"An Industrial Perspective on Sustainability"

Defining Sustainability:
Science, Standards, and Scorecards

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Outline:

1. Novozymes
   - Novozymes in brief
   - Novozymes and biofuels

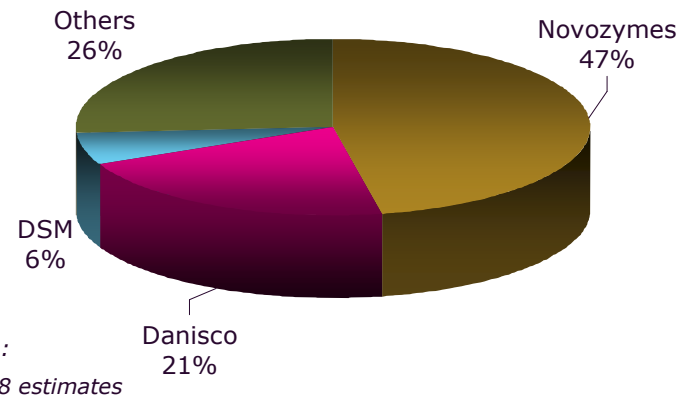
2. Novozymes and Sustainability
   - Enzymes and the carbon footprint

3. Sustainability assessment of biofuel
   - Methodology
   - Stakeholders
   - Challenges
   - NZ positions

Novozymes in brief

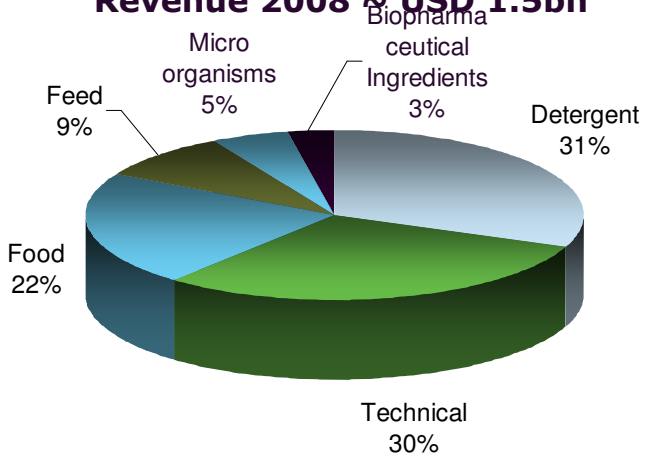
- World leader in industrial enzymes & microorganisms and market leader in all industries where present
- More than 700 products used in 130 countries in 40 different industries
- R&D activities in 5 countries
- 13-14% of revenue invested in R&D
- New products represented around 25% of total sales in 2008
- More than 6,000 granted or pending patents
- 43 new products launched during the last 5 years

Enzymes for industrial use
Market size ~ USD 2.9 billion



Source:
Novozymes' 2008 estimates

Novozymes' business composition
Revenue 2008 ~ USD 1.5bn



Novozymes and biofuel:

Enzymes for commercial production of cellulosic ethanol ready by 2010

- **~17% of total revenue in 2008**
- **Largest supplier of enzymes to the fuel ethanol industry**
  - Since 2002, 75% of all new plants have started up with support from Novozymes
- **Mainly a US business, currently based on conversion of starch to ethanol**
- **Cellulosic industry leader collaborations include:**
  - USA: Poet, ICM, KL Process Design
  - China: Sinopec, COFCO
  - Europe: Sekab, Inbicon
  - Brazil: CTC
- **Enzymes for commercial production of cellulosic ethanol ready by 2010**

World leader in sustainable business practices

- **Triple-bottom line reporting**
  - Financial, environmental and social results are reported annually and drive management compensation
- **Sustainability Indexes**
  - **Dow Jones Sustainability Indexes**
    - Novozymes is #1 in its field
  - **Sustainable Business.com**
    - World's Top 20 sustainable stocks
- **Life Cycle Assessment of Products**
  - Measuring the environmental impact of enzymes on products and processes
- **Presidential Green Chemistry Awards - 2005, 2002**

Dow Jones Sustainability World Indexes - Biotechnology:

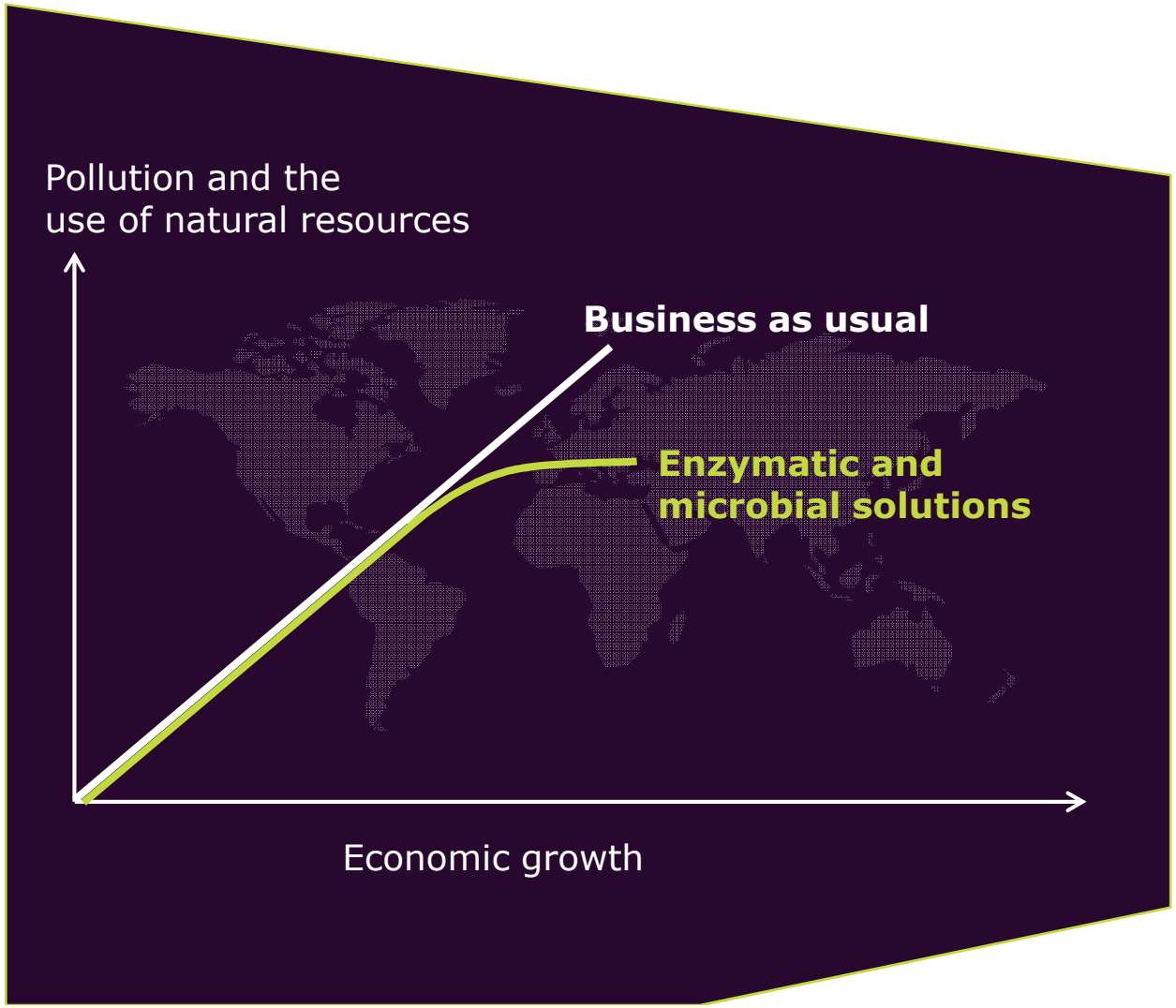
1. **Novozymes A/S**
2. Genzyme Corp.
3. Serono
4. Quest Diagnostics Inc.
5. Idexx Laboratories

Sustainability STOXX Indexes - Healthcare:

1. **Novozymes A/S**
2. GlaxoSmithKline
3. Novartis AG
4. Novo Nordisk A/S
5. Roche Holding AG
6. Coloplast
7. Smith & Nephew plc
8. SSL International
9. AstraZeneca PLC

Novozymes and Sustainability

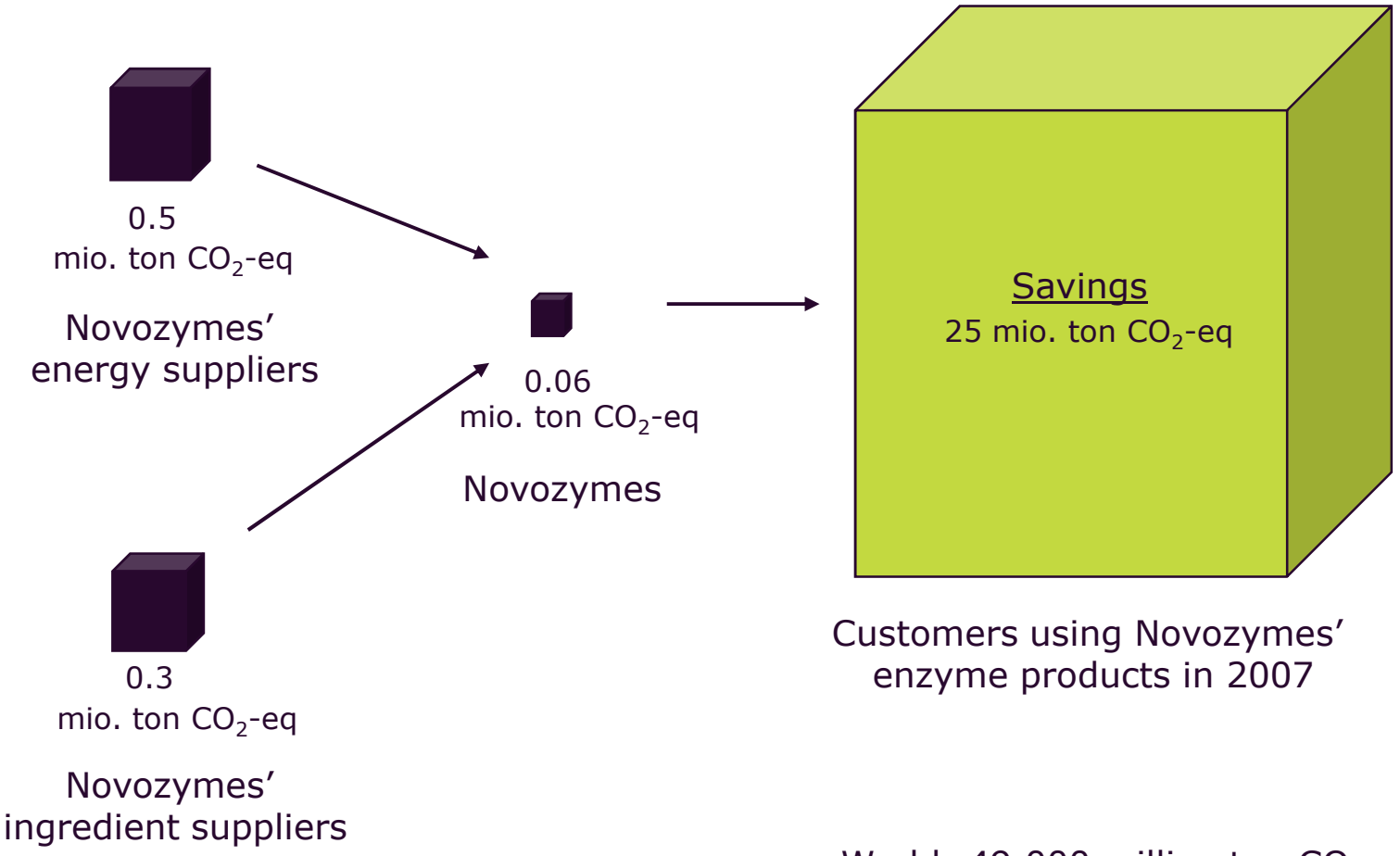
Decoupling economic growth from pollution and the use of natural resources



When enzymes and microbes are used in production they can increase efficiency and yield of a wide range of processes in our society.

With enzymes and microbes we can ***produce more with less*** and contribute to the decoupling of economic growth from pollution and the use of natural resources.

Carbon foot print of Novozymes enzyme products



World: 49,000 million ton CO_2 -eq

Sustainability assessment of biofuel

Novozymes' work on sustainability of bioethanol

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Our ambition:

- Novozymes is known for making a serious effort to understand all the sustainability aspects of bio ethanol.
- Novozymes engages in the bioethanol sustainability debate with political decision makers, academia, NGOs

Our activities:

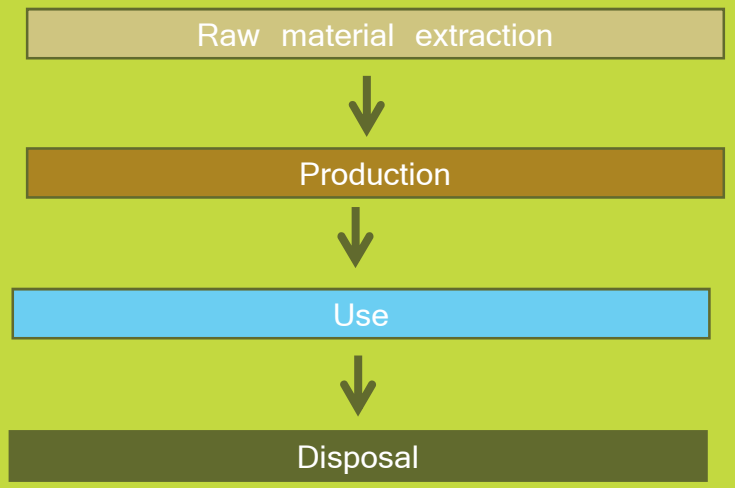
- We follow the public and scientific debate
- We engage in dialogue with NGOs, scientists and decision makers
- We engage in sustainable biofuel initiatives
  - Roundtable on Sustainable biofuel
  - ISO working group on sustainable biofuel
  - International Standard Carbon certification
- We carry out documentation of sustainability performance based on LCA

Our communication about the benefits of substituting gasoline with EtOH builds on literature

Our own LCA studies are limited to the documentation of the environmental benefit of new ethanol manufacturing processes involving new Novozymes enzyme products.

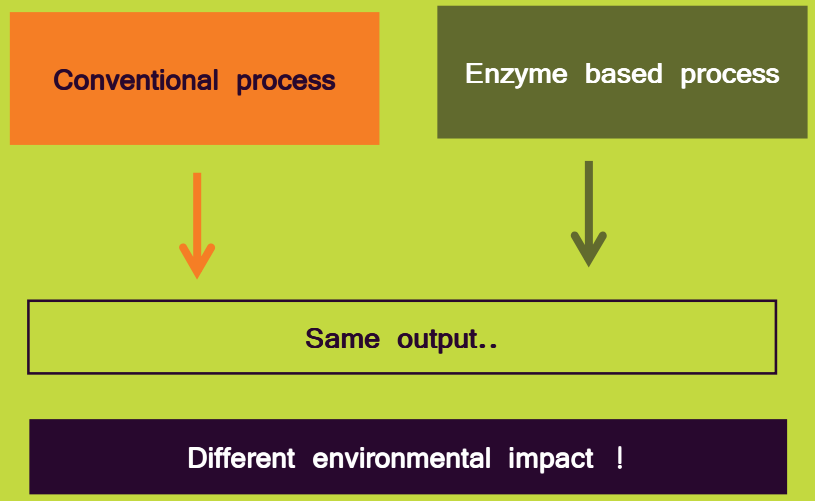
Our focus is achievements, which can be documented by the use of technical data

LCA - an environmental assessment tool



LCA is used to compare environmental impacts of two or more alternative processes

LCA addresses all processes in the product chain - from 'cradle to grave'



Quality control of Novozymes' LCA studies

LCA studies used in Novozymes' external communication are

- Carried out in accordance with the requirements of the ISO 14040 standard on LCA
- Subject to external critical review and/or
- Published in the International Journal of life cycle assessment

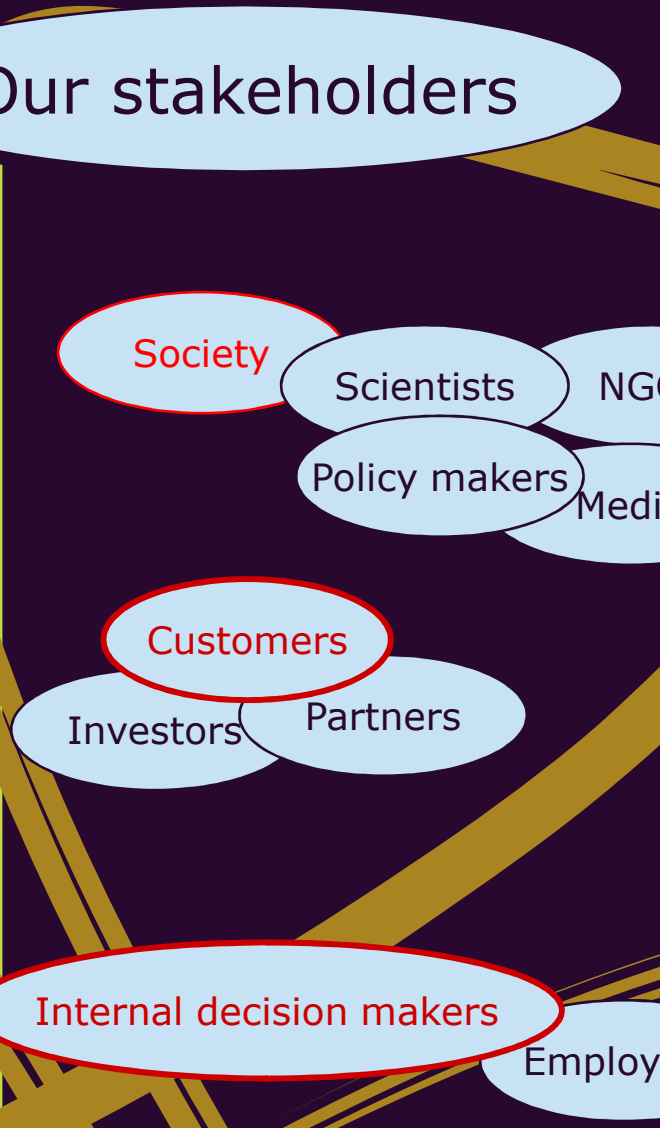
ISO International Organization for Standardization

THE INTERNATIONAL JOURNAL OF LIFE CYCLE ASSESSMENT

6 of Novozymes LCA studies are published in International Journal of Life Cycle Assessment

We use LCAs

- to document the environmental benefits of enzyme technology
- to assist our customers in documenting performance improvement
- to strengthen the technical dialogue with partners
- to influence regulation
- to support our own decision making regarding new product developments
- to engage in dialogue and participate in multi-stakeholder initiatives regarding sustainable biofuel



Bioethanol is different

- The benefit to society of bioethanol is challenged. Thus there is a need to make a comparative assessment of bioethanol and gasoline.

- It takes more than an environmental assessment. Other types of consequences need to be analysed:
  - Economic
  - Social
  - Energy supply

Bioethanol is different

- Comparing gasolin with bioethanol is much more complicated than comparing 2 types of bioethanol
- Many LCA results on bioethanol are published
- Completely new requirements to environmental assessment – first and foremost land use change
- LCA is to be used for regulatory purposes*

New requirements for Novozymes LCA studies

Completely new use of LCA

*The first time systematic LCA is used for regulation

LCA in NPD

Novozymes experiences with the use of 'LCA light'

- We operate with assumptions, sensitivity analyses and scenarios – like we do for the NPVs
- This means sharpening of our understanding of the environmental opportunities and potential weak points of the technology
- In some cases we need information from our partners – an opportunity to strengthen the dialogue about the project

How?

Availability of data

Sustainable biofuel

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Challenges

1. The benefit of bioethanol is challenged
   - A challenge to Novozymes self-image
   - Worried employees
2. The wide range of expertise requirements
3. The number of stakeholders and parallel initiatives
4. The need for a regulatory framework NOW
5. The lack of scientific data for land use change impacts
6. The use of LCA for regulatory purposes


Thank You!

NZ position on implementation of standards

Important needs

- International harmonization
- Speed
- Approach that will drive improvement (usable for farmers, biofuel manufacturers, technology providers)
  - Simplicity, pragmatism
  - Transparency
  - Credibility
- A first step towards carbon accounting for all agricultural products – because this will
  - Provide simplicity (ILUC -> LUC)
  - Help release the fulll carbon potential of sustainable agriculture

NZ position on implementation of standards

There is a need for

- Protection of specific high carbon/high diversity areas
- Identification of 'idle' land
- Land use strategies

BUT standards and certification is not enough

Novozymes key messages to policy makers regarding biofuel regulation

It is important to

- distinguish between the various types of climate impacts of biofuel (different types of data-uncertainty, timelines, actors)
- stimulate use of practices and technological development in favour of increased sustainability (tools for farmers, biofuel manufacturers – based on technical information)
- ensure protection of carbon sensitive areas – peat-bogs, tropical forest
- develop plans for the future use of biomass in a fossil fuel limited society. Economic equilibrium models of small impacts now cannot stand alone

Need for

- Transparency
- Incentives driving sustainability development
- Protection of the environment
- Strategic view