

# Side-streams AAK - Aarhus, Denmark

From pain to gain



## The shea fruit and kernel

- The Shea fruit is approx. 4 cm in diameter
- A shea kernel contains approximately 50% oil (shea butter)



Edible sweet pulp

Shell

Kernel – 50 % fat



# The Shea belt



# The Shea Tree

- Starts giving fruit after 15-20 years
- 40-50 years to reach maximum fruit production
- Up to 300 years old
- No clearing of land
- No plantations
- Agroforestry system





# Shea collection

- Women collect in the bush and parklands around the villages
- No picking, only collecting of kernels
- Farming land belongs to the men, women collect on their fields
- Shea requires no fertilizers
- It requires only women's time to collect kernels, wood and water
- Approximately 50% of kernels will not be collected





# Steps to produce dry shea kernels



*Good post harvest practices are essential for a good quality production. AAK is training the women to produce a better quality.*



# Local importance of Shea

## Local consumption

- **Food oil:** shea butter used as main cooking oil in the shea belt
- **Food:** shea fruit pulp is a very important food during the annual food short season
- **Skin protection:** shea butter is used as skin moisture during the dry season

## Source of Income

- **Income:** provides an income to around 16 million people, mainly women
- **Helps fighting poverty:** sales of shea kernels allow the women to fight poverty. It is a safety net that they can use in case of need



# Climate change mitigation and economic potential of the shea value chain

GSA and FAO are conducting a multi-impact appraisal of the shea value chain in eight countries in West Africa.

## Preliminary results:

- Shea has enormous potential to mitigate climate change in West Africa. Every year, the shea value chain fixes 1.5 million tons of CO<sub>2</sub> in the soil. Relative to production volumes, every ton of shea kernel produced has a negative carbon footprint of 1.04 tons of CO<sub>2</sub>.
- In 2018, every day of work in the shea industry generates USD 1.9 of value added per woman.



Food and Agriculture  
Organization of the  
United Nations



# The importance of shea to AAK

- Key raw material
- > 95% of shea = Food Industry
- <5% of shea = Cosmetics
- AAK is the market leader
- Demand for shea has increased dramatically over recent years





## Side streams from the production of shea 2021

Shea meal	Fatty Acids	Fatty Acids RS65	Soap stock	Sheaolein	Caritene
90.000 T	10/8.000 T	1.250 T	12 – 36.000 T	27.500/12.500 T	2.000 T

Clean up	Sludge	Waste oil	Bleaching earth	Ashes	Waste water
2.600 T	500 T	150 T	625 T	500 T	150.000 m <sup>3</sup>

- No overview of the side streams
- No documentation
- Limited knowledge of applications
- Few customers primarily in Denmark and Poland



# The secret of getting ahead is the secret of getting started

The first step is to get an overview of the side streams
Types of side streams
Volume of each side stream
Handling of the side streams
Logistics
Legislation
Documentation (product sheets) for each side stream



# Value creation and co-development with our customers

Our side streams are important raw materials for our customers
Visiting customers to get information on applications & handling
Direct communication between AAK specialists and customer specialists
Tailor-made logistic solutions
Sharing the shea story to create context and loyalty
React positively on requests
Cooperation with Teknologisk Institut
Food & Bio Cluster, Aarhus & Aalborg University. Aarhus Harbour

# How to set the right price on the side streams?

The sales platform has been expanded
Expansion into new applications
Geographically expansion
Direct Sales - sales via agents - use of brokers
Bidding rounds
Introducing a "cost in use pricing model"



# Status 2023

The demand is exceeding the supply

Side stream	Application
Sheameal	AAK power plant for burning sheameal
Sheameal	Biogas – Power plants (DK & PL) – Cow bedding – Fertilizers
Fatty Acids	Biogas – Biofuel
Soap stock	Biogas
Shea Olein	AAK applications - Biogas – Biofuel
Bleaching earth	Biogas
Ashes	Fertilizers

# Shea meal as cow bedding



## **Niels Hedermann is an Arla Foods supplier with 1.200 cows**

- Niels has substituted straw with shea meal in the stables
- Advantages using shea
  - Less heat development = less CO<sub>2</sub>
  - Shea absorbs more liquid
  - Shea keeps the cows clean and dry
  - No flies
  - Porous surface
  - Shapes itself after the cows
  - Easy handling – the shea is distributed in the stable by the cows
  - Longer lasting
  - Used for biogas production
  - After the biogas, the shea is used as a fertilizer



# In 2024 AAK Aarhus will reduce the carbon footprint by 90%

ESG (Environmental, Social & Governance)

Significant CO<sub>2</sub> reduction, fundamental to reach overall AAK Science Based Target

## CO<sub>2</sub> Emission

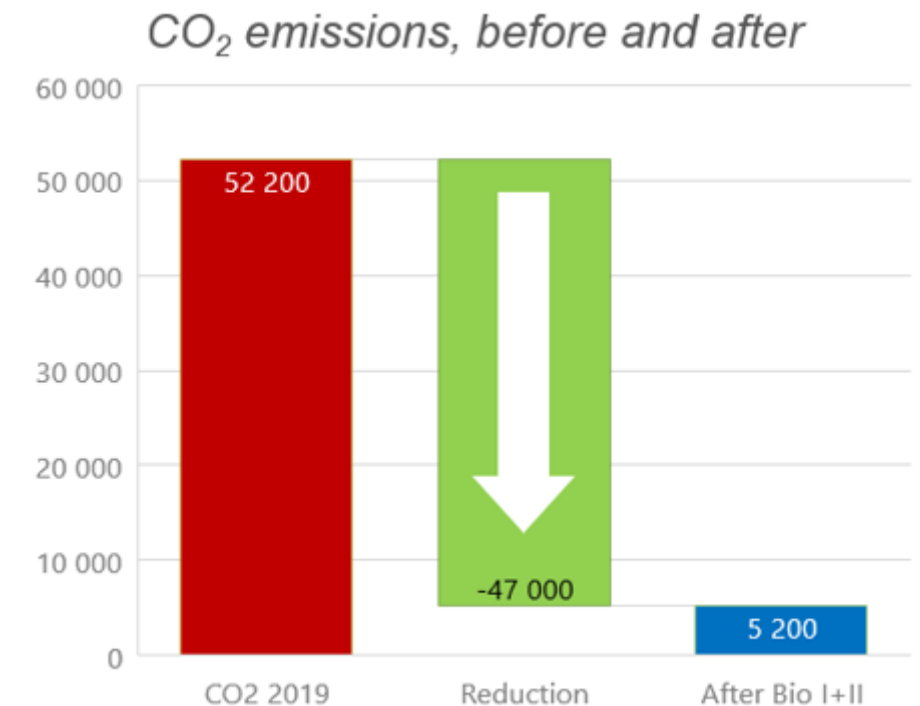
- Bio boiler I + II will reduce Site Aarhus CO<sub>2</sub> emission with 47.000 ton per year
  - 90% reduction Site Aarhus emission
  - ~16% reduction of AAK Scope I emissions globally
- The future CO<sub>2</sub> footprint on components produced in Aarhus will be reduced
- Possibility to reduce the last ~5.200 mt CO<sub>2</sub> emission with bio diesel in the future for 100% conversion

## Water consumption

- Unchanged from today

## Waste to landfill

- The ash after burning shea meal becomes a residual product
  - AAK has 3 customers who are interested in buying the ash for fertilizing



## Status 2023 – possible new applications?

Side stream	Projects
Shea meal	Reusable, compostable and edible plastic
Shea meal	Aviation- and marine fuels by HTL
Shea meal	Extracting minerals for fertilizers
Caritene	Aviation- and marine fuels by HTL
Caritene	Polymer
Caritene	Paint and wood protection
Shea Olein	Substitute linseed oil for paint and wood protection
Bleaching earth	Aviation- and marine fuels by HTL
Bleaching earth	Bricks and roof tiles
Sludge	Aviation- and marine fuels by HTL
CO2	Carbon Capture for Storing CO2
CO2	Biogen 2 – Power to X





There is more to come...

Other side streams	Possible applications
Wastewater	Ammonia water for smoke purification
Wastewater	May be mixed with food waste for biogas
Wastewater (excess heating)	For the district heating network
Heating	For our neighbours at the harbour
Power	For our neighbours at the harbour
Investigating claims	Kosher, halal, CO2 ?
AAK	S, NL, B, UK, USA, MX, CO, UY, JP, CN, PH, IN, RUS

What does a reduction in the carbon footprint mean for AAK and our customers?

Impact of the reduction in CO2 footprint
47.000 mt CO2 eq at scope I level at site Aarhus
The tax on CO2 emission will be reduced dramatically at site Aarhus
A scope I reduction at AAK is a scope III reduction at our customers
Reducing the CO2 Foot print is strategic for most companies
Helping customers achieve their strategic goals gives room for a closer cooperation



What if we look at the down stream savings of CO2 ?

Side stream	Mt per year	Substitutes	Kg CO2 eq per mt	Savings per year Mt CO2 eq
Fatty acids	18.000	Palm Oil	4.970*	89.460
F.A. RS 65	1.250	Palm Oil	4.970*	6.212
Shea Olein	40.000	Palm Oil	4.970*	198.800
Sludge	500	Palm Oil	4.970*	2.485
Waste Oil	150	Palm Oil	4.970*	745
Shea meal	90.000	Coal/fuel?	?	?
CO2	47.000	Palm Oil	4.970*	233.590

\*Schmidt and De Rosa 2019

**Customers buying the AAK side streams will save 1st generation raw materials which will have a positive impact**


Everything we do is about  
**Making Better Happen™**




# Backup slides

# Beiersdorf Climate Care Moisturizers made of recycled CO<sub>2</sub>



**Beiersdorf**

590.697 følgere  
2d • Redigeret • 


In April this year, we announced that we are combining skin care and carbon dioxide which otherwise do not have much in common: NIVEA MEN is breaking new ground as the first manufacturer of skin care products to use an ingredient derived from recycled CO<sub>2</sub>. To deep dive into the story of this disruptive project, [Dr. Manuela Köhler](#), Chief Scientist Feedstock & Formula Science, and [Jennifer Joan Williams](#), Global Brand Manager Sustainability, now tell in an exciting interview how the idea came about and how interdisciplinary teamwork ended up in a groundbreaking product launch.

With the innovative NIVEA MEN "Climate Care Moisturizer", which is on shelf now, we demonstrate again that it is possible to benefit both the skin and the environment. Together with our excellent cooperation partner [LanzaTech](#), one of the world's leading chemical companies in gas fermentation technologies and extracting ethanol from CO<sub>2</sub>, we could illustrate once again that we truly care beyond skin.

Discover more in our blog story:  
<https://lnkd.in/evsyHQSP>

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04/10/2022 • 8 delinger

# Beiersdorf Climate Care Moisturizers made of recycled CO<sub>2</sub>



[https://www.beiersdorf.com/beiersdorf-live/career-blog/blog-overview/2022/07/18-beiersdorf-launches-world-s-first-cosmetic-product-with-recycled-co2?utm\\_source=LinkedIn&utm\\_campaign=brands&utm\\_medium=social&utm\\_content=story](https://www.beiersdorf.com/beiersdorf-live/career-blog/blog-overview/2022/07/18-beiersdorf-launches-world-s-first-cosmetic-product-with-recycled-co2?utm_source=LinkedIn&utm_campaign=brands&utm_medium=social&utm_content=story)