

The Bioeconomy in the Netherlands
-Valorization from biomass to high-end products -

DSM Circular & Bio-based Economy

Sep 5th, 2018

Ken Kuriki, Director Innovation
DSM-Japan

Mission

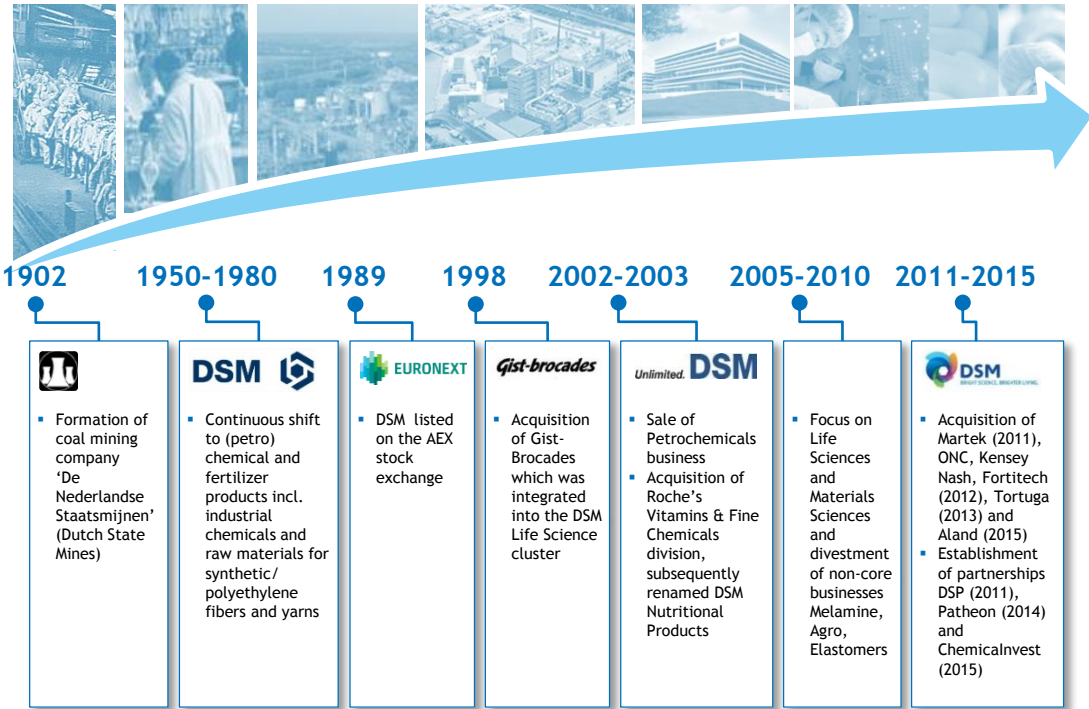
Our purpose is to create brighter lives for people today and generations to come



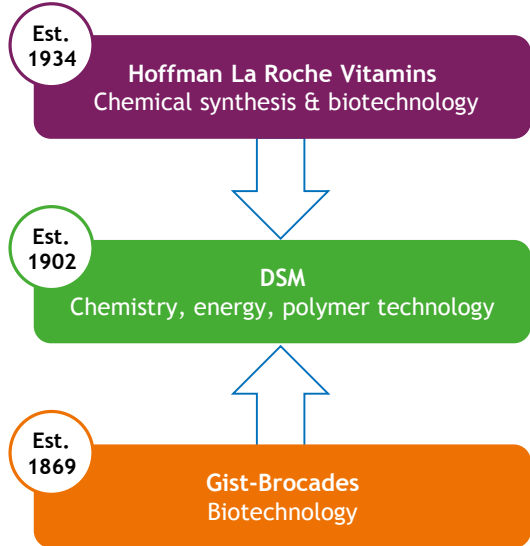
We connect our unique competences in Life Sciences and Materials Sciences to create solutions that nourish, protect and improve performance

DSM history

Successful transformation building on an impressive history



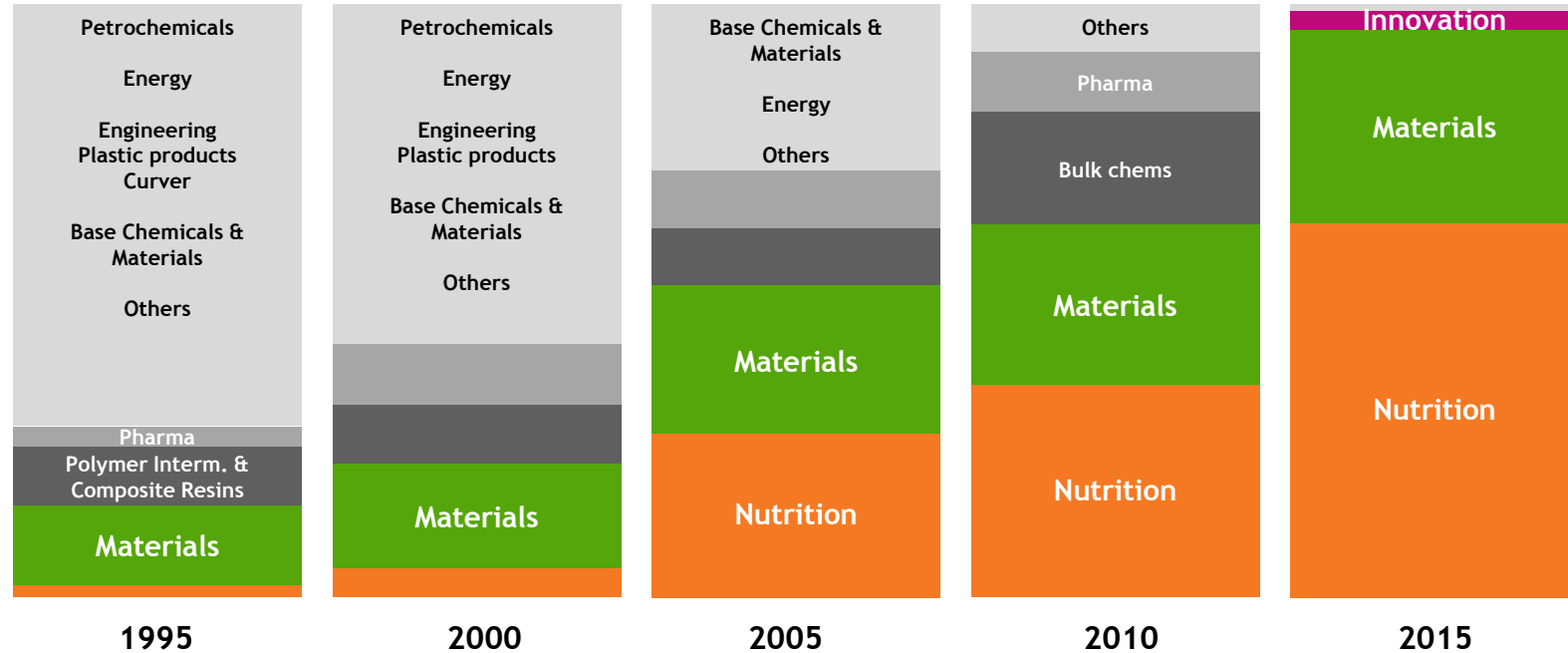
Extensive experience in chemical synthesis and biotechnology



Portfolio Transformation

Significant portfolio transformation

Proportion of DSM sales (%)



* Dividend proposal to AGM to be held April 29 2016: 2015 dividend stable at € 1.65 per ordinary share

Active in Health, Nutrition and Materials



Health



Nutrition



Materials

- Leading supplier of nutritional ingredients (including vitamins, carotenoids, omegas, food/feed enzymes, cultures, yeasts, nutraceuticals) for the feed, food and personal care industries
- Leading supplier of sustainable high performance materials for the automotive, electrical & electronics and building & construction industries
- Recognized as top innovator active in biomedical materials, advanced biofuels, bio-based chemicals and advanced solar systems

DSM offers products & solutions to a wide range of end-markets (2017 numbers)



Our strategy is well aligned with the Sustainable Development Goals



Please see DSM's Integrated Annual Report 2017 for definitions and additional information

Advocates carbon pricing as a key instrument for an orderly transition to a low (fossil) carbon economy

Feike Sijbesma (CEO, DSM) was co-chair of World Bank Carbon Pricing Coalition, together with Canada's Environment & Climate Change Minister, Catherine McKenna in 2017.



2016



2017

Purposeful strategy is starting to become recognized

Partnerships



Recognition



FORTUNE CHANGE THE WORLD	
THE TOP 10	
THE TOP 10	
1	JPMorgan Chase
2	DSM
3	Apple
4	Novartis
5	LeapFrog Investments
6	Ant Financial
7	Walmart
8	Toyota Motor
9	Johnson & Johnson
10	Yara

Advocacy of Sustainability/ Climate Actions in Japan

- Ministry of Environment / Ministry of Foreign Affairs - SDG Committee and Public hearing



- Global Compact Network Japan



- The Economist CEO Roundtable



- Ministry Media Session



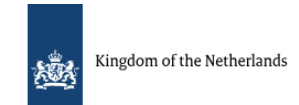
DSM-Japan organized Sustainability Forum in March 2017.



Left to right
 Kiyoshi Matsuda (Mitsubishi Chemical),
 Yuji Nakahara (DSM), Dimitri de Vreeze (DSM), His Excellency
 Aart Jacob (Ambassador of the Netherland), Yukari Takamura
 (Nagoya Univ.), Futoshi Nasuno (METI) and Takejiro Sueyoshi
 (UNEPFI)



Led dialogues with industries/ministries/academia



Established three attractive innovation platforms



DSM Biomedical

Innovative materials that deliver more advanced clinical procedures and improved patient outcomes



DSM Bio-based Products & Services

Advanced enzymes and yeast platforms: enabling advanced bio-energy and bio-based chemicals



DSM Advanced Solar

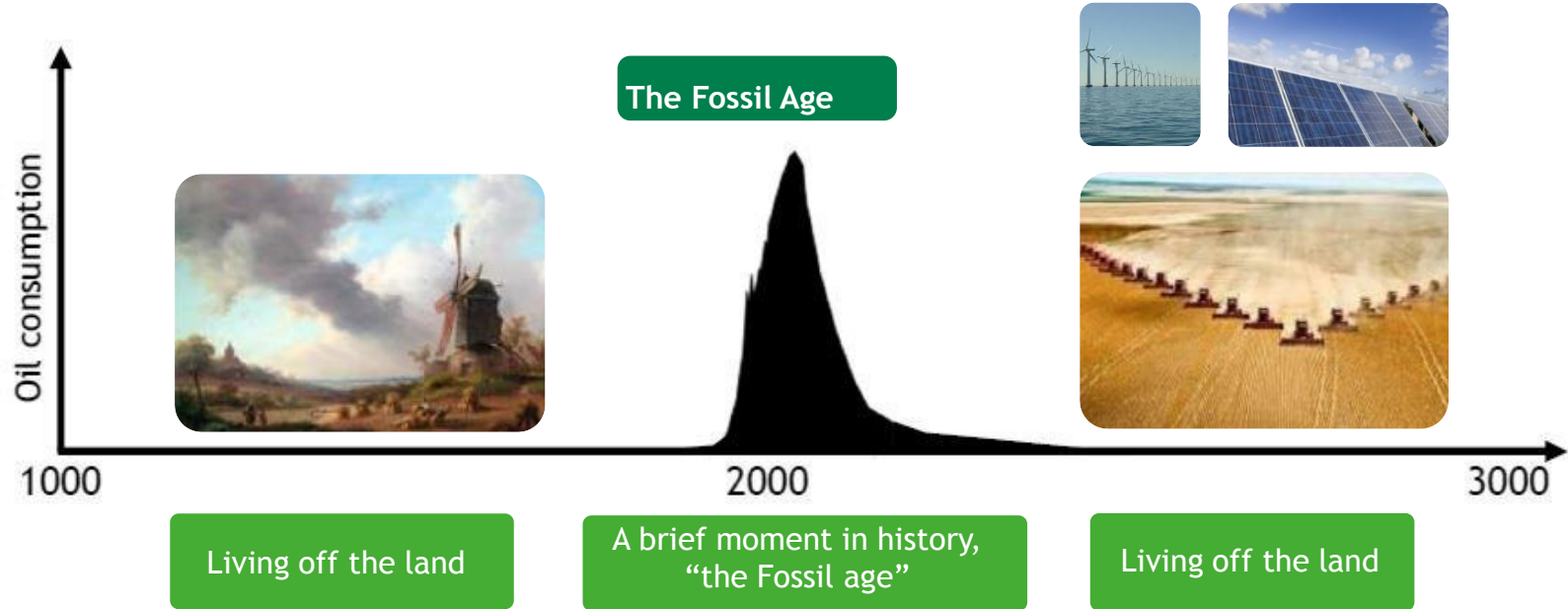
Smart coatings and surface technologies to boost performance in the solar industry

Bringing Life Sciences and Materials Sciences competences together

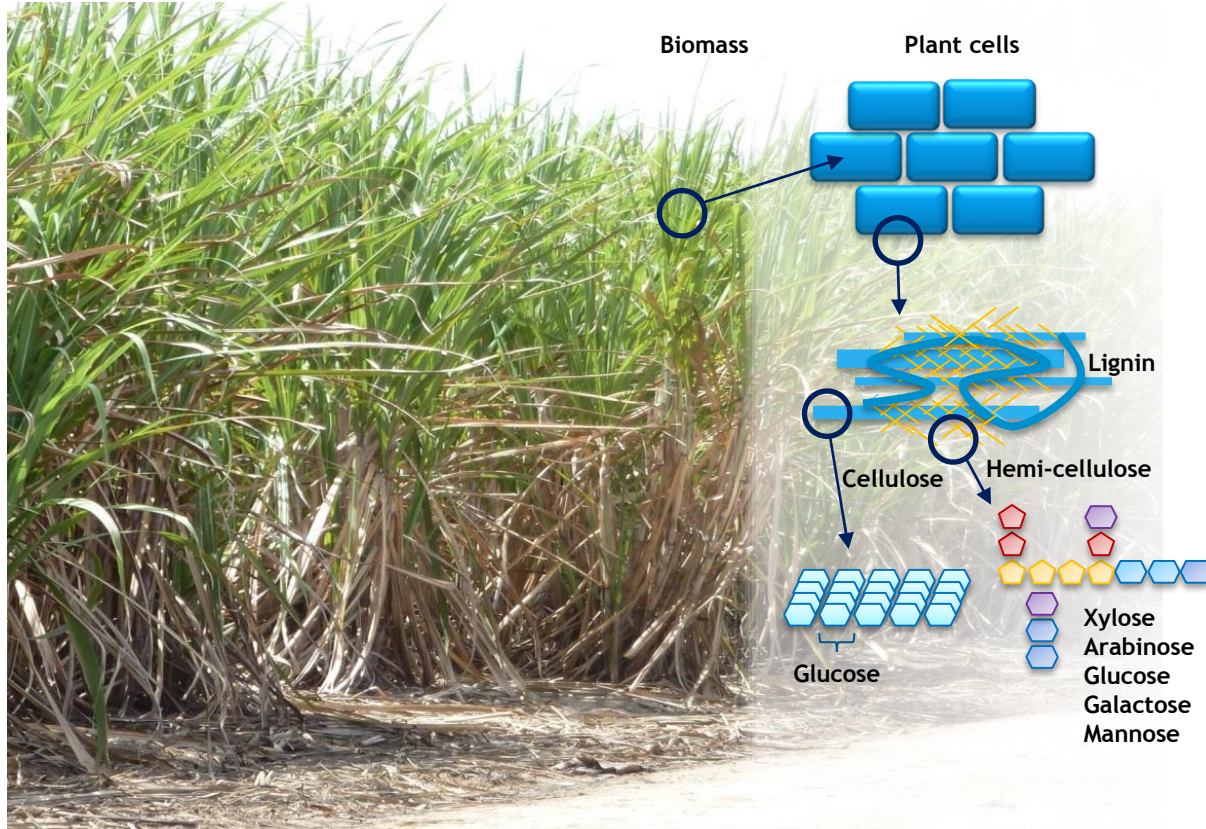
DSM Bio-based Products & Services



Why Renewable Energy?



Biomass as a source of fermentable sugars



Leading biotech solutions

- 100+ years of experience in biotech
- Cross-over various technologies in DSM
- Top scientists; leading in innovation
- Extensive IP portfolio (Yeasts & Enzymes)
- State of the Art R&D and Application labs
- Leading business and academic partners



Reliable large scale execution

- Large scale Yeast and Enzymes production
- Extensive Pilot and Process scale-up capabilities
- Strong Large Capital Projects Management
- Customer focused, fast-acting technical support

Advanced yeasts

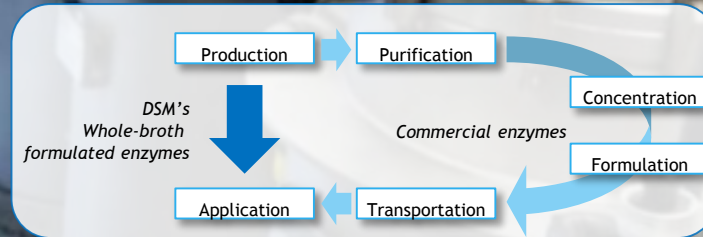
improved yeasts on enzyme level and on robustness...

Through targeted genetic modifications (rational and evolutionary techniques) DSM developed a broad, IP protected, portfolio of Advanced yeasts:

- Xylose fermentation
- Arabinose fermentation
- By-product reduction
- Yeast-cell energy balance
- Fermentation processes



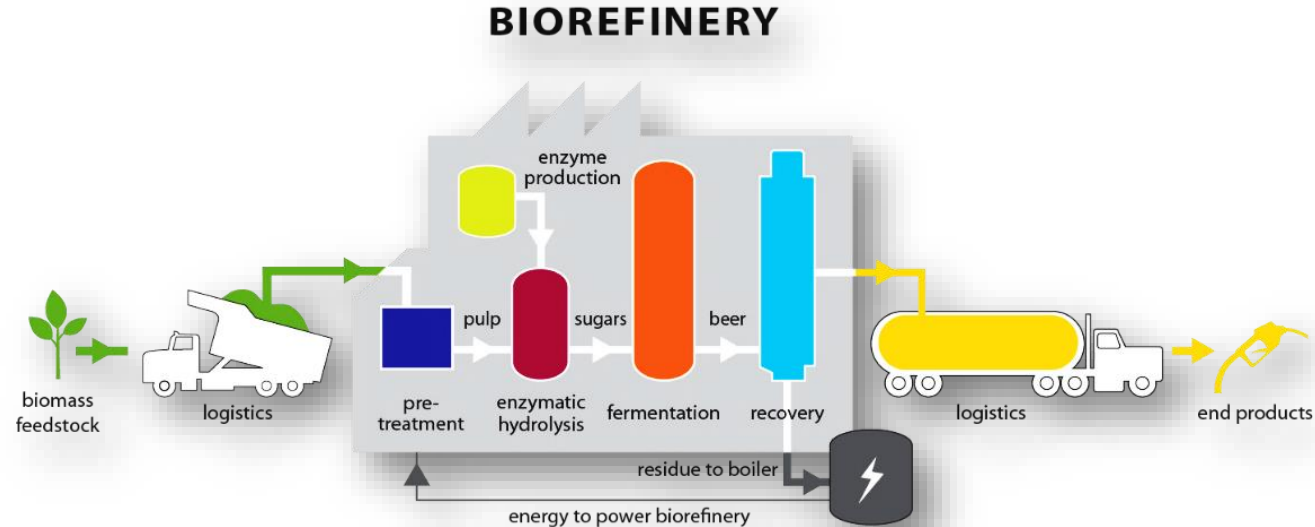
On-Site Manufacturing of DSM Cellulotic enzymes



DSM cellulolytic enzymes package, EC200, is a most cost effective, whole-broth formulated cocktail of cellulases and hemi-cellulases, which is produced by and at the ethanol production plant

- Tailor produced on local feedstock: Higher quality
- Integrated production, whole broth, No DSP, no logistics, thermostable enzymes: Lower OPEX
- Enzymes production on site: Reduced risks
- Additional value flows to plant: Higher returns

Break through technology package to make cellulosic biofuels a reality



- POET-DSM JV Project Liberty
- First commercial scale cellulosic biofuel plant of POET-DSM JV
- Shared infrastructure with existing grain ethanol plant in Emmetsburg Iowa





Key success factors for advanced biofuels

- > Long-term partnering: strong collaboration with the committed partner
 - > to ensure effective technology transfer and optimize value creation & sharing
- > Technology valorization: requires commitment for multi-plant roll-out
 - > to support extensive investments and manage IP
- > Timely regulatory approvals for Advanced Yeasts and Enzymes
 - > to expedite access to improved biofuel solutions (potential to leverage US MCAN/GRAS for Asia to expedite)
- > Consistent regulatory framework for biofuels
 - > to ensure stable demand and thus support long-term investment and development

Other Innovations

- Circular & Bio-based Economy -

- Niaga: 100% recycle carpet
- Veramaris: high value omega-3 fatty acid products rich in EPA and DHA for animal nutrition produced from natural marine algae

- Climate Change-

- Anti-reflection/soiling coating and backsheet for Solar Panel
- Cleancow: Reducing Methane Emission from Cattle



Hello Niaga®, Goodbye waste

Circular economy breakthrough: Niaga® Technology enables the elimination of carpet waste

niaga®

alive. again and again.

Algae based Animal Nutrition



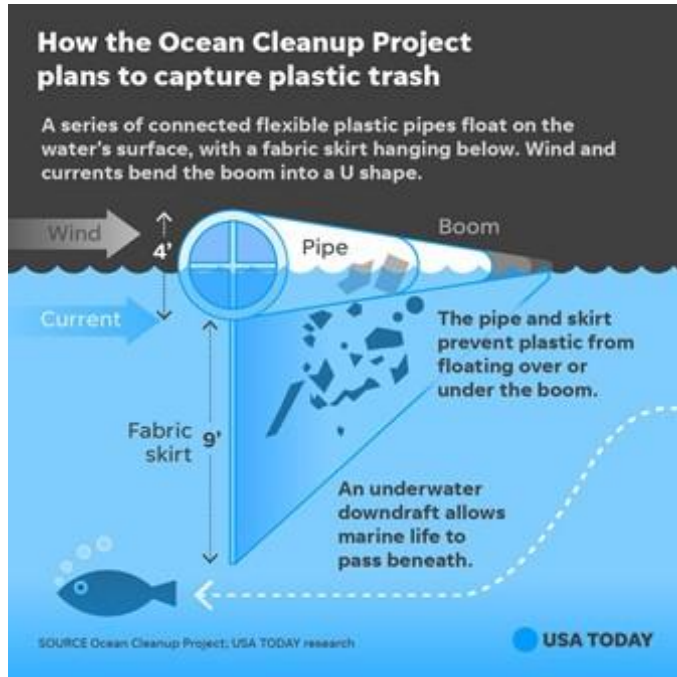
DSM and Evonik establish joint venture for omega-3 fatty acids from natural marine algae for animal nutrition



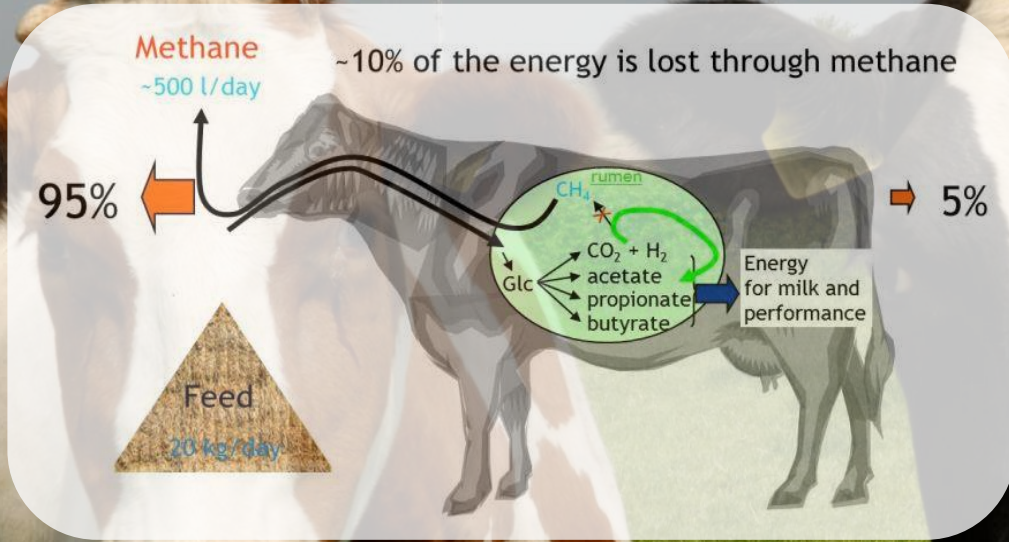
THE OCEAN[®] CLEANUP



DSM provides Dyneema®, the world's strongest fiber™ and materials expertise.



Reducing Methane Emission from Cattle



Identification and development of a feed additive(s) solution to reduce methane by 25-30% *in vivo* and with the potential for better performance



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DSM Advanced Solar

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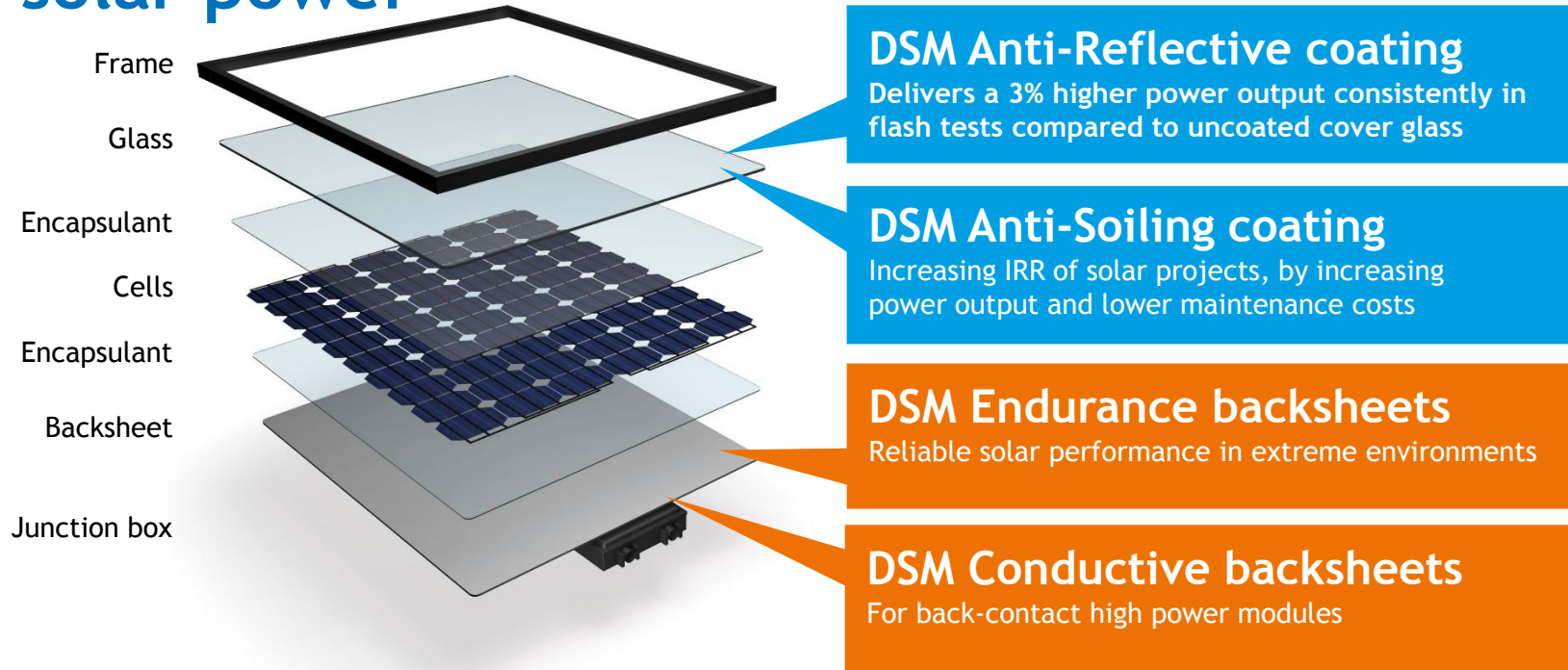
Bringing Life Sciences and Materials Sciences competences together



DSM in the photovoltaics market

Innovations to accelerate solar power adoption

DSM solutions are lowering the cost of solar power





BRIGHT SCIENCE. BRIGHTER LIVING.™