Kemi-Tornio region and Lapland: Arctic Hub of industrial symbiosis - Arctic Industry and Circular Economy Cluster
Digipolis - Kemi Technology Park: development company and cluster organisation

- **Digipolis Kemi**, established in 1993
- Owned by the cities of Kemi & Tornio, the University of Oulu and municipalities of Simo, Keminmaa and Tervola
- 50 companies, 500 employees in the technology park – network of more than 160 industrial service businesses in Lapland, more elsewhere
- Development actions and services:
  - Team of 10 persons + service providers
  - Innovative environment especially for industrial service businesses
  - New openings: 2008-2016 Expertise on Arctic conditions & Industry, novel wood constructions: CLT development platform
  - 2012- Ecosystem of the Arctic Industry - Innovation Platform
  - 2014- Arctic Industry and Circular Economy Cluster management
  - 2016- Digipolis chosen as key actor in national circular economy roadmap and implementation of the key project activities
- Start-Up, Business Incubation, Business Growth, Invest In services
- 21 ongoing development projects, 584 companies and organisations
Nordic Industries

Story of Natural Resources Refining

- Global Markets
- Good Connections
- Arctic Solutions
- Cleantech Solutions
- 5 Bio Refineries
- 32 Sawmills
- 16 Mines
- 5 Metal Refineries
- 2 Aluminium Smelters
- 1 LNG Refinery
- 2 Chemical Plants
What is the growth potential of industries related to the Arctic business of Lapland?

- Forest industry
- Metal industry
- Mining and industrial services as well as environmental business
- Tourism
- Reindeer farming
- Natural products
- Local food
- Green construction
- Arctic testing
- Biofuels
- Mines

Source: The Arctic specialisation programme 2013, page 24
Kemi-Tornio’s circular economy innovation platform

- Worlds northernmost hub of bio-, mining -, metal industry and services
- 1,7 Mt of by-products and residues (without waste rock)
- Responsible for 80% of Lapland’s industrial production, with over 5 billion EUR of exports annually (7-8 % of the total export value of Finland)
- Industrial symbiosis estimated at 700 million EUR annually
FURTHERING THE CIRCULAR ECONOMY AND BIOECONOMY IN LAPLAND IN 2012–2016

Where did it all begin?
11/2012
The key players of Kemi–Tornio industries and industrial services were interviewed in the side-stream evaluation of needs.

Lapland EU’s model region
7/2014
European Commission’s selection: Lapland EU’s model region in sustainable processing of natural resources

The FISS model
10/2014
FISS workshops, Finland benchmarking, business potential

Recognition for work
21 September 2016
Work carried out by the Kemi–Tornio region & Lapland and Digipolis and partners. Key project of Sitra's Finnish circular economy action plan

Development of operations
2014
Side-stream recognition tool development together with industries across sectoral boundaries. Development of measures furthering the systematic process and taking the matter forward

Expansion of operations
2015-2016
Entire Lapland’s big industries involved in development. Synergies between mines and the processing industry, and entry of new service businesses. Expanding the process to northern Finland, northern Sweden and northern Norway.

Prioritisation of development tasks
4/2013
Prioritisation of development tasks with key players of industries and industrial services

2017
Implementation of Sitra’s action plan

4 side-stream recognition, total volume:
27
1.4 million tonnes annually = Over 100 trucks daily

DIGIPOLIS
EU
LAPIN AMK
Leverage from theEU 2014-2020
1 700 000 t of Industrial by-products

Stream | Quantity t/a
---|---
Ferro-Chrome Slag | 650000
Steel Slag | 400000
Lumpy rock | 220000
Sawmill by-products | 170000
Calcite + Filter Dust | 60000
Burnt Lime/Slaked Lime | 30000
Fly Ash | 22000
Fiber Clay | 20000
Water Purification Precipitate (Steel) | 20000
Dolomite - Bricks | 20000
Clacite | 15000
Biosludge | 12000
Ferro-Chrome Underflow | 10000
Debarking Waste | 9000
Fly Ash | 7000
Green Liquor Dregs | 6300
Filter Dust (Lime) | 5000
Green Liquor Dregs | 5000
Bottom Ash | 4000
Fly Ash | 3000
Knot Reject | 2500
Bottom Ash | 2400
Burnt Lime | 2000
MgO-C Bricks | 2000
Bottom Ash | 1500

Classification

<table>
<thead>
<tr>
<th>Classification</th>
<th>Examples of utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supporting materials</td>
<td>Agriculture and road construction, concrete aggregate, mining areas</td>
</tr>
<tr>
<td>Bases</td>
<td>pH control, liming and soil amendments</td>
</tr>
<tr>
<td>Organic matter</td>
<td>Landscaping, combustion</td>
</tr>
<tr>
<td>Ashes</td>
<td>Agriculture and road construction, soil amendments, mine filling</td>
</tr>
<tr>
<td>Packing materials</td>
<td>Sealing layers of landfill sites</td>
</tr>
<tr>
<td>Symbiotic products</td>
<td>Multiple uses</td>
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</tbody>
</table>
Modern Cluster of Arctic industry –
Sustainable utilisation of the arctic natural resources

Model region to demonstrate EC new wave cluster policy:
• The region possesses the vast deposits of natural resources and pristine nature
• Lapland has potential to become one of the leading regions in the world in the sustainable exploitation of natural resources
• The region should focus on refining of Arctic natural resources in a socially and ecologically sustainable manner, combined with high value added generation from natural resources in the region
• Focus on to maintain the balance in the sustainable development
Modern Cluster of Arctic Industry

Sustainable utilisation of arctic natural resources
Opportunities and plans

Potential utilisation sites in Northern Finland area

• Infrastructure Projects (incl. landfills and recovery sites)
• Mining Projects
• Other industrial projects
• Other projects

Mine projects in Northern Finland

• The cooperation has started with mines that are different stages of the life cycle
• Applications examples: construction, landfills, mine fillings, neutralization etc.

Investment potential and job creation in Kemi-Tornio and Lapland

• 500 000 000 € in 14 different IS investment projects
• 400 new employees
• Kaidi (in Kemi) and Boreal Bioref (in Kemijärvi) biorefineries are CE and IS cases, total Investments 1,68 billion €
• 1300 new employees in potentially circular value chains - ecosystems

Plans

• Making pilots, scale-ups and investments to happen, process of cluster funding
• Tighter cooperation and benchmarking through Nordic & European networks
• More resources through strategic alliance with Lapland UAS and growing capacity
• Modern cluster approach and cooperation
• Efficient development/funding tools
• Lapland UAS: CE curricula starts on 2018
• Excess heat utilisation
SAT and it’s use - Where “the SAT” can be used?

- At mill and industry integrate level:
  - to evaluate the single investment and/or mill site operation chain sustainability, including supply chain management’s sustainability
- At corporate level:
  - to evaluate sustainability of company’s mill sites (helps when investment money is shared)
  - to give valuable information for greenfield mill investment
  - to give valuable information when you want to buy the existing factory
Digipolis key actor in Finland’s Circular Economy roadmap

Technical loops

Competitive advantage from the decreased use of virgin raw materials and long lifecycle of materials and products.

Key projects:
- The Arctic industries ecosystem and Kemi-Tornio circular economy innovation platform. (*Digipolis Oy*)
- Circular economy demo plant for waste electrical and electronic equipment. (*Technology Industries of Finland*)
The Kemi-Tornio region in northern Finland has established an Arctic industry and circular economy cluster to enhance industrial symbiosis and strengthen the development of a holistic bioeconomy in the region. Via extensive analysis of the by-products and residue streams from companies in the region, value-added products are now being produced by combining and rethinking several by-product and residue streams. Examples include silvicultural thinning practices, bioenergy from forest residues with the possibility for future for largescale biofuel production, as well as two plants that enable recovery of metals from slags from the steel and ferrochrome production in the region.
Thank You!

Interested in to do co-operation?

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Leverage from the EU 2014–2020