



# ATV's Technology Day 2015

Per Falholt, EVP of R&D  
November 23, 2015

# Novozymes – the world leader in bioinnovation

## Who are we?



### Global

~6,500 employees,  
700 products in  
140 countries



### R&D intensive

~7,000 patents,  
~14% of sales  
spent on R&D



### Profitable

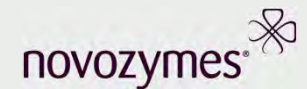
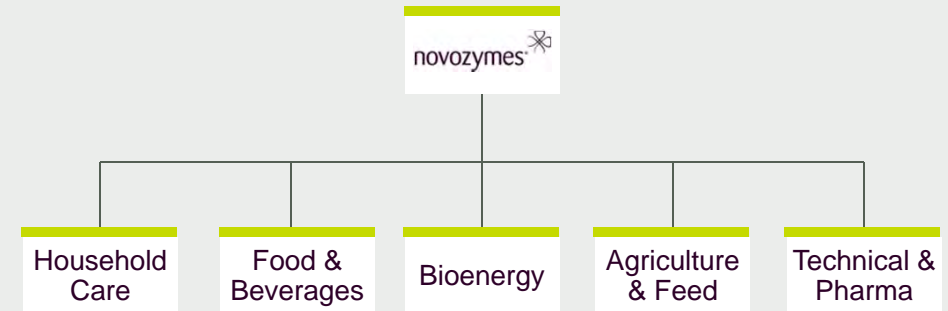
\$2bn in sales and  
27.2% EBIT margin  
in 2014






### Majority owner Novo A/S

controls 25.5% of  
the capital and  
70.4% of the votes

Founded	1925
Listed	2000
Ticker	NZYM B
Exchange	Copenhagen
Market Cap	US\$ ~15bn
Long-term targets 2015-2020:	<b>8-10% organic sales</b> <b>≥ 26% EBIT margin</b> <b>≥ 25% ROIC</b>



## Novozymes' purpose

**T**  **GETHER** WE  
FIND  
**BIOLOGICAL**   
ANSWERS FOR  
BETTER **LIVES** IN A  
GROWING  
**WORLD**   
LET'S RETHINK TOMORROW



# Novozymes is recognized as one of the most innovative companies in Europe

Ten Most Innovative Companies in Europe 2015

**Forbes | 2015**  
**THE WORLD'S MOST INNOVATIVE COMPANIES**  
 Powered by The Innovators DNA



**9. Novozymes**

Name: Novozymes  
 Industry: Specialty Chemicals  
 Country: Denmark  
 Innovation Premium: 44.6%  
 Market Cap: \$11.7 billion  
 5-Year Annualized Total Return: 17.1%

Photo: Freya Ingrid Morales/Bloomberg



## The World's Most Innovative Companies

- ambev** #58 AmBev
- novozymes** #59 Novozymes
- CAPITA** #60 Capita

**INNOVATORS**

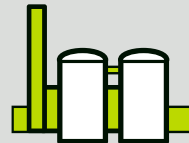
**THE TOP 100**

RANK	COMPANY	INDUSTRY / COUNTRY	INNOVATION PREMIUM
84	WHOLE FOODS MARKET	FOOD RETAILING / USA	43.37
85	TESLA	VEHICLE MANUFACTURE / USA	44.08
86	ILLUMINA	LIFE SCIENCES / USA	43.71
87	TEKNOLOGI HOLDINGS	INTERNET / CHN	43.54
88	NOVOZYMES	GENETICS / DEN	44.60
89	USA COMPENSATIONS	INSURANCE / USA	42.91
90	UNICHARM	HOUSEHOLD PRODUCTS / JPN	42.81
91	LI & FONG	APPAREL & LUXURY GOODS / USA	42.63
92	KONE	VEHICLE MANUFACTURE / FIN	42.44
93	INTUITIVE SURGICAL	HEALTH CARE EQUIP. / USA	42.38
94	BEARDS GREEN MOUNTAIN	FOOD PRODUCTS / USA	42.21
95	PERIGO	PHARMACEUTICALS / USA	42.27



# When science goes big scale

discover



develop

deliver

## Benefits for consumers

- Better products
- Reduced footprint
- Better lives

## Benefits for Novozymes' customers

- Improved efficiency
- Reduced cost
- Innovative solutions

## Benefits for the planet

- Significant reduction of CO<sub>2</sub>
- Fewer chemicals
- Sustainable solutions

# Developing new technology creates business platform opportunities

Continued development in our technology base...



**Molecular biology**

Strain development using protein engineering, genetic modification, DNA sequencing, etc



**Bio-informatics & Systems biology**

Application of computer algorithms in the computational discovery of enzymes in DNA databases



**Screening systems**

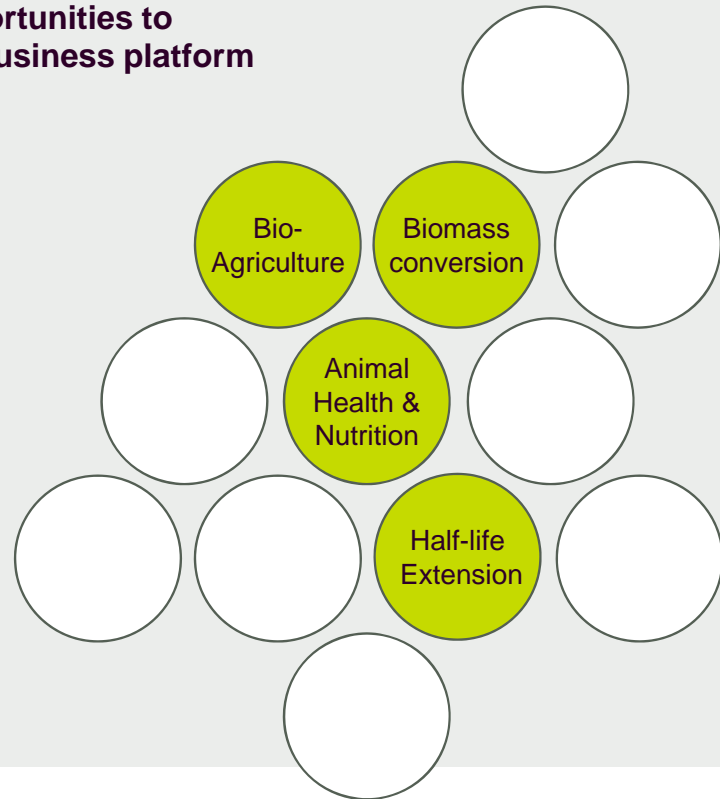
Application of high-throughput robotics to find the best enzyme candidates



**Industrial-scale fermentation**

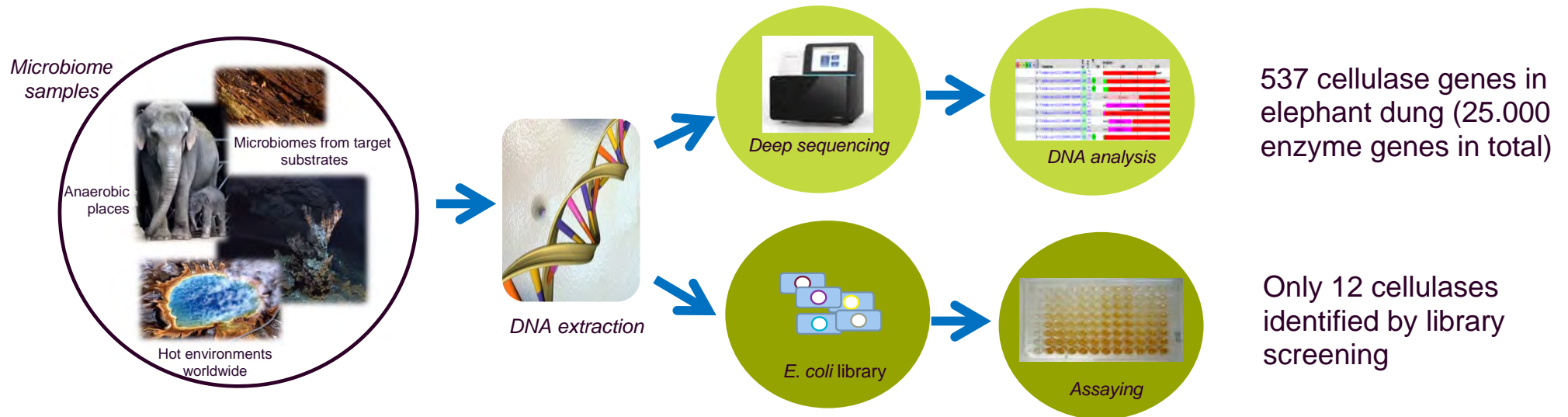
Production of enzymes and proteins whilst continuously optimizing and improving yields

...creates opportunities to develop new business platform

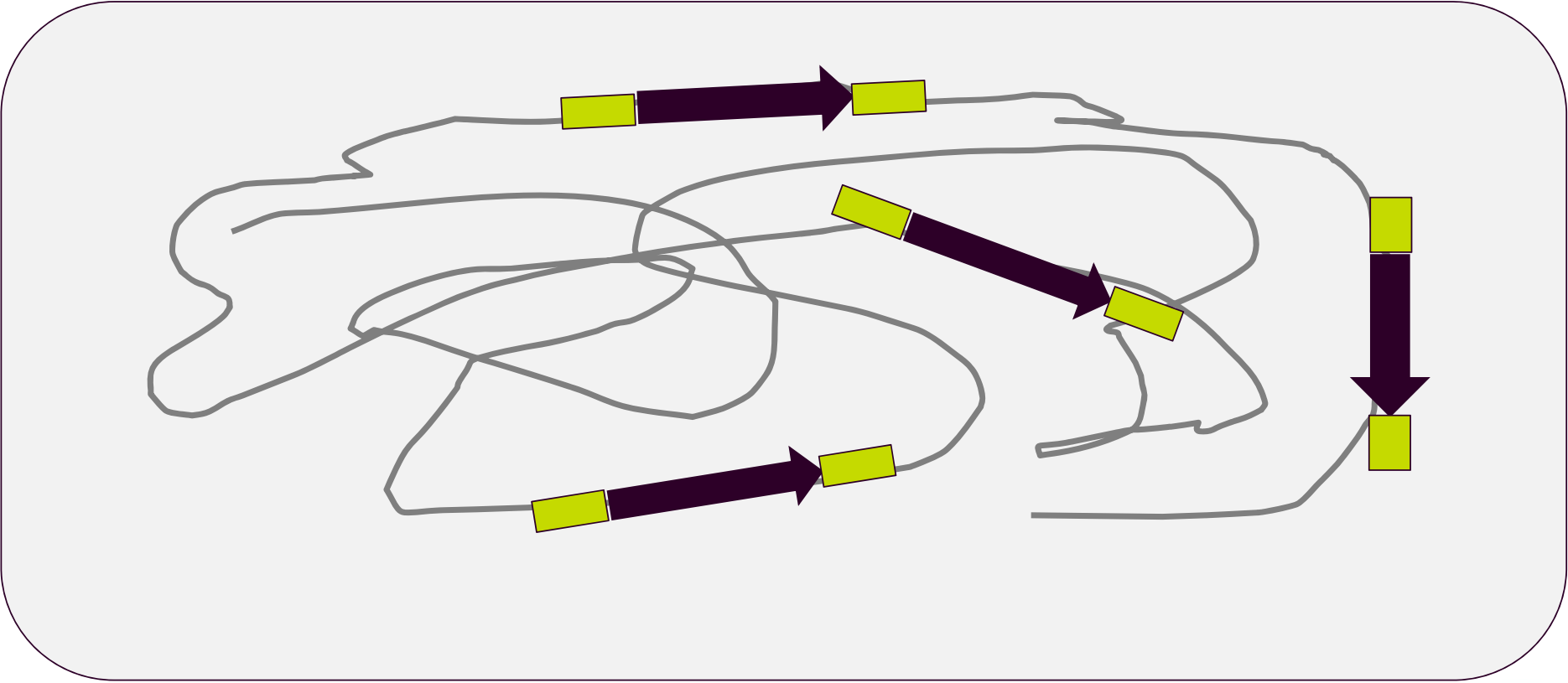


# Metagenomics opens the door to a new world of diversity

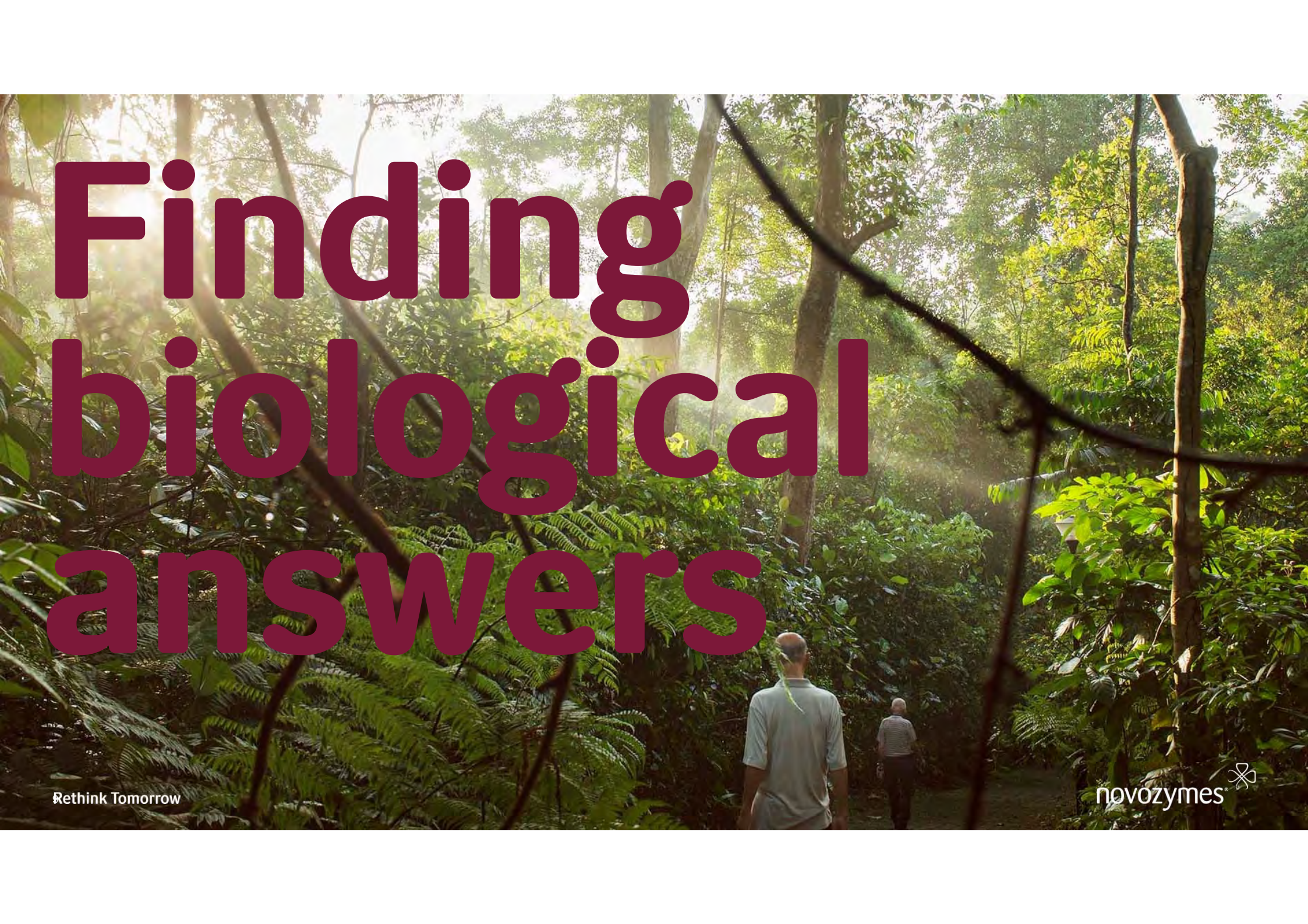
- Only ~1% of the world's microorganisms can be cultured in isolated form!
- Metagenomics gives us access to enzymes from the remaining 99% - revealing new types of biodiversity
- Our bioinformatics approach reveals more enzyme diversity than classic library screening – at lower cost



# Plug & Play system for gene insertion increases production strain efficiency







# Finding biological answers

Rethink Tomorrow

novozymes 



# BioAg: Combination of Capabilities Establishes Industry's Most Advanced Microbial Platform

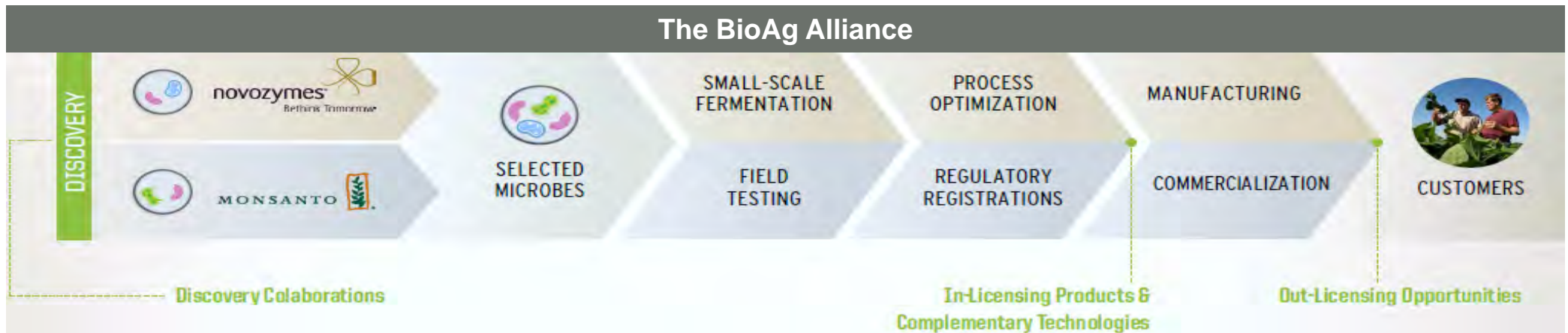
- Together with Monsanto, **Novozymes is developing yield enhancing microbes** that **protect crops from pests** and diseases and **enhance plant productivity** and fertility
- Discovery scaled up to **2000 strains per year** that are **delivered to Monsanto for field testing**

## *Additional Crop Protection*

- Complements or potentially replaces synthetic products
- Beneficial insects
- Additional modes of action

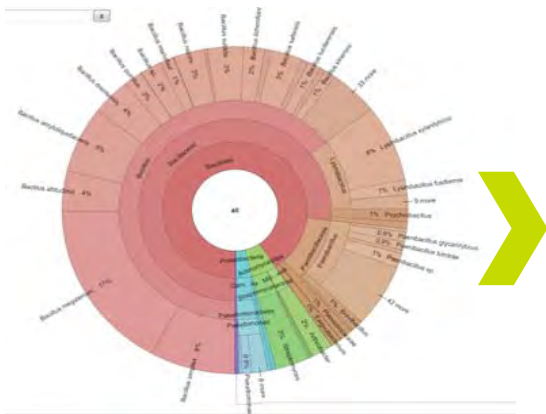
## *Crop Enhancement*

- Utilizes nutrients in the soil
- Stronger, healthier plants
- New options for sustainable agriculture



# BioAg research includes several technology areas

Microbial Diversity



Which diversity is relevant for plants health & yields?

Assay Development



How to understand basic mode-of-actions and plant-microbe interactions?

Fermentation



How to produce a large diversity of microbes, both bacteria & fungi

Formulation



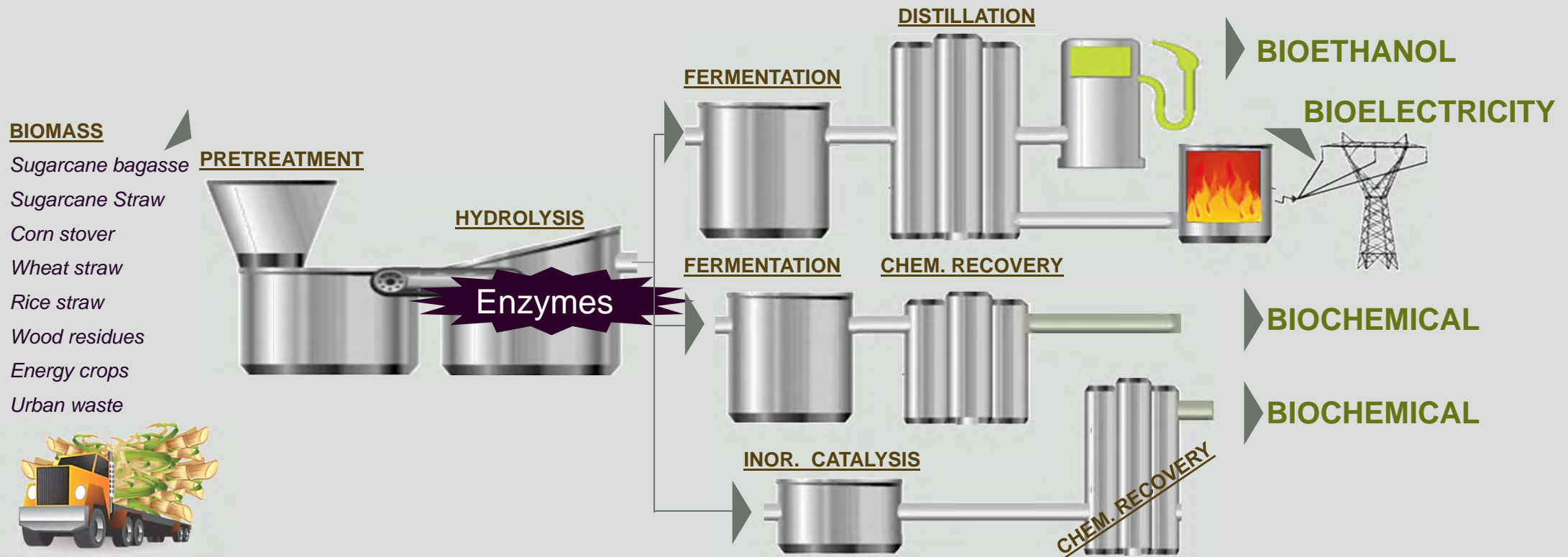
How to increase microbial stability on seeds

Early field trials in The BioAg Alliance show enhanced corn yield of four bushels per acre. If applied to the entire U.S. corn production, we would have **9 million** more tons of corn per year – or more than the annual corn production in Minnesota.

9,000,000

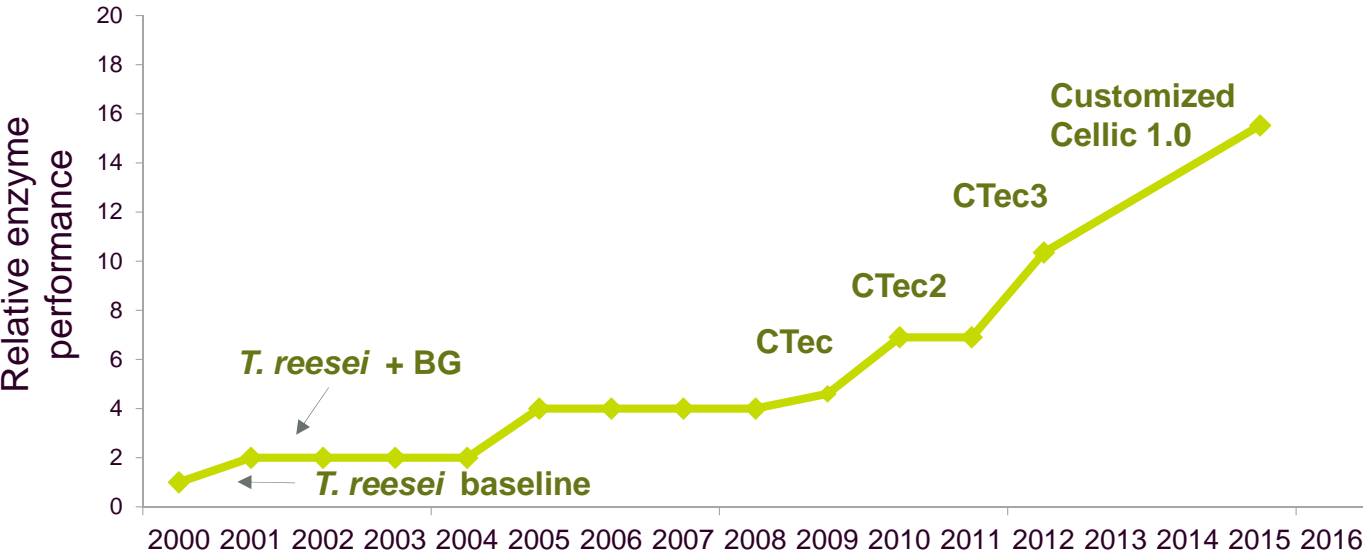


# Biomass Conversion into sugar and cellulosic ethanol

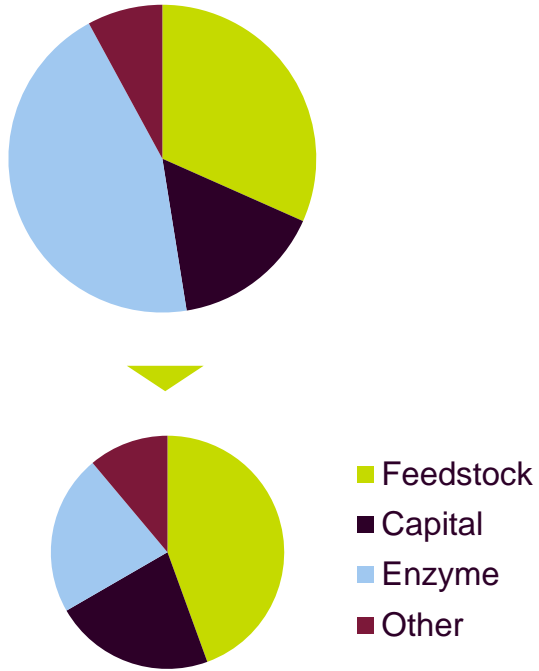




# Fifteen years of continuous cellulosic industry development



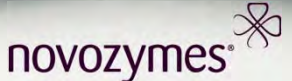
- > 15X improvement over 15 years
- From main inhibitor to valuable tool
- Now other cost items hit the steep part of customers' development curves



Illustrative example of Cellulosic ethanol cost reduction

In 2014, Novozymes' customers reduced their CO<sub>2</sub> emissions by an estimated **60 million tons** through the application of our products – equivalent to taking 25 million cars off the road.

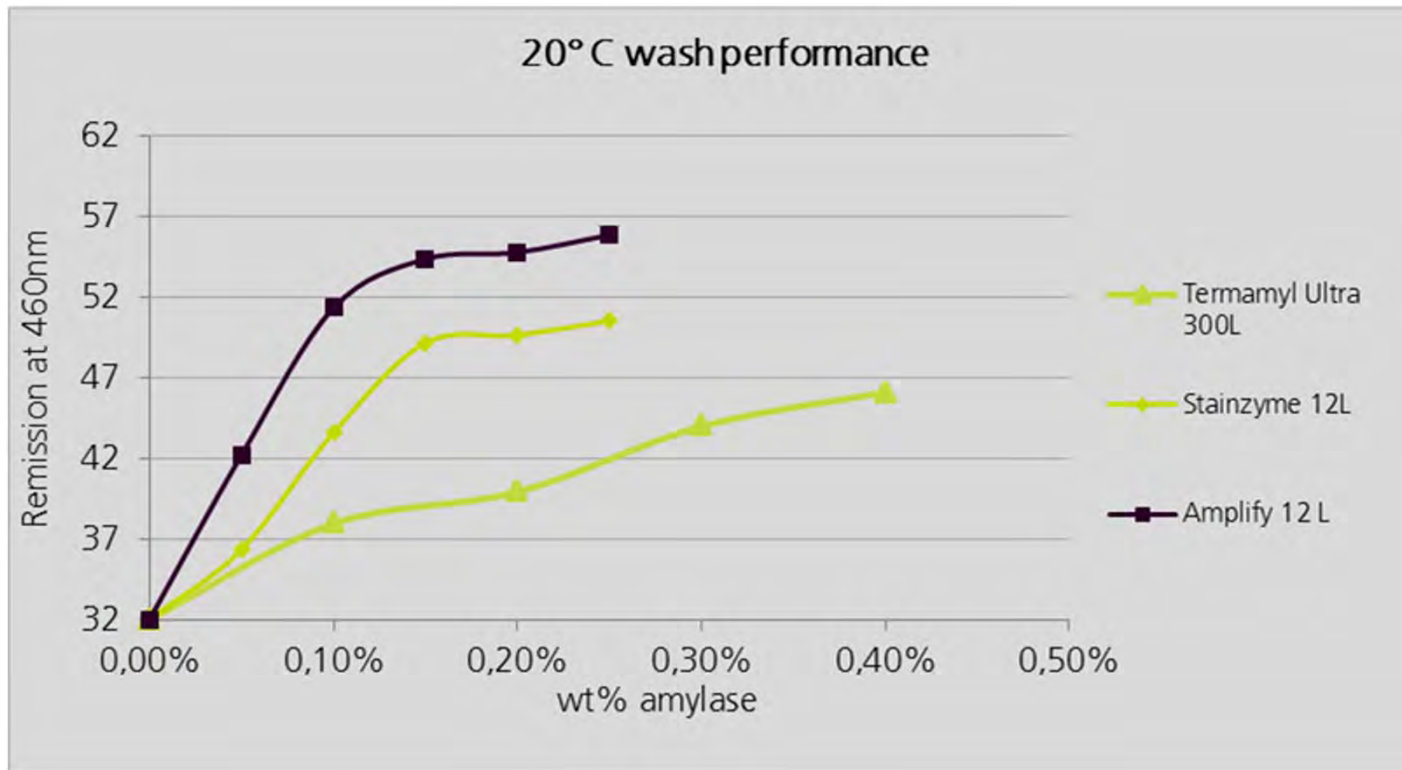
25,000,000




# Enabling the washing evolution since the first detergent amylase



# New improved enzyme variants greatly improve performance at low temperatures





A man in a grey t-shirt is sitting on a grey sofa, sorting through a large pile of colorful laundry. A woman is visible in the background, standing near a kitchen counter. The scene is set in a modern living room with a bookshelf and a window.

Green meets clean: If all households in Europe washed at 30°C instead of 40°C, we would save electricity corresponding to the annual consumption of more than 2 million homes and save more than 6 million ton CO<sub>2</sub>

2,000,000

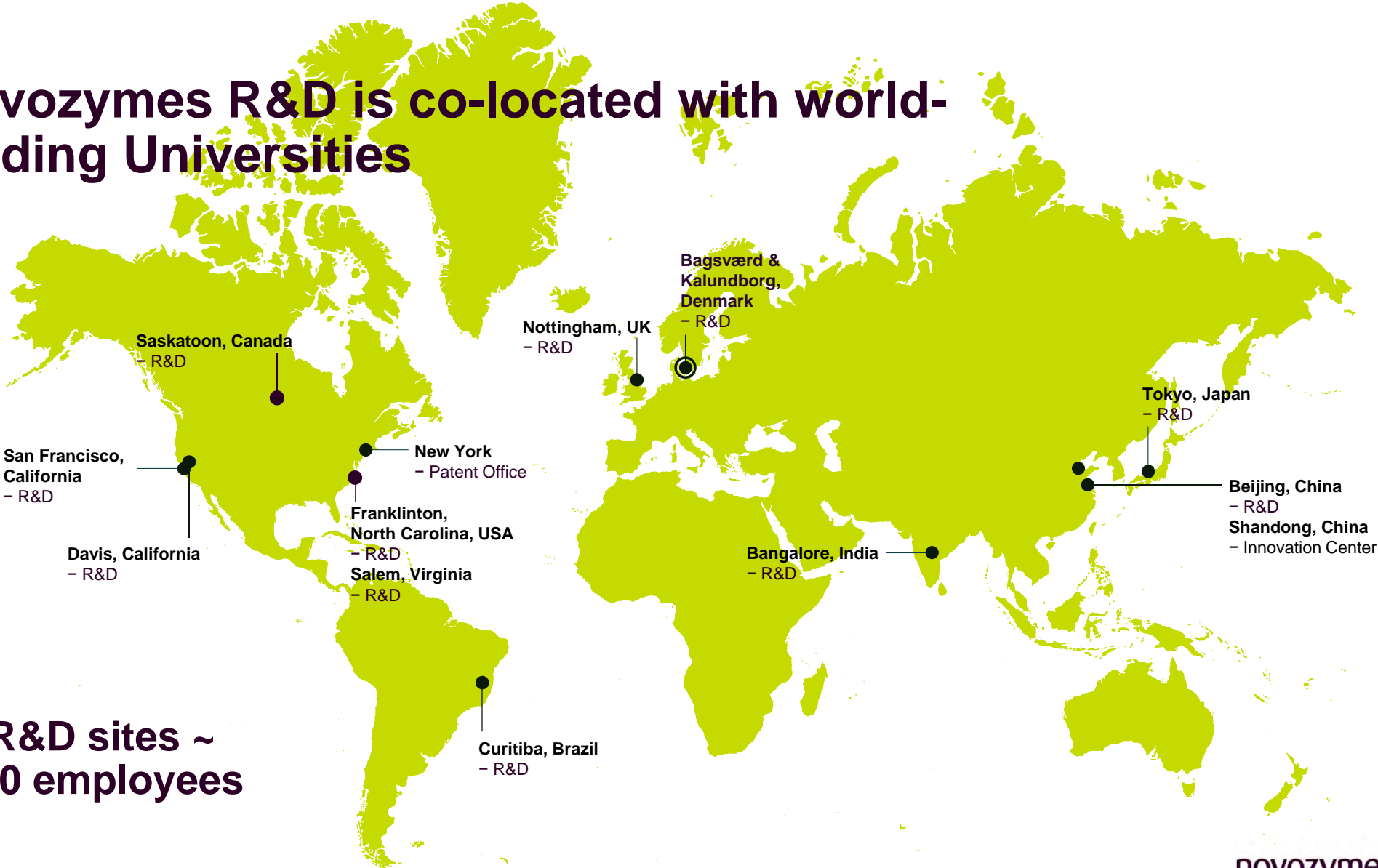




## New technology opportunities often come from academia

- Technology development and transformative innovation is to a large extent taking place in strong academic environments
- Diversity, out of the box thinking and risk willingness to exploit new ways is part of the fundament for open research done at universities
- Curiosity to understand and make new insight is a key driver for academic research
- Novozymes current and future technology leadership is 100% depended on our ability to work closely together with university groups
- Today we have collaboration with many university groups, often linked to external funded projects

# Novozymes R&D is co-located with world-leading Universities



**12 R&D sites ~  
1200 employees**

# Welcome to Novozymes Innovation Campus



- Located at Dyrehavegaard in Lyngby, right next to DTU
- Expected inauguration end of 2018
- Novozymes' largest research facility
- Up to 800 employees
- An integral part of the local community
  - “Biological Learning Center” - a learning center for biotechnology
  - “Naturstien” - a nature trail with activity zones that combines exercise, learning and nature



# Biotechnology for a Better World

## #1 Biotech employer globally

### - Science magazine



- Science Magazine ranks Novozymes the world's best employer
- The key driving characteristics of the ranking were
  - 'Innovative leader in the industry'
  - 'Treats employees with respect'
  - 'Is socially responsible'

**Top twenty employers**

The 20 companies with the best reputations as employers and the top three driving characteristics for each company, according to respondents in the 2015 survey undertaken for the Science/AAAS Custom Publishing Office. The companies without a 2014 rank did not receive enough mentions to qualify or did not receive a high enough ranking during the 2014 survey.

2015 Rank	2014 Rank	Employer (Global headquarters)	Innovative leader in the industry	Treats employees with respect	Has loyal employees	Is socially responsible	Work culture values aligned
1	-	<b>Novozymes</b> (Bagsvaerd, Denmark)	✓	✓		✓	
2	1	<b>Regeneron Pharmaceuticals, Inc.</b> (Tarrytown, NY)	✓	✓	✓		
3	2	<b>Novo Nordisk</b> (Bagsvaerd, Denmark)	✓		✓	✓	
4	4	<b>Vertex Pharmaceuticals</b> (Boston, MA)	✓			✓	✓
5	-	<b>Alexion Pharmaceuticals</b> (Cheshire, CT)	✓		✓	✓	
6	3	<b>Genentech</b> (South San Francisco, CA)	✓	✓			✓
7	-	<b>Moderna Therapeutics</b> (Cambridge, MA)	✓	✓	✓	✓	
8	8	<b>Roche—excluding Genentech</b> (Basel, Switzerland)	✓		✓	✓	
9	6	<b>Monsanto Company</b> (Creve Coeur, MO)	✓	✓	✓		
10	7	<b>AbbVie</b> (North Chicago, IL)			✓	✓	✓
11	5	<b>Eli Lilly and Company</b> (Indianapolis, IN)		✓	✓	✓	

novozymes<sup>®</sup>



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