

Technology Innovations and Business Models for Valorisation of Industrial Waste Biomass in Sparsely Located Enterprises

<https://symbioma.eu>



Northern Periphery and
Arctic Programme
2014–2020



EUROPEAN UNION

Investing in your future
European Regional Development Fund

Partners



Core partners

- ☐ Centria University of Applied Sciences, FI
- ☐ Atlantic Technological University, IE
- ☐ Norwegian Institute of Bioeconomy, NO
- ☐ Luleå University of Technology, SWE
- ☐ Bottenvikens Bryggeri Ab, SWE
- ☐ Hermanni Winery Ltd, FI

Associated partners

- ☐ Kokkolanseudun Kehitys Oy, FI
- ☐ Donegal Aquaculture Services Ltd, IE
- ☐ Clonarn Clover Ltd, IE
- ☐ Donegal Brewing Company Ltd, IE
- ☐ LTU Business AB, SWE
- ☐ Almi Nord, SWE
- ☐ Arctic Business Incubator, SWE
- ☐ Finnish Food and Drink Industries Federation, FI
- ☐ Tromspotet As, NO

Objectives

- ☐ To establish viable multidisciplinary Circular Economy related Technology Innovation Platform (TIP) in NPA region to boost eco-innovations in SMEs
- ☐ To develop service portfolio
- ☐ Train stakeholders on how to promote circular economy opportunities and SYMBIOMA Technology Innovation Platform services

Technology Innovation Platform

- provide with inspirations
- provide with methodology and tools to develop business
- provide with knowledge, technological know-how and access to pilot infrastructure
- matchmake with technology providers and potential new products users

centria
University of Applied Sciences

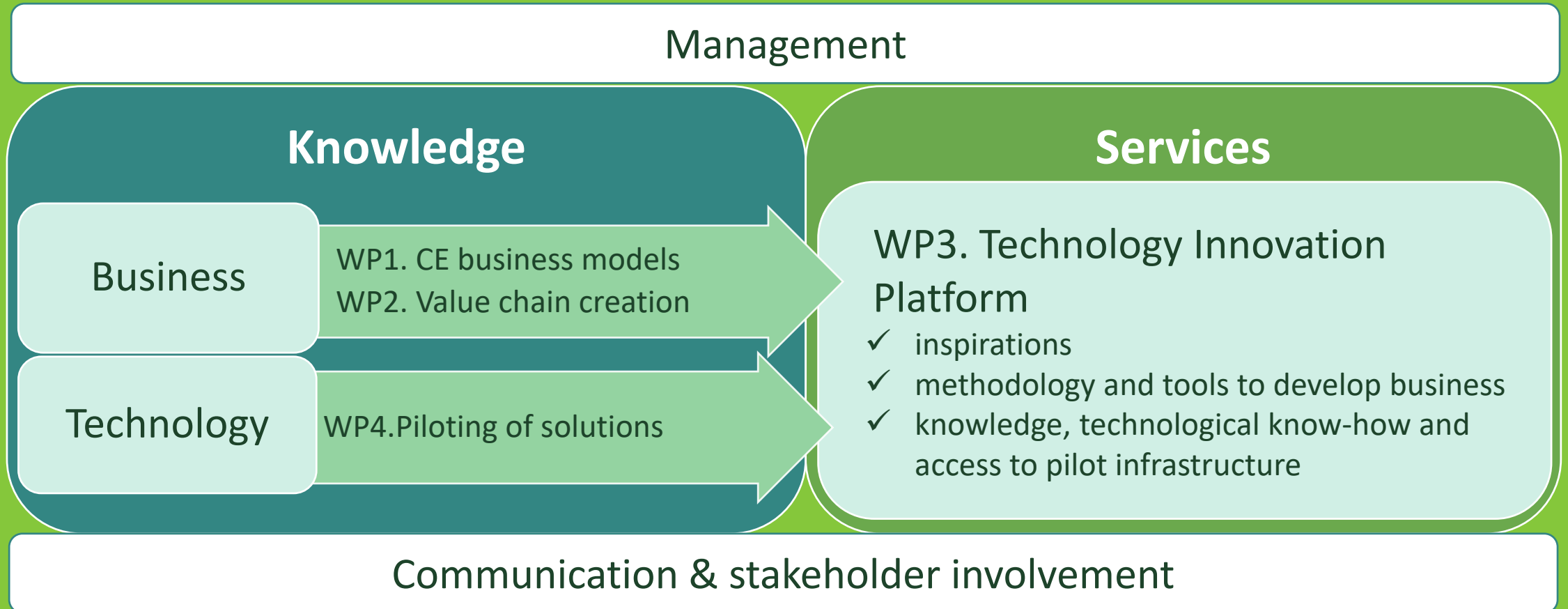
 **NIBIO**
NORSK INSTITUTT FOR
BIOØKONOMI

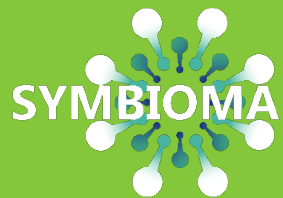
 **LULEÅ**
TEKNISKA
UNIVERSITET

 **Ollscoil**
Teicneolaíochta
an Atlantaigh

Atlantic
Technological
University

Implementation





secure | <http://symbioma.eu>



[Home](#)

[About](#)

[Services](#) ▾

[Case Studies](#)

[Webinars](#)

[Partners](#)

[Contact Us](#)

Services

SYMBIOMA services has been built to link companies with service providers.

By clicking on the link below you will be asked a series of questions that will help us pair you with service providers that best suit your needs.



**Circular economy
business development
& consulting**



**Technology
development**



Technology knowledge



Analysis services

One-stop shop

symbioma@outlook.com



**Northern Periphery and
Arctic Programme**
2014–2020



EUROPEAN UNION

Investing in your future
European Regional Development Fund

Circular economy business development and consulting

Why?

The way we use raw materials, manufacture, consume and dispose of our products and side-streams today has a tremendous influence on the future of our planet and the people living in it. Today's, short-term and usually opportunistic, economic profits can be tomorrow's losses.

What?

We need to rethink and redesign products and processes to better utilise virgin raw materials, use reclaimed materials, reduce process pollution, and eliminate waste in all forms – emissions to air, solid waste, wastewater, and energy.

Successful implementation of circular economy principles in business creates sustainable economic growth, reduces the environmental impact of economic activities, and assures prosperity and wellbeing for today and future generations.

Who?

SMEs in three industry segments: brewery, potatoes, and fishery with a focus in the Northern Periphery and Arctic regions.

How?

We created a roadmap for you with several practical tools and information to assist you in creating a circular economy business case that is suitable for your company.

You can create your specific roadmap using the practical tools we provide or take SYMBIOMA partners to your journey and we develop it in collaboration. Contact symbioma@outlook.com for further discussion.



Circular economy business development and consulting roadmap

Circular economy business development & consulting

Roadmap approach

Phase 0. Trigger

Phase 1: Analysis of current business model and resource streams

Phase 2: Circular Business model and ecosystem design

Phase 3: Technology and ecosystem integration

Phase 4: Scale-up the circular business model

A list of some of the supports available

Consulting

Consult and facilitate roadmap development and relevant activities within each phase for its implementation

Identify stakeholders

Identify stakeholders for new business ecosystem. Knowhow of technologies, technology providers, local industries, their processes, and products can reduce time spent to identify good ideas and stakeholders for their implementation.

Facilitate ideation sessions

Facilitate internal and external ideation sessions

Applications

Identify and prepare applications for public funding

Not only a list of the phases but also a Menu for each phase

SYMBIOMA partners can:

Roadmap

Circular economy business development and consulting
Click on the icons below to see each phase.



Phase 0

Initiation or trigger circular BM development



Phase 1

Analysis of current business model and resource streams



Phase 2

Circular Business model and ecosystem design



Phase 3

Technology and ecosystem integration



Phase 4

Scale-up the circular business model

Potato Product Manufacturing

Circular economy cases and their business models in potato industry

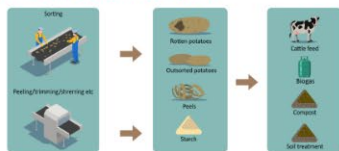
According to FAO/STAT, potato is one of the most important agricultural crops for human consumption and high amount is produced worldwide every year. In particular, the EU produced about 60.7 million tons of potatoes¹.

Here you can learn more about the process, find the case studies and find out the challenges and opportunities of the by-product valorisation.

Potato peel is currently considered a zero-value or rather low value by-product, which occurs in large amounts after industrial potato processing and can range from 15 to 40% of initial product mass, depending on the various peeling or processing methods. Food waste utilization causes great concern in food industry in Europe and many scientific works and projects on the topic offer solutions and original approaches towards possible valorisation of potato peels (Dępień and Gasiuńska, 2016).

Below you can see the visual processing of the potatoes, generated side streams and their common use.

POTATO PROCESSING AND GENERATED BY-PRODUCTS



Case studies in NPA region, local affects and potential of by- product valorisation

From the documents below you can learn more about the regional characteristics of the potato industry in NPA regions of Finland, Sweden, Norway and Ireland. Regional offer, services, historical developments and existing collaborations affect the industries and the presented case studies give a representative illustration of the conditions.

Finland

Sweden

Norway

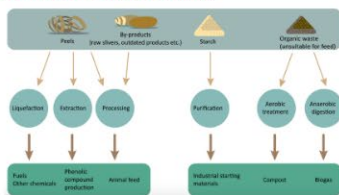
Ireland

Conclusions, challenges and possibilities

The NPA region of the partner countries offers rather good conditions for potato farming and further production of potato products. The utilization of by-products and waste streams from potato production, and with it the existing business models, vary a lot from country to country. Some examples of the potential uses of potato by-products are pictured below. The by-products are highlighted in grey, potential products are highlighted in green. The processes which the waste or by-products must undertake to be valorised are highlighted in light blue.

Finland has some well-established valorisation routes (e.g. production of potato flakes). Overall, logistics issues, small waste volumes and short shelf life of waste and by-products are common challenges in the potato industry. In addition, the potato industry is highly regulated, thus the unique challenge is restrictions due to potato diseases which may connect with soil and related machinery and equipment.

POTENTIAL VALORISATION OF POTATO BY-PRODUCTS



As in the beverage industry, the potato processors share an awareness of underutilized streams, and show a willingness to explore and establish collaborations with other companies and governmental institutions as well as municipalities. Centralised support and regulations have shown great success in certain areas. More actions are required from all partner countries to drive the development towards circular business models. Challenges and possibilities are listed in table below.

Challenges

- Logistics: high water content, shelf life, long distance, small volumes.
- Restrictions due to potato diseases, waste classification.
- Need for additional technology.

Opportunities

- Utilization of valuable side streams, extraction, potato starch.
- On-site valorisation.
- Collaboration with other partners and municipality.

Utilization of waste and side streams from the potato and starch industry

Side streams from potato industries - quality and quantity

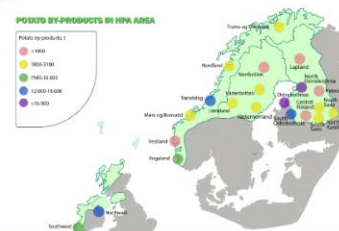
POTATO BY-PRODUCT POSSIBILITIES

Example of valorisation from by-products:



...that can be used e.g. in:

Map of main by-products from Potatoes



Technology Knowledge

Potato Product Manufacturing

Circular economy cases and their business models in potato industry exploring:

- Potato processing and generated by-products
- Case studies in NPA region, local affects and potential of by- product valorisation: [Finland](#), [Sweden](#), [Norway](#) and [Ireland](#).
- Conclusions, challenges and possibilities
- Potential valorisation of potato by-products
- [Utilization of waste and side streams from the potato and starch industry](#)
- [Side streams from potato industries - quality and quantity](#)
- Potato by-product possibilities
- Map of main by-products from Potatoes

Technology Development



Technology scouting



Energy and Material Audits



Technology Pilots



Laboratory Research



Sustainability Analysis

Analysis of raw materials and products

- ☐ Analyses of chemical composition
- ☐ Evaluation of suitability of secondary raw materials for further production processes
- ☐ Analyses of new products that might be economically important and marketable
- ☐ Developing suitable methods for quality control (raw materials, process intermediates, final products, etc.).



SYMBIOMA Analysis Services

DOWNLOAD

One-stop shop symbioma@outlook.com

Cases



- ☐ Bakery products: spent grains
- ☐ Mealworm farming: spent grains from brewery and heat from datacentre
- ☐ Hops, algae, fertilisers in one biorefinery: heat, CO₂ and waste water
- ☐ Cosmetics: spent grain fractions

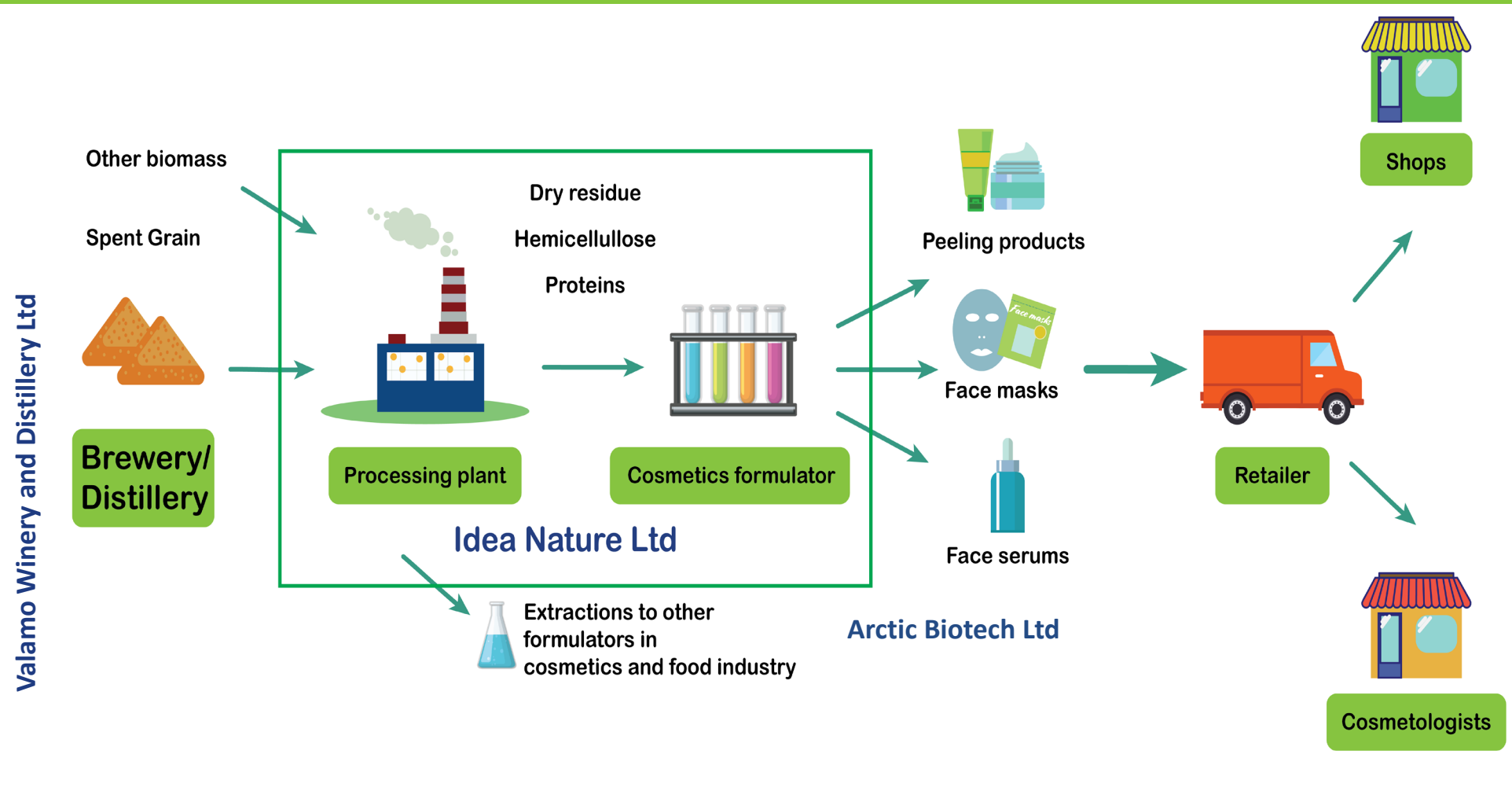


- ☐ Biorefinery: crab waste processing
- ☐ Solid surface countertop: oyster shell valorisation



- ☐ Potato waste utilization as a biostimulant
- ☐ Alcohol distillation

Case 1 - Ingredients for cosmetics and food



Case 2 - Microwave-assisted Crab Processing Waste Biorefinery

SYMBIOMA Proposed
Valorisation Route

Microwave-assisted Crab Processing Waste Biorefinery

Products

Chitin/Chitosan
1.5t, €300K to €900k



Calcium Lactate
170t, €200K to €350k



Carotenoids
100kg, €30k to €100k



Protein Conc. Powder
5t, €15k to €25k



Liquid Soil Conditioner
81t, €8k to €16k



Total Income €550 to 1392K

144 tons a year



Microwave-assisted Biorefinery Processor

Investment: €750,000

Depreciation value @20Y

Profit

❖ Year-1: €139K, rate 34%

❖ Year-4: €565k, rate 94%

Input

Acetone
7.5t, €8K

KOH
81t, €46K

Lactic Acid
141t, €141K

Personnel
& others
€120K

Space rent
€15K

Total Expense €375K

Case 2 - Microwave-assisted Crab Processing Waste Biorefinery

Mid-term Valorisation
Networks to use
Industry Side-streams
and Wastes

De Brun Iasc Teo

Side-stream & waste accumulator, and cluster responsible.

Kerry Coast
Shellfish

Spa Seafoods

Glenbeigh
Shellfish

Kenmare Bay
Seafoods

Organic Fertiliser Production

International Fertiliser Manufacturing Co
based in Cork

Innovative Use Products in Combination with Coarse
Wool unsuitable for the Clothing Industry

Various Sheep and Wool farmers in Kerry
Region, Ireland

Research Support on Various Aspects of Technology, Circular Economy and Business Considerations



Ollscoil
Teicneolaíochta
an Atlantaigh

Atlantic
Technological
University



MTU
Ollscoil Teicneolaíochta na Mumhan
Munster Technological University



UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh



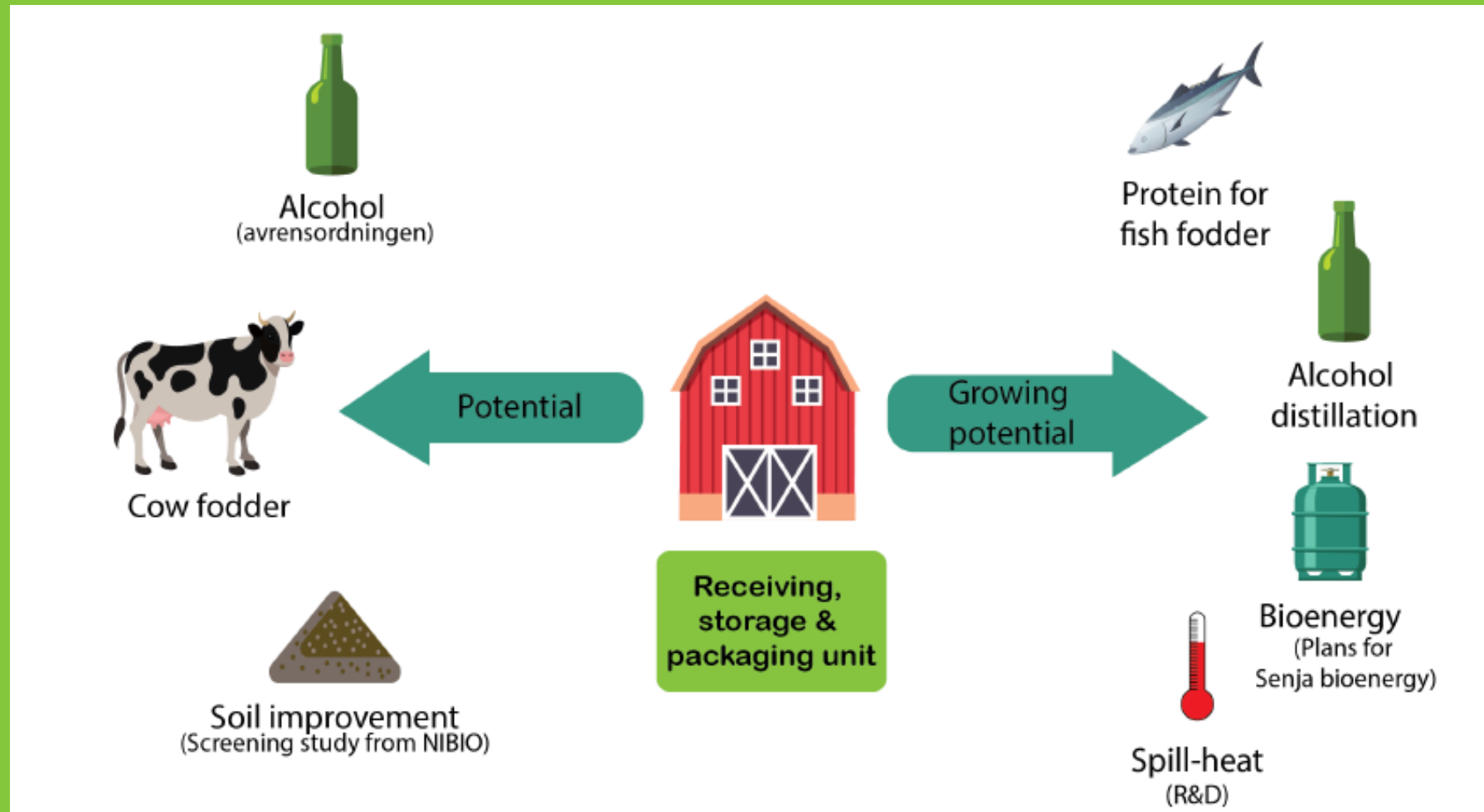
Northern Periphery and
Arctic Programme
2014-2020



EUROPEAN UNION

Investing in your future
European Regional Development Fund

Case 3 - Waste utilization of potatoes and other vegetables



Results

Meet & work together



>20 Overall project staff
3 Internal face-to-face meetings



>30 Virtual meetings

Train

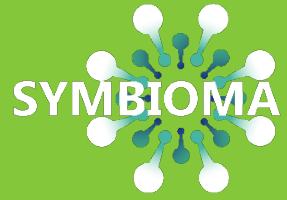


3 International webinars
1 Training for BSO
National meetings

Communicate & network



>300 SMEs
10 Sectorial agencies
9 Research infrastructure providers
10 Universities (including partners)
>40 Business support organisations
2 Big companies
2 Local public authority
4 Education/training centres



Great project atmosphere and nice memories!



Thank you for attention!

