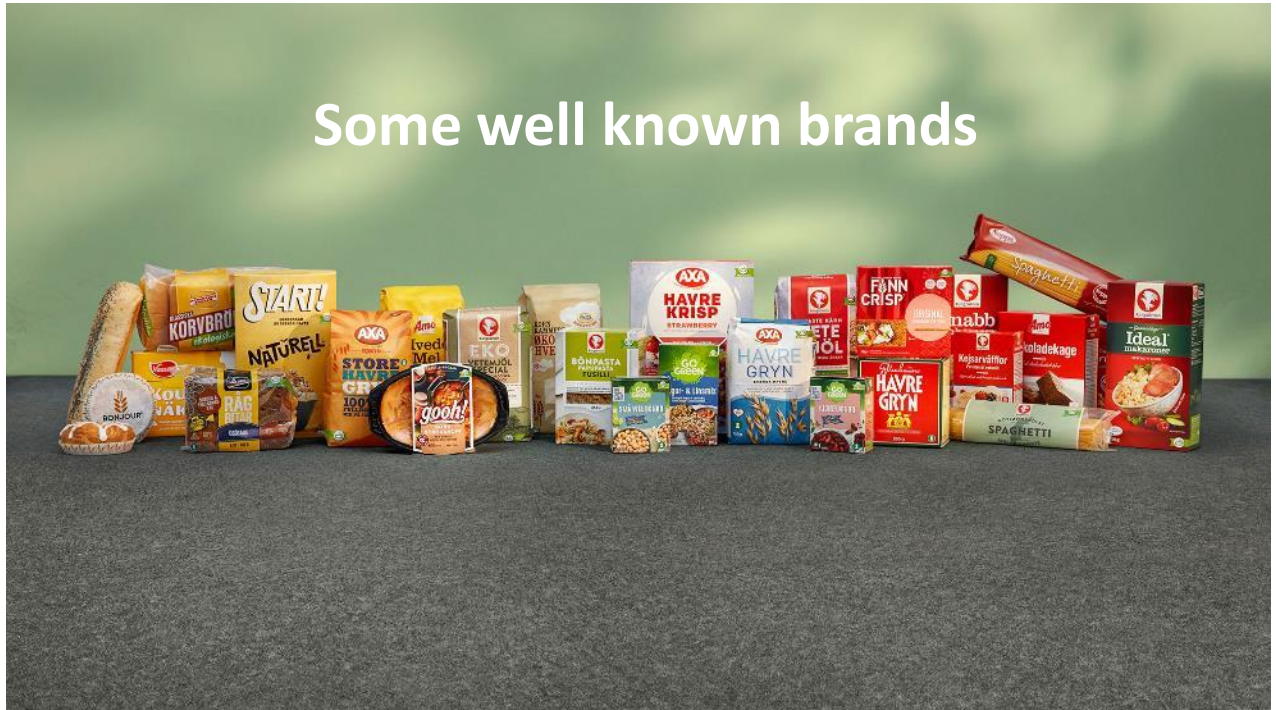
Wood powder installation in Åhus

Biofit 19th of April 2021

Lantmännen

Our base is in Northern Europe

- Lantmännen is an agricultural cooperative and Northern Europe's leading player in agriculture, machinery, bioenergy and food.
- We are owned by 20 000 farmers, have 10 000 employees, operations in some 20 countries, and an annual turnover of SEK 50 billion.



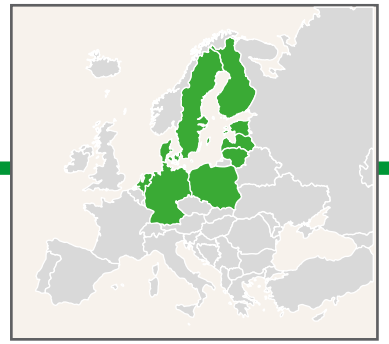
Lantmännen as a leading player in the value chain from Field to Fork in Northern Europe

4.5 million tons
of grain in the Baltic Sea area

60+
international markets

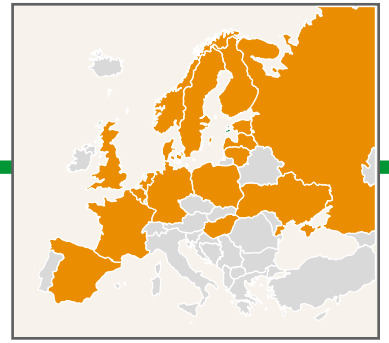
Farming division

Cultivation and plant breeding
Inputs and trade
Agricultural machinery



1st Line Processing

Milling
Flour and mixes
Ethanol and spirits
Malting
Grain trade
Food ingredients



2nd Line Processing

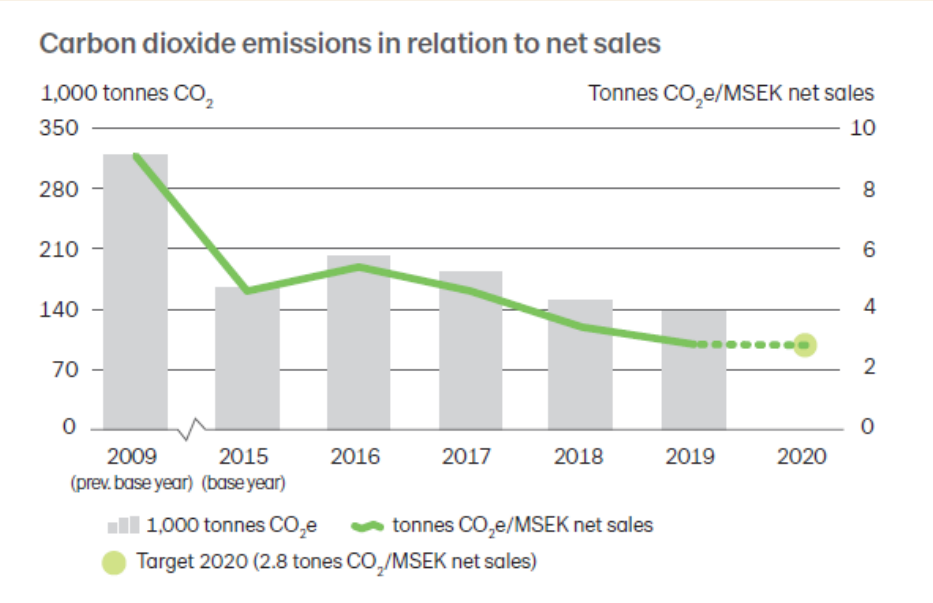
Bread and baking
Breakfast and pasta
Ready-to-eat
Feed products

The climate target

Own production

- 40 percent reduction target was set in 2009 to be achieved in 2020 but was reached in 2015
- Target for a further 40 percent reduction 2015 - 2020 in tons/million turnover. *See diagram to the right.*
- Fossil-free production
  - Sweden and Norway 2025
  - Other Nordic countries 2030
  - Other EU 2040
- Continuous conversion from fossil fuels, transition to green electricity and increased energy efficiency are important parts

Lantmännen's climate target: Reduction with 40 percent in 2015-2020, for own production. Target 2,8 tons CO_2e / MSEK turnover by 2020



Status: Lantmännen reduces climate impact with 39 percent. Lantmännen has reduced climate emissions relative to turnover with 39 percent. Result 2,85 tons CO_2e/MSEK .

Work during 2019 with conversion to renewable energy and origin labelled electricity as well as energy efficiency has shown good results. There are good prospects of reaching fossil-free production in Sweden and Norway before 2025.

Priority and time plan

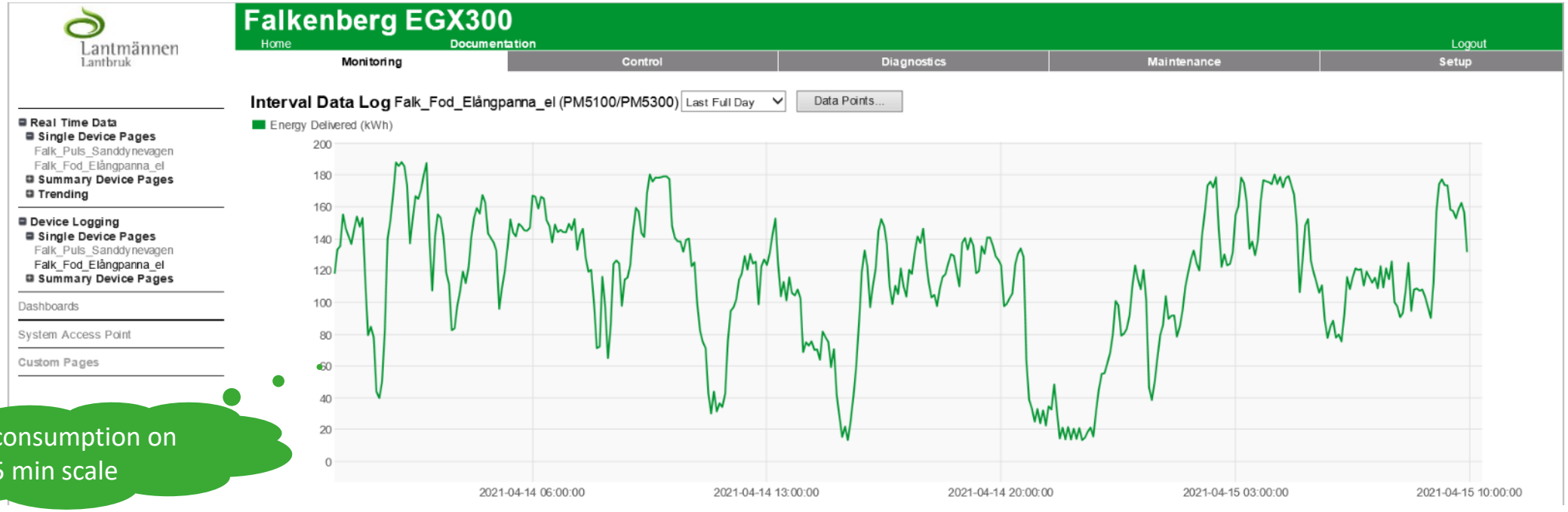
1	2	3	4
Åhus	Malmö	Eslöv	Helsingborg
Falkenberg	Djurön	Skara	Norrköping
Holmsund	Sala		
Klintehamn	Kumla		
	Strängnäs		
	Alstad		
	Uddevalla		
	Klagstorp		
	Ystad		

- Start with the easiest
  1. **Feed factories**. Typically 24/7 usage. Low power needs. Major fluctuations
  2. **Grain silos**. Two months usage. High power needs. Even user profile
  3. **Seed factories**. Low power and energy needs
  4. **Direct fueled grain silos**. Major refitting needed

Task was to prepare business cases with alternative renewable steam and hot water suppy

Energy profile feed factories

- Volatile power usage when conditioning feed
  - Within 10 minutes from 200 kW to 2 MW, and back again
- The first site converted was from fuel oil to wood pellets, the burner couldn't handle the quick changes
  - Resulted in unreliable steam supply and very high maintenance costs

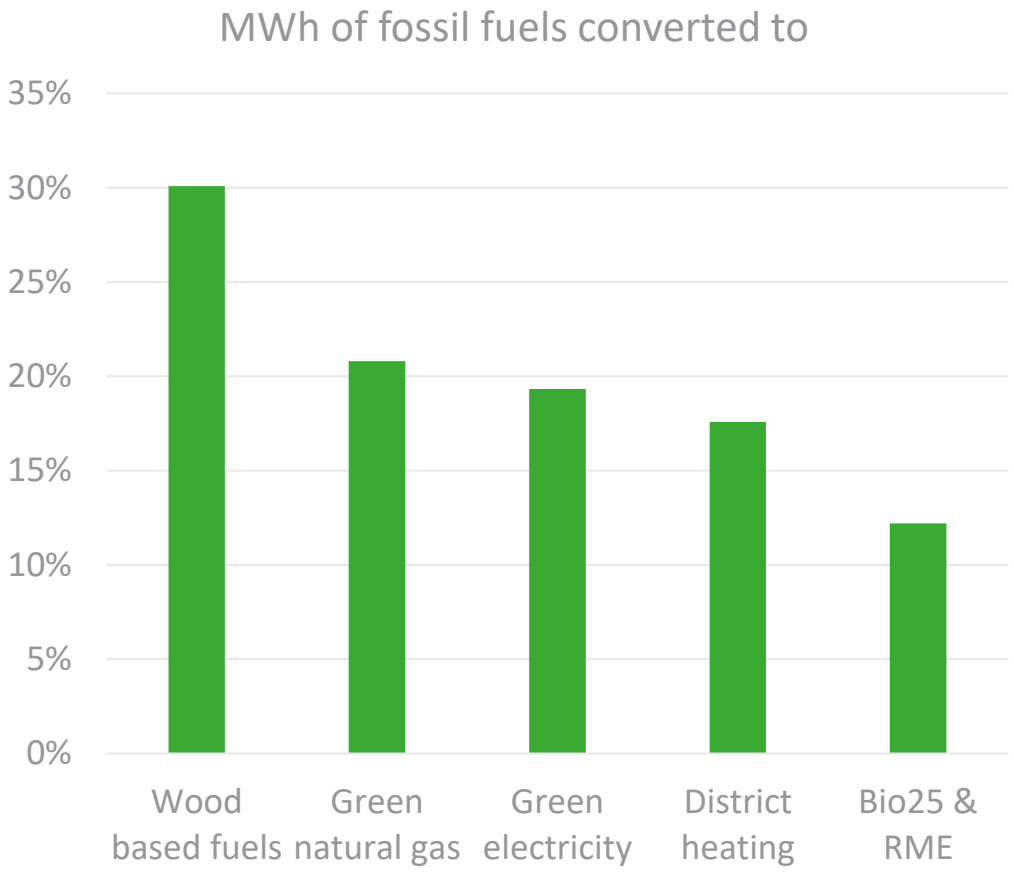


Power consumption on a 5 min scale

Important to understand the technical limitations of each technique

Diversed solutions

- Depending on energy profiles and local possibilities different solutions were preferred
- Wood based solutions are high in CAPEX but low in OPEX
- Grain silos have typically a favorable user profile for district heating with main usage July to September
  - 15 locations connected to district heating today
- Converting fuel oil sites to Bio25 has been successful both technically and economically



Energy profiles and local possibilities determined the solution

The Åhus project

- Annual 12 GWh propane consumption
- 24/7 steam power need to feed production <2 MW
- Power need for feed and grain drying 7 MW July, August and September
- Major short term fluctuations, especially in feed production
- Solution
  - Retrofit existing 8 MW Osby Parca steam boiler
    - 2 MW powder + 5 MW propane

Crucial with detailed and correct energy data to not under- or over dimension equipment

Economy

Investment

- 15 MSEK
  - 2*500 m3 wood powder silos
  - Burner and burner control
  - Dust and ash filter
  - Installation

Running costs

- Replacing 12 GWh propane with wood powder halved annual heat cost
- Thanks to cooperation with local wood floor producer wood powder is bought to competitive price

Our main concerns

- How much daily **maintenance** will be needed?
  - There has to be a local owner ship and a boiler operator
    - Typically wood powder jam in silo or transport
- How much **propane** will we use?
  - Monthly values <0,5 % up to 50 %
  - Since 2015 annually 10 %, mostly during harvest season
- Will it be a **good investment**?
  - Yes! A very good investment

Summary

- **What are the process needs?** Challenge current truths
- **Look for local synergies** when it comes to fuel
- Tight dialogue with **local authorities** about emission levels
- Annual **CO2-emissions reduced** with 2000 ton


Thanks!
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