



Sidestreams or mainstreams?



Harnessing the plus in plus products

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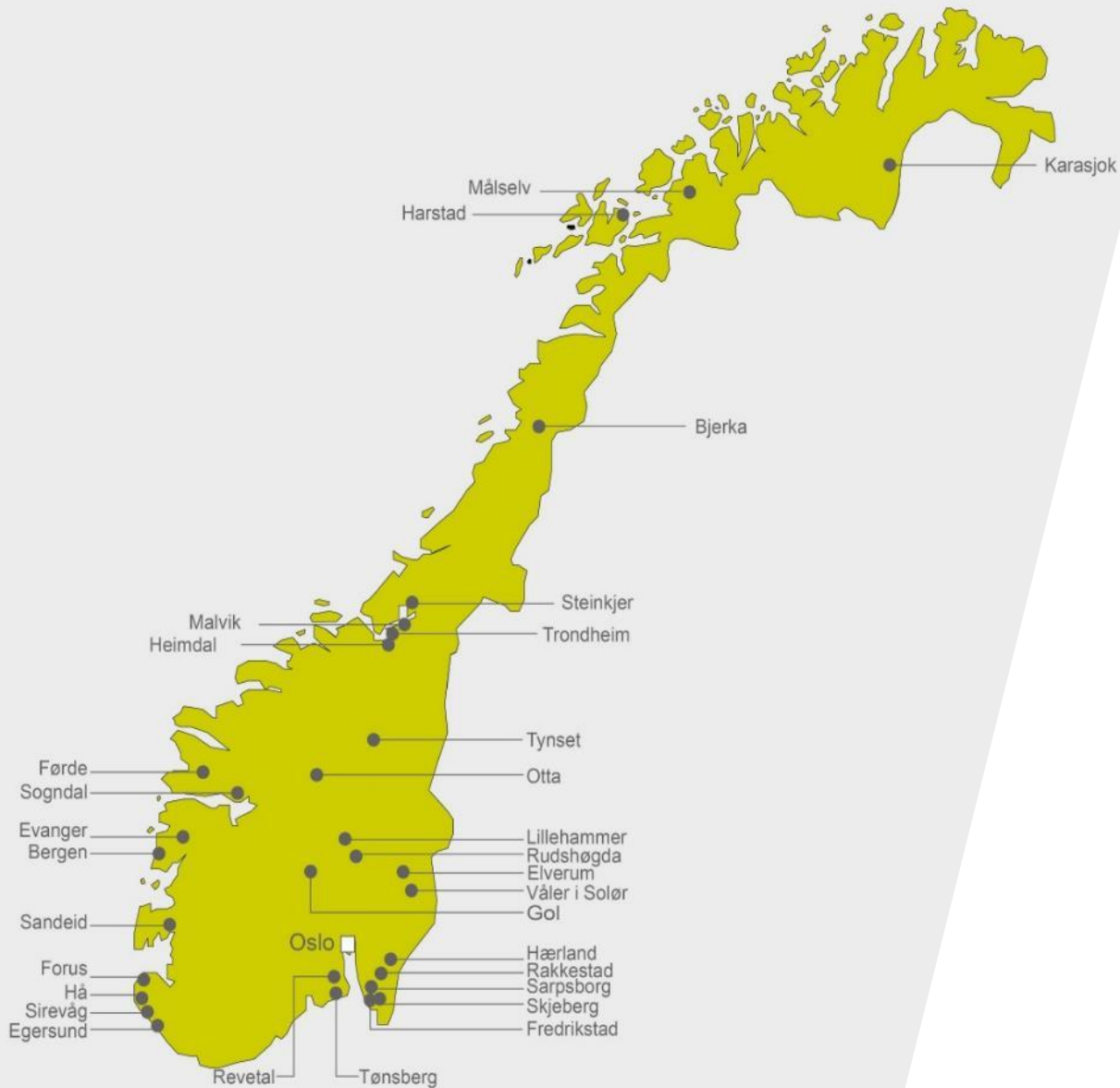
100% subsidiary of Nortura

**Responsible for value-added
production and sales of by-
products from Norwegian meat
processing industry**

160,000 tons per year

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Nortura - Across Norway

- Sales of NOK 23 billion
- Activities in 28 municipalities
- 5,200 full-time equivalents
- Owned by 18,800 farmers

The Nortura Model



Health

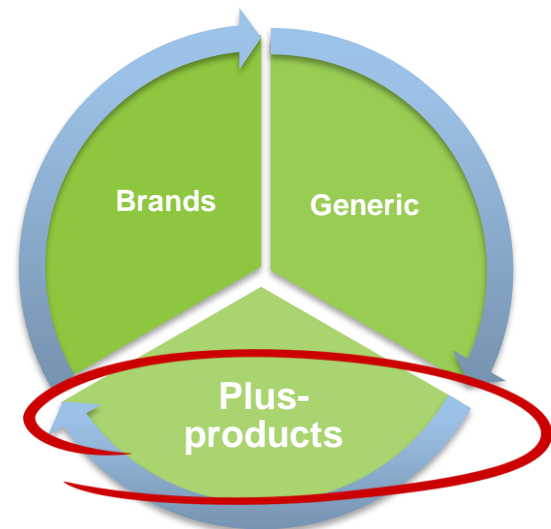
Sustainability

Food
enjoyment

Plus-products is one of three sectors selected for future growth and profitability for Nortura

'Sustainable processing and utilization of all resources is important to take environmental responsibility and bring Nortura and Norwegian agricultural in to a more sustainable future'

CEO Nortura : Arne Kristian Kolberg

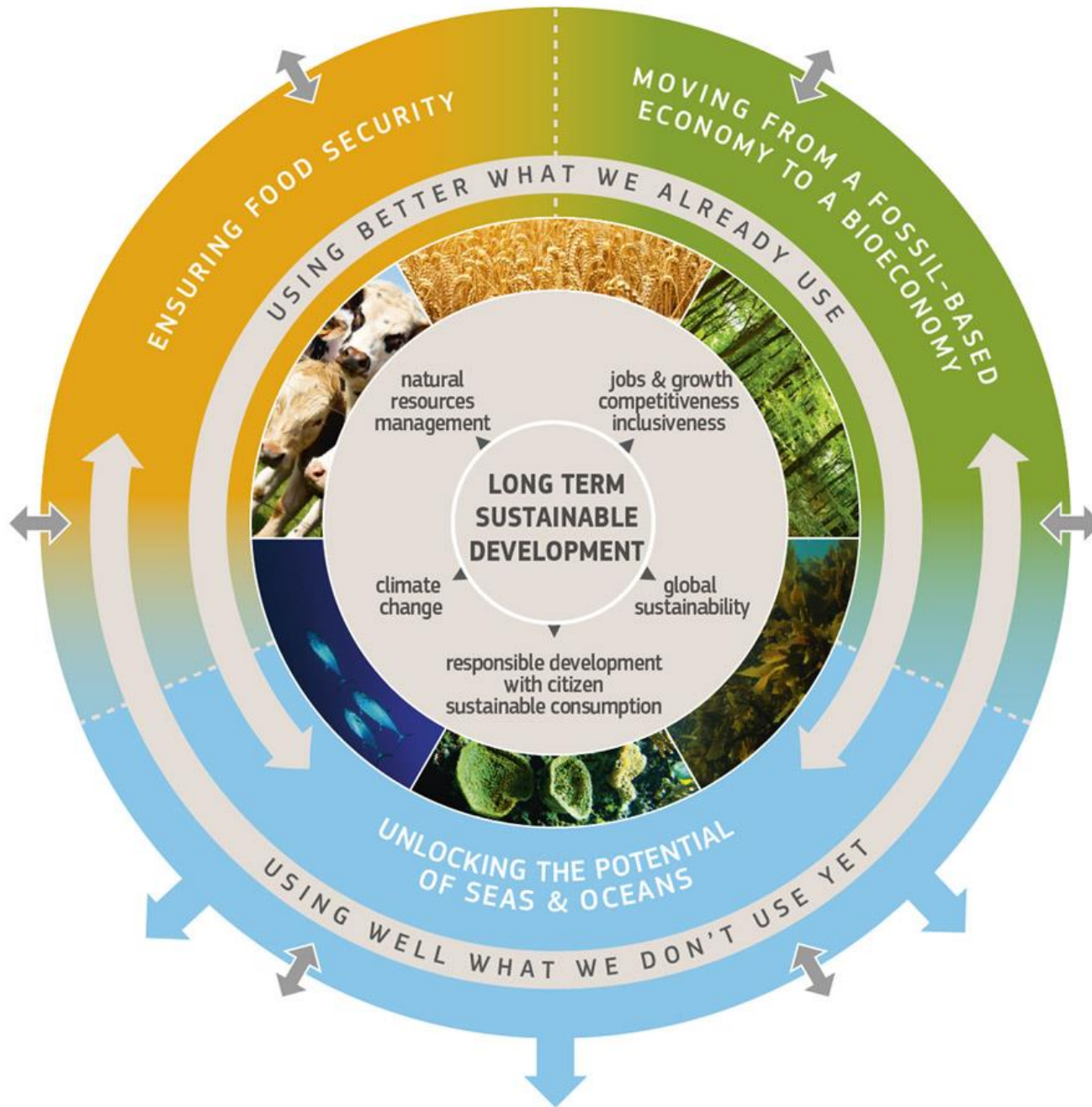


**Also linked into programme:
'The Green Shift'**

Sustainability

Health

**Food
enjoyment**



Circular principle

Sustainable value chains

Ethics

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Proper resource utilization: not waste, but plus products

A plus-product is an ancillary biomass that, when properly handled, delivers a plus (value-add)



Up to 50% of volume



Up to 35% of volume



Large volume, often low price

Hides and skins

90% of all hides and skins in Norway.
210 million NOK in 2016.
Hides sold in luxury segment.



Wool

3300 tons of wool graded per year.
45 million NOK in 2016.
Nordic Ecolabel in 2015.



Natural casings

Import, secure quality, and prepare natural casings for Norwegian sausage production.
Export sheep casings.



Nutri

47000 tons offal and bones per year.
83 million NOK in 2016.
Many products for export and animal feed.





Hides and skins

Wool

Securing value through:

- 1. Sorting**
- 2. Quality control**
- 3. Logistics**
- 4. Finding the right markets**



Natural casings

Nutri



Harnessing value of plus products

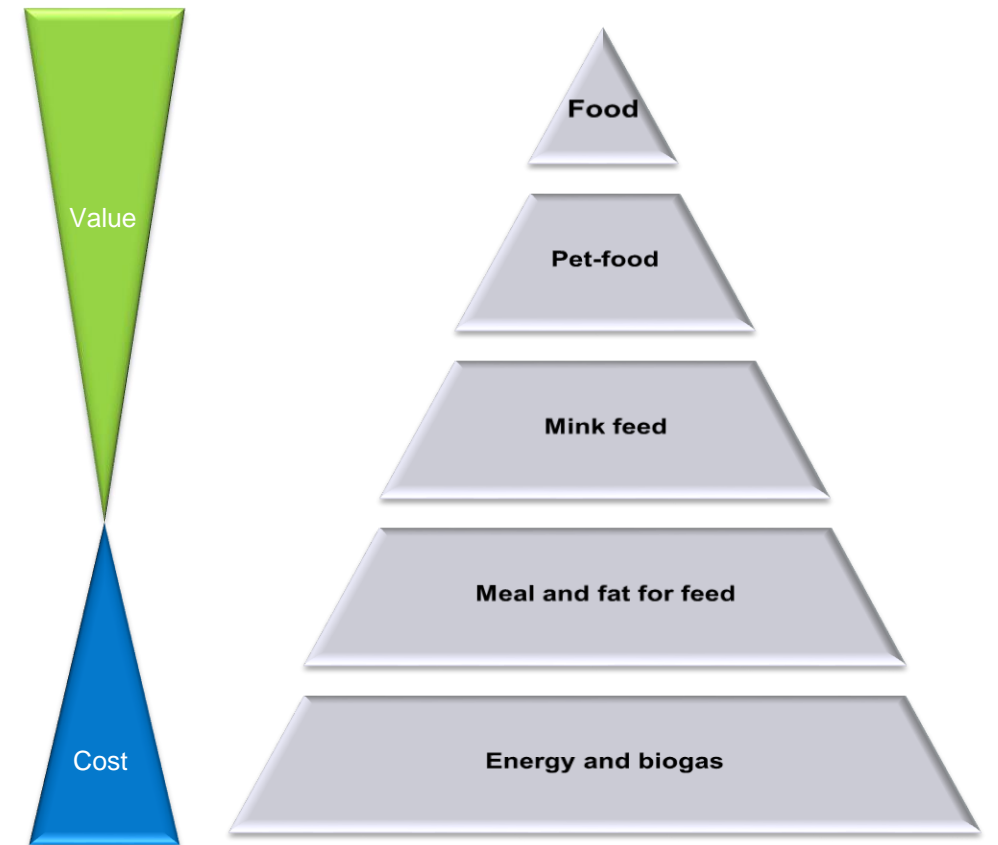
CHALLENGES

- Products that go to feed and energy cost money
- Uncertain markets

OPPORTUNITIES

- Product content allows for many applications
- Better at sorting / conserving or use new processes can expand options and open up new markets or applications

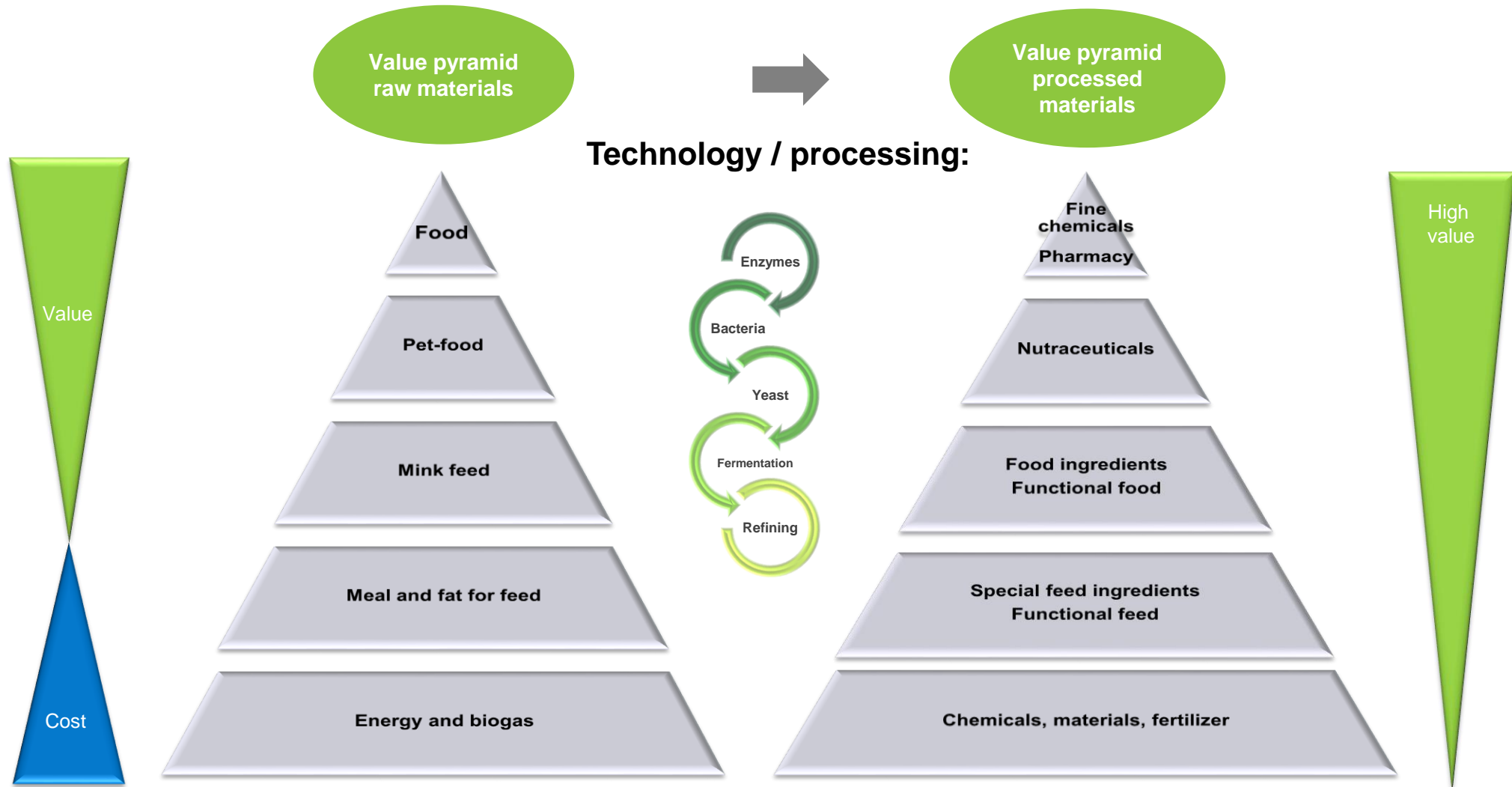
Understanding products – understanding market opportunities and opportunities for value creation



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Using new technologies and bio-processes to refine plus-products into new ingredients for higher value markets



We are involved in 18 different R&D projects in collaboration with Norwegian institutions and with support from the Norwegian government



Example projects that harness the value of plus products

THE EGGSHELL PROJECT



BIOCO (PROTEIN HYDROLYSIS)



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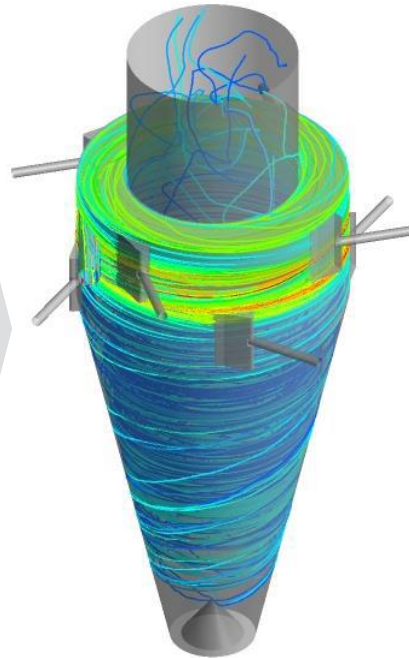
The Eggshell-project:

From cost and negative environmental impact,
to new profitable ingredients and increased sustainability

800 tons of egg-residues
per year



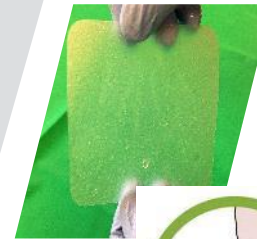
New technology allows
unique processing



Separated membrane and
organic eggshell calcium



New applications



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New factory (Bioco, start Q3-2018) for enzymatic hydrolysis of poultry biomass

bioco



The result of research, technology development, and goals for better use of raw materials, value creation and environmentally friendly production.

- ✓ Joint venture between Felleskjøpet Agri and Nortura, with Norilia as projectleader
- ✓ Innovative technology for continuous enzyme application
- ✓ Technology developed inspired by experiences in Norwegian fish industry
- ✓ Situated next to Norway largest chicken processing factory south-east in Norway
- ✓ Total capacity of 16.000 tons raw material
- ✓ Environmentally friendly solutions



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