Novozymes (NZ) is the world market leader in industrial enzymes and microorganisms - Dedicated team in SEA.

NZ snapshot

- **Sales:** EUR 1.5 billion
- **14% of revenue** R&D reinvested
- **Enzymes constitute** >90% of turnover
- **~ 7,000 employees** in 30 countries
- **> 6,500 granted patents** & pending patent applications
- **More than 700 products** used in 130 different countries in > 30 different industries
- **Listed on the Nasdaq OMX,** Nordic stock exchange
- **Was founded almost 100 years ago** and ‘The Global 100 List’ rank us to be around for another 100 years...
- **≈ 50% market share** in supplies of enzymes for industrial use
The mobilization of large-volumes of ‘Agricultural residue’ mobilization in SEA presents numerous challenges

Source: Expert interviews

**Biomass ownership throughout Asia is typically very fragmented and dispersed**

- The agricultural industry is extremely fragmented, predominantly made up of small holders where mechanization is not very common
- Rice, wheat, palm oil mills are usually owned by families or individuals and produce only a small % of required biomass volumes for a 2G plant
- To aggregate sufficient volumes, multiple mill owners would need to collaborate, within a 50km radius and near infrastructure
- Experiments with cooperatives in the past have largely failed, as farmers have been unwilling to invest for the longer term
- There is a strong short-term/cash preference for farmers, not really thinking 5 years in the future

**Infrastructure can be very challenging**

- Road networks in rural areas are often not well developed, access and transport to ‘aggregation hubs’ could be challenging
- Often 1-20km of narrow dirt track between villages and the nearest road, and these tracks are only accessible by ox-cart or hand-pulled cart
- Trucks are often overloaded and have a high risk of tipping over or otherwise being involved in accidents, blocking single access roads.
better business, a cleaner environment, and better lives

This is our opportunity to leave the planet in a healthier shape – achieving a better climate and better growth. The future is now, enabling technologies are here, and business is behind the politicians to take the right decisions. Taking strong action now will cost much less than failing to do so later.”

PEDER HOLK NIELSEN,
CEO, Novozymes
Together we find biological answers for better lives in a growing world. Let’s rethink tomorrow.
Novozymes
Opportunities for production in Southeast Asia
Ethanol trade-flow overview
Asia Pacific faces ethanol shortage by 2020

Size of arrow indicates volume of flow
Enzymatic biomass conversion is the technology that enables Cellulosic fuels and chemicals.

- **Paddy Straw & Cotton Stalk**
- **Corn stover**
- **Energy cane**
- **Wheat straw**
- **Wood chips**

**Cellulose**
- Ethanol
- Cooking gel
- Electricity
- Textiles
- Diapers
- Plastics
- Detergents
Commercial-scale 2G (ethanol) production started in Italy more than a year ago, so technology risk has reduced.

Enzymatic hydrolysis is now the technology of choice for all currently commercial 2G operations.

*Currently 5 commercial-scale plants are operating worldwide.
Novozymes
How to drive investment and growth in SE Asia

Ensure first 2G plants will be built in SEA:

• Implement and enforce (Advanced) Biofuels and Bio Chemicals mandates

• Provide access to low interest debt/financing

• Provide access to large volumes Feedstock availability and security:
  – Infra structure
  – Logistics
  – Pricing mechanism