients' outcome and at the same time contribute to total treatment cost reduction.
- These trends, along with other factors such as new treatments and surgical techniques, drive ongoing market growth in medical devices (such as pacemakers, implants). Similarly, there is an ongoing strong market demand for sophisticated pharma drug delivery systems, notably for those clinical indications where systemic administration is sub-optimal (e.g. poorly soluble drugs, biologics) or simply fails (e.g. ophthalmology, neurodegenerative diseases). Both markets are the main consumers of specialty biomedical materials. Furthermore, the use of biodegradable materials to help the body to heal and to restore functions is also increasing.
- These smarter solutions are having a tremendous impact on society. On the one hand they contribute to significantly reduce total healthcare costs, e.g. less time in hospital, less infections, less need for re-operation, and on the other they improve the patient's quality of life e.g. by increasing comfort, reducing pain, etc.



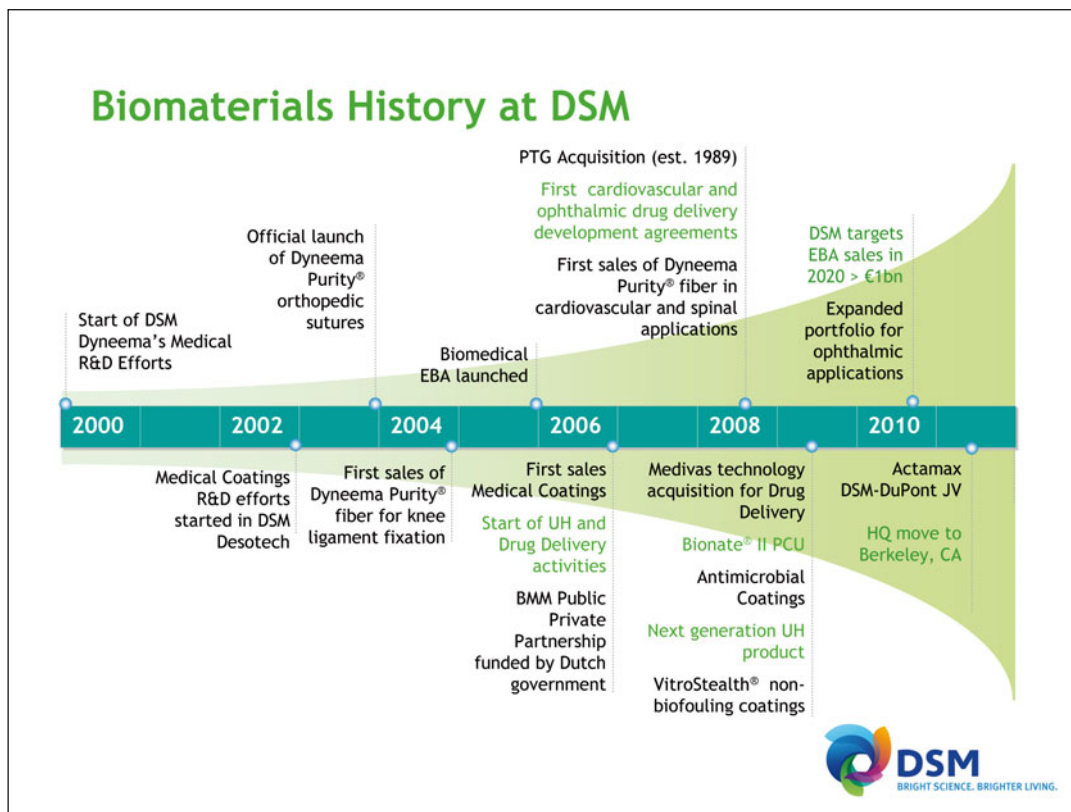
- The worldwide medical device market is estimated at approximately US dollar 150 billion in 2010(\*) with a growth close to 10%. The United States is the largest market, followed closely by Western Europe and Japan. In this market the cardiovascular and orthopedic segments are the main focus for biomedical materials while with the introduction of new materials and techniques other markets like ophthalmology, neurology and cosmetic surgeries are also growing. The United States produces half of the world's medical devices and consumes approximately 40% of the world's output. A country's medical devices market is directly correlated to its economic strength and degree of healthcare infrastructure.
- The medical devices market is incredibly diverse, including products such as surgical blades and hand tools for surgeons, orthopaedic screws but also pacemakers and neural leads. The very unique characteristics of individual segments of the industry are often not recognized when the market is assessed at the overall level.
- While the vast majority of medical device companies are highly specialized and have very

few employees, large medical device companies generating than half-a-billion dollars a year or more account for approximately 65% of overall sales in this market.

(\*) This figure includes all products in direct contact with the body for short and long term use but excludes all other products or equipment used in hospitals such as diagnostics, machines (scanning equipment), beds, chairs, gloves, plasters.



- As the medical business environment continues to evolve at a rapid pace, medical devices and pharmaceutical products must meet stringent standards for safety, efficacy and affordability. This calls for innovative and reliable materials solutions which enable medical device and pharmaceutical companies to meet existing and future healthcare needs.
- A key requirement of biomedical materials is that these remain functional in the human body for the duration of the therapy, in some cases up to lifelong. Therefore biostability is of paramount importance to maintain the physical and chemical integrity of the materials after implantation in living tissue.
- In addition, the materials need to be biocompatible as they should not interact negatively with the patient's physiology.
- In the still embryonic area of regenerative medicine, bio-interactive properties come into play. Here, polymer-based 'scaffolds' containing biological materials either from the patient or a donor are inserted into the body, with the purpose of providing a catalyst to tissue healing. The first breakthroughs in regenerative medicine are only now becoming commercialized.
- Given the strong growth in demand and high entry barriers because of the market's complexity with its stringent regulatory requirements, polymer-based biomedical materials offer a very attractive business for those companies active in the space.



- DSM has history of more than 10 years in the field of biomaterials. It all started with research and development efforts to bring Dyneema® to the medical field with the introduction of Dyneema® Purity (a tailor made fiber for use in biomedical applications) as new material of choice for orthopedic sutures, quickly followed by similar efforts in the field of medical coatings.
- An important milestone was the establishment in 2006 of the Emerging Business Area (EBA) Biomedical within the DSM Innovation Center.
- Over the last five years several new products have been launched as a result of a strong emphasis on building new technology platforms addressing changing market needs.
- DSM is also broadening its portfolio of partnership options in order to speed up entry in and knowledge of new markets. Significant examples are BMM (Public-Private partnership in (The Netherlands), the acquisition of the Polymer Technology Group in 2008 enabling DSM to access new markets and technologies, and more recently the Actamax® joint venture with DuPont.
- DSM's most recent strong and visible commitment to Biomedical has been, in the context of DSM's new strategy DSM in motion: driving focused growth, the setting of a sales target of € 1 billion in 2020 for the EBAs, followed by the decision to move the headquarter of DSM Biomedical to the United States in an effort to be more closely connected to customers and innovation activities.

## Strategy of DSM Biomedical

- Cardiovascular, Orthopedic & Ophthalmic as main market focus
- Expand current biomaterials, application and technology portfolio
  - Largest material portfolio
  - Covering full spectrum of material evolution needs
  - Offering synergies across technologies & products
- Grow emerging drug delivery business through market presence/access
- Explore opportunities for regenerative medicine & tissue engineering



- Building on its broad technology portfolio and its understanding of specific market needs, DSM's strategy is to focus on cardiovascular, orthopedic and ophthalmic markets. Other markets such as urinary, general surgery or wound care are also addressed whenever required by key customers.
- DSM's strategy in the biomedical field in these focused areas is to expand its offering through new products based on the broadest technology portfolio of the industry, to establish a presence in the field of drug delivery based on licensed-in technology from MediVas and to explore opportunities in the promising field of tissue engineering and regenerative medicine.
- Of all the businesses with a presence in the polymer-based biomedical materials & solutions market, DSM is the only company with products covering all the major applications, from implants and coatings to drug delivery systems and sutures. DSM technology/products pillars are: Dyneema® Purity, medical coatings, polyurethane, UHMWPE, silicone hydrogels, and Drug delivery (PEA).
- Furthermore, the combination of these products allows customers to use the synergies between them, e.g. Dyneema® Purity (suture) and PLA (anchor) for sport medicine, Dyneema® Purity (balloon) and Trancerta® (Drug Eluting stent) for cardiovascular stents, Polyurethane and UH for lumbar discs.
- To achieve this, DSM will rely on organic growth, strategic alliances/partnerships and acquisitions.



## Open innovation to speed up growth



JV with DuPont on surgical materials for adhesion barrier & wound care



Public private partnerships between universities, companies, charitable funds



Licensing in new technology for fast portfolio expansion in drug delivery



Taking stakes through venturing in promising new field



- Partnering with DSM offers the customers of DSM Biomedical the advantage of working with a global provider of contract manufacturing services for the manufacture of active ingredients (APIs) and biological products. In addition, its products comply with all applicable regulatory and c-GMP requirements.
- Actamax Surgical Materials LLC, the 50/50 joint venture agreement between DSM and DuPont, will address the market for surgical sealants, adhesion barriers and tissue adhesives. This is a large and underserved market of over 100 million annual surgical procedures worldwide. Actamax Surgical Materials LLC will build a comprehensive biomedical product portfolio based on several patent-protected biodegradable hydrogel technologies focus on the clinical validation of the products, its technology and the further commercialization.
- To boost the innovation process the unit actively exploits venturing and licensing opportunities, setting up business models that are typical of knowledge-based rather than production-based businesses, including the licensing of intellectual property. Through DSM Venturing, DSM has taken equity stakes in several start-ups focusing on key areas of the biomedical market have been taken.
- In addition DSM Biomedical is involved in a number of public-private research partnerships with top-universities and other well-recognized players. For example in June 2008 DSM Biomedical received funding from the Biomedical Materials Program (BMM) a public private partnership in the Netherlands. In total BMM allocated over € 50 million to seven R&D projects, four of which were initiated by DSM Biomedical. The funding will help DSM Biomedical to expand its technology platform and accelerate the development time of new biomedical materials.

## A wealth of future business opportunities

### Cardiovascular



- Artificial heart
- Ventricular assist device
- Cardiac assist system
- Catheters
- CRM (leads)
- Shunt / stent
- AAA grafts
- CV sutures
- Electrostimulation leads
- Heart valves
- Peripheral grafts
- Sternum closure
- Drug eluting stents & balloons
- Guidewires



### Ophthalmic



- Bioresorbable drug delivery systems
- Novel silicone monomers, cross-linkers and contact lens and lens care formulations
- Coatings for ocular devices

### Orthopedic



- Articulating Surfaces
  - Hip & knee joint implants
  - Interventional arthroplasty
  - Small joint implants
- Motion Preservation
  - Total disc replacement
  - Dynamic stabilization
  - Process spacers



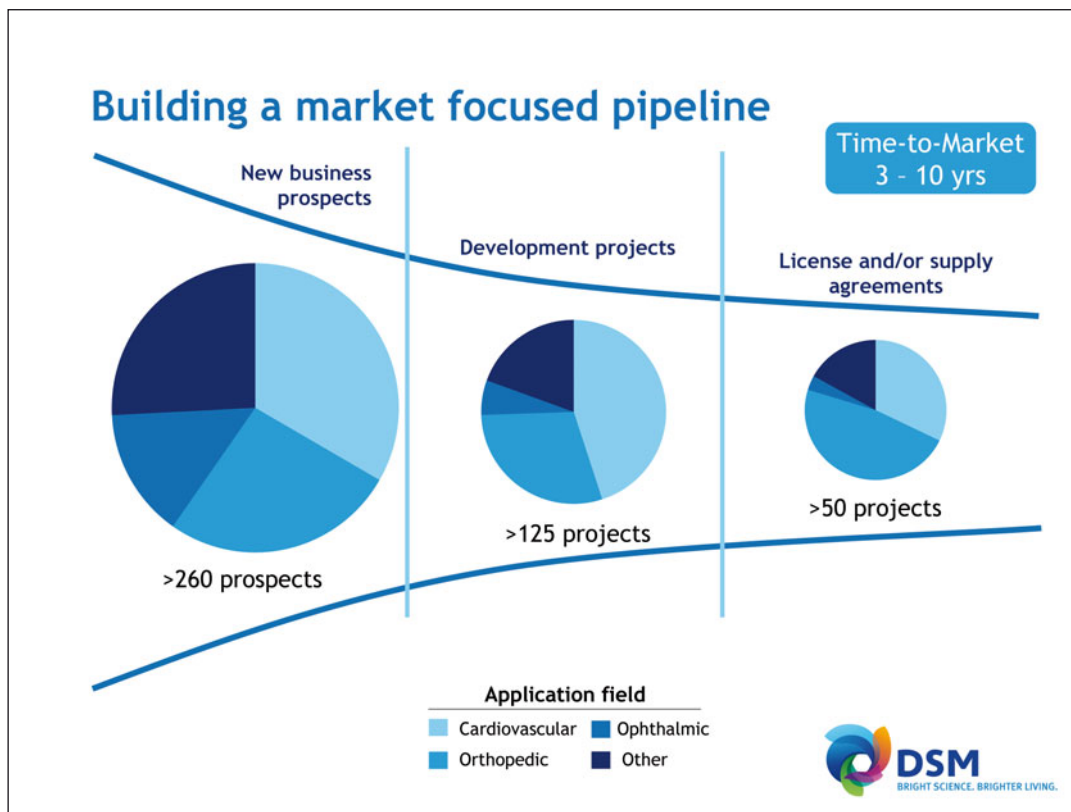
### Other



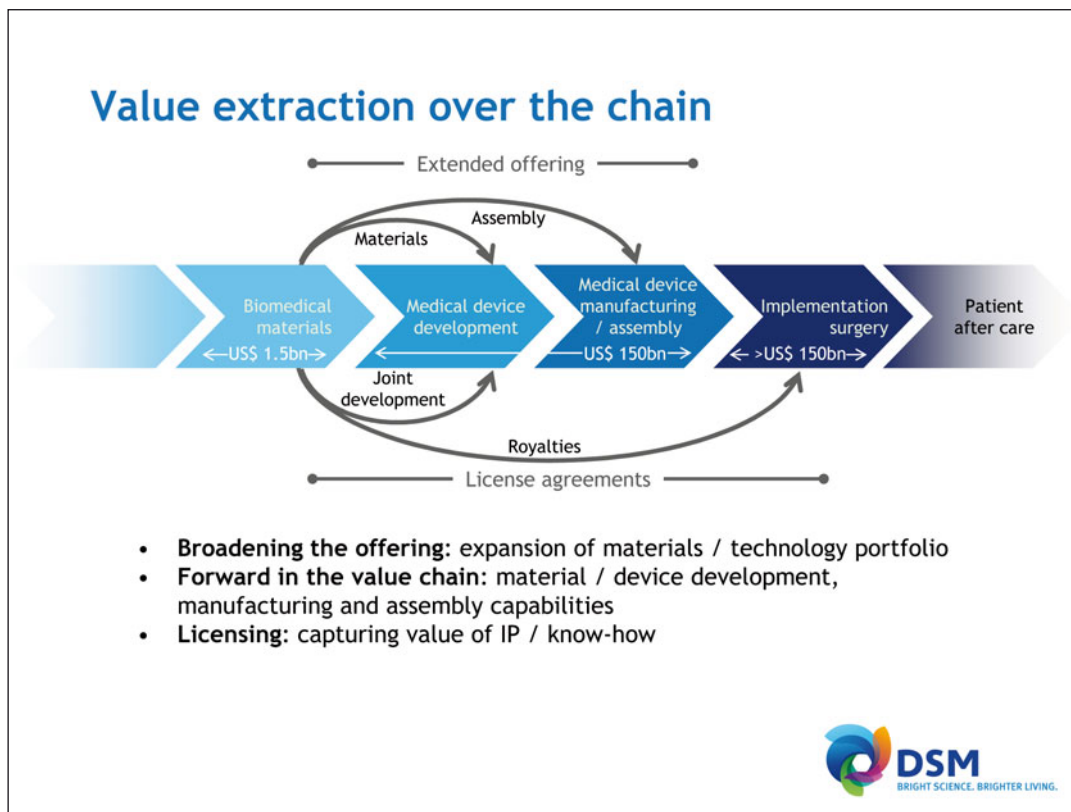
- Neurostimulation leads and headers for pulse generators
- Diabetes: glucose monitoring
- Drug delivery for pain management
- Urinary catheters and guidewires
- In-vitro diagnostic
- Wound care
- Renal dialysis tubing and filters
- Women's health



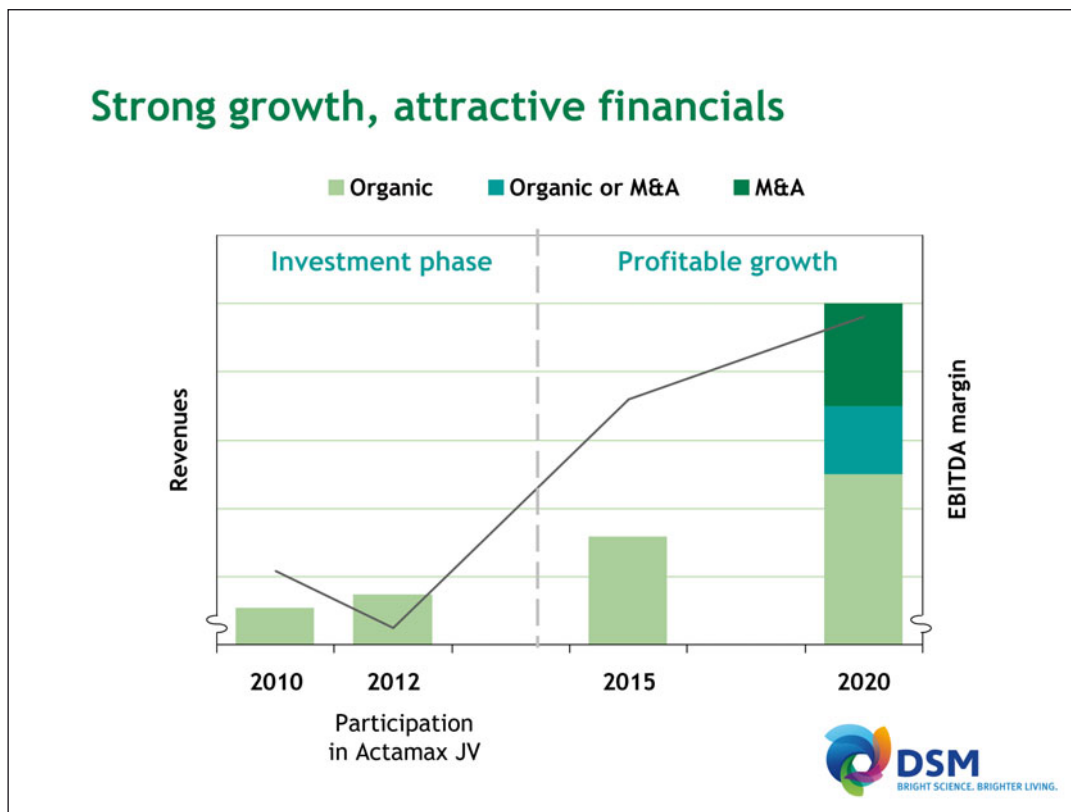
- These examples reflect the high level of innovation needs of the industry requiring new materials, devices and approaches.
- With its portfolio breadth (5 technology pillars) and depth (building its offering along the material evolution lifecycle) DSM is well positioned to address unmet needs of the industry.



- With its market focused organization DSM is well positioned to understand the needs of the industry. Being connected to the long-term needs of the market is a critical step to ensure the right technology, products and application development activities are carried out in time.
- DSM is managing its portfolio of future business activities in such a way that the pipeline is balanced across two axes:
  - Application field: efforts spread over cardiovascular, orthopedic, ophthalmic and others,
  - Project phase: efforts spread over new prospects, development from ideas to projects and agreements phases.
- Time to market is significantly different not only per market segment but also per device. Depending on novelty time to market typically ranges from 3 to 10 years.



- The above picture illustrates in a schematic way the value extraction from the value chain relevant for biomedical materials.
- The value chain for biomedical materials obeys to the standard principles of any value chain in the sense that the physical place in the chain is usually connected to the value extraction potential i.e. the closer to the market/end-user the more value is created and extracted.
- However, this typical value chain also offers the opportunity to create and extract value by using value chain enablers e.g. material knowledge, IP, licensing, regulatory, etc. It is therefore possible for players along the chain to:
  - Expand the materials and technology portfolio offering to medical device companies and leveraging the synergies.
  - Support medical device companies with material / device development as well as manufacturing and assembly capabilities.
  - Provide excellent quality and regulatory capabilities.
  - To connect to medical device companies unmet needs at M&S level.



- The EBA Biomedical is still in its “investment phase” building a healthy portfolio of emerging businesses through internal incubation (e.g. Dyneema Purity<sup>®</sup>, medical coatings) and acquisitions (e.g. The Polymer Technology Group in the US), but also through venturing opportunities like Actamax, a DSM-DuPont joint venture addressing the unmet needs in the area of adhesion barriers and sealants/hemostats.
- The objective of the EBA is to contribute substantially to DSM’s target of reaching € 1 billion in sales for the DSM Innovation Center by 2020. This will be achieved by organic growth and growth from acquisitions. A growth of € 100 million might come from either organic growth or acquisitions.
- Around 2015 the EBA will enter into its profitable phase by delivering both revenue growth and very profitable returns with an expected EBITDA/sales ratio in 2020 in the 35%-45% range. During the investment phase EBITDA margins will temporarily decrease. In 2011/2012 this will for example happen as a result of DSM’s participation in the Actamax Joint Venture. The expected EBITDA/sales in 2020 can vary between 35% and 45%.

## Conclusions DSM Biomedical

- Continued strong growth in the medical device and surgical material markets
- Growth opportunity for DSM through its unique market position, know-how and portfolio of biomedical materials
- Accelerated development and market introduction via several forms of partnership, while investing in own new technologies
- Fast growth in existing business and strong pipeline of new developments
- Value capturing through broadening of the technology/product & service portfolio, building solid customer partnerships based upon value-sharing business models



- DSM's development of its biomedical business is exemplary of its innovation strategy. Taking global trends, in this specific case Health and Wellness, as a starting point, the company leverages its strengths in the areas of Life Sciences and Materials Sciences to develop innovative solutions for specific market needs.
- Open innovation is a key element of DSM's innovation approach. Throughout the innovation pipeline there is continuous interaction with external parties in order to complement the competences, products and technologies available within DSM.
- Through its strategic commitment to (open) innovation DSM creates a source of competitive advantage that will secure long-term sustainable growth for the company.

## Overall conclusions Innovation

- DSM innovation is well on track:
  - to further increase the speed of innovation
  - to reach its 20% of sales target in 2015
  - to reach its sustainability target of >80% of pipeline is ECO+
- DSM emphasizes open innovation and well balanced pipeline management to drive the quality, impact and speed of innovation results
- The EBAs BP&S and Biomedical are based on strong growth fundamentals and have ample opportunity to grow substantially in the coming period confirming the potential to reach the € 1 bn sales ambition in 2020



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## DISCLAIMER

This document 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.

Examples of forward-looking statements include statements made or implied about the company's strategy, estimates of sales growth, financial results, cost savings and future developments in its existing business as well as the impact of future acquisitions, and the company's financial position. These statements can be management estimates based on information provided by specialized agencies or advisors.

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 the company's actual performance and position to differ materially from these statements.

These factors include, but are not limited to, macro-economic, market and business trends and conditions, (low-cost) competition, legal claims, the ability to protect intellectual property, changes in legislation, changes in exchange and interest rates, changes in tax rates, pension costs, raw material and energy prices, employee costs, the implementation of the company's strategy, the company's ability to identify and complete acquisitions and to successfully integrate acquired companies, the company's ability to realize planned disposals, savings, restructuring or benefits, the company's ability to identify, develop and successfully commercialize new products, markets or technologies, economic and/or political changes and other developments in countries and markets in which DSM operates.

As a result, DSM's actual future performance, position and/or financial results may differ materially from the plans, goals and expectations set forth in such forward-looking statements.

DSM has no obligation to update the statements contained in this document, unless required by law. The English language version of this document is leading.

A more comprehensive discussion of the risk factors affecting DSM's business can be found in the company's latest Annual Report, a copy of which can be found on the company's corporate website, [www.dsm.com](http://www.dsm.com)

Abbreviation	Explanation	Abbreviation	Explanation
6-APA	6-amino-penicillanic acid	EU	European Union
AGI	AGI Corporation Taiwan	F&B	Food & Beverage
AMEA	Association of Machinery and Equipment Appraisers	FD	Finished dosage / final dose
ANH	Animal Nutrition & Health	FDA	Food and Drugs Administration
API	Active pharmaceutical ingredients	GBP	Pound Sterling
AR	Anti-reflective	GDP	Gross Domestic Product
ARA	Arachidonic Acid	GHG	Greenhouse Gas
B&C	Building and Construction	GUR	Global Utilization Rate
B2	Vitamin B2	HGE	High Growth Economies
B2C	Business-to-Consumer	HMDA	Healthcare distribution management association
B6	Vitamin B6	HQ	Headquarters
BCM	Billion Cubic Meter	IFRS	International Financial Reporting Standards
BF	Bio-Fuel	INF	Infant Formular
BMM	Biomedical Material	JPY	Japanese Yen
bn	billion	JV	Joint Venture
BP&S	Bio-based Products & Services	KA	KuibyshevAzot OJSC
C/E	Central / East	KGA	Ketoglutaric Acid
CAGR	Compound Annual Growth Rate	kt	kiloton
CAPEX	Capital Expenditures	LATAM	Latin America
CEO	Chief Executive Officer	LCD	Liquid crystal display
CFO	Chief Financial Officer	m	million
CH4	Methane	M&A	Merger & Acquisitions
CHF	Swiss franc	MB	Managing Board
CHP	Combined heat and power	NGO	Non-governmental organization
CIO	Chief Innovation Officer	OEM	Original equipment manufacturer
CIS	Commonwealth of Independent States	OWC	Operating Working Capital
CMD	Capital Markets Days	P&L	Profit and Loss
CMO	Contract Manufacturing Outsourcing	p/a	per annum
CRM	Customer Relationship Management	PA6	Polyamide 6
CTO	Chief Technology Officer	PEN	Penicillin
DA	Depreciation and amortization	PI	Polymer Intermediates
DAI	DSM Anti-Infectives	PM	Performance Materials
DBM	DSM BioMedical	PTG	The Polymer Technology Group
DBPS	DSM Bio-based Products & Services	PUFA	Polyunsaturated fatty acids
DD	DSM Dyneema	R&D	Research and Development
DEP	DSM Engineering Plastics	ROCE	Return on Capital Employed
DEP	DSM Engineering Plastics	SSC	Shared Service Center
DHA	Docosahexaenoic acid	SSP	Supplies Service Partner
DPP	DSM Pharmaceutical Products	UD	Unidirectional
DS	Dietary Supplements	UHMwPE	Ultra-High Molecular Weight Polyethylene
DSP	DSM Sinochem Pharmaceuticals	UOR	Urgent Operational Requests
E&E	Electrical & Electronic Industry	US	United States (of America)
EBA	Emerging Business Area	US\$	United States dollar
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization	USA	United States of America
ECO+	The Greenhouse Dialogue	USD	United States dollar
EFSA	European Food and Safety	UV	Ultra Violet
EP	Engineering plastics	VA	Vitamin A
EPA	Environmental Protection Agency	VE	Vitamin E
EPS	Earnings per Share	VOC	Volatile organic compounds
		y-o-y	Year-on-year
		YTD	Year-to-Date