Kemi-Tornio region and Lapland: Arctic Hub of industrial symbiosis - Arctic Industry and Circular Economy Cluster

REMIX Kick-off Meeting
Smart and Green Mining Regions of EU
Lapland UAS, Kemi 4.4.2017

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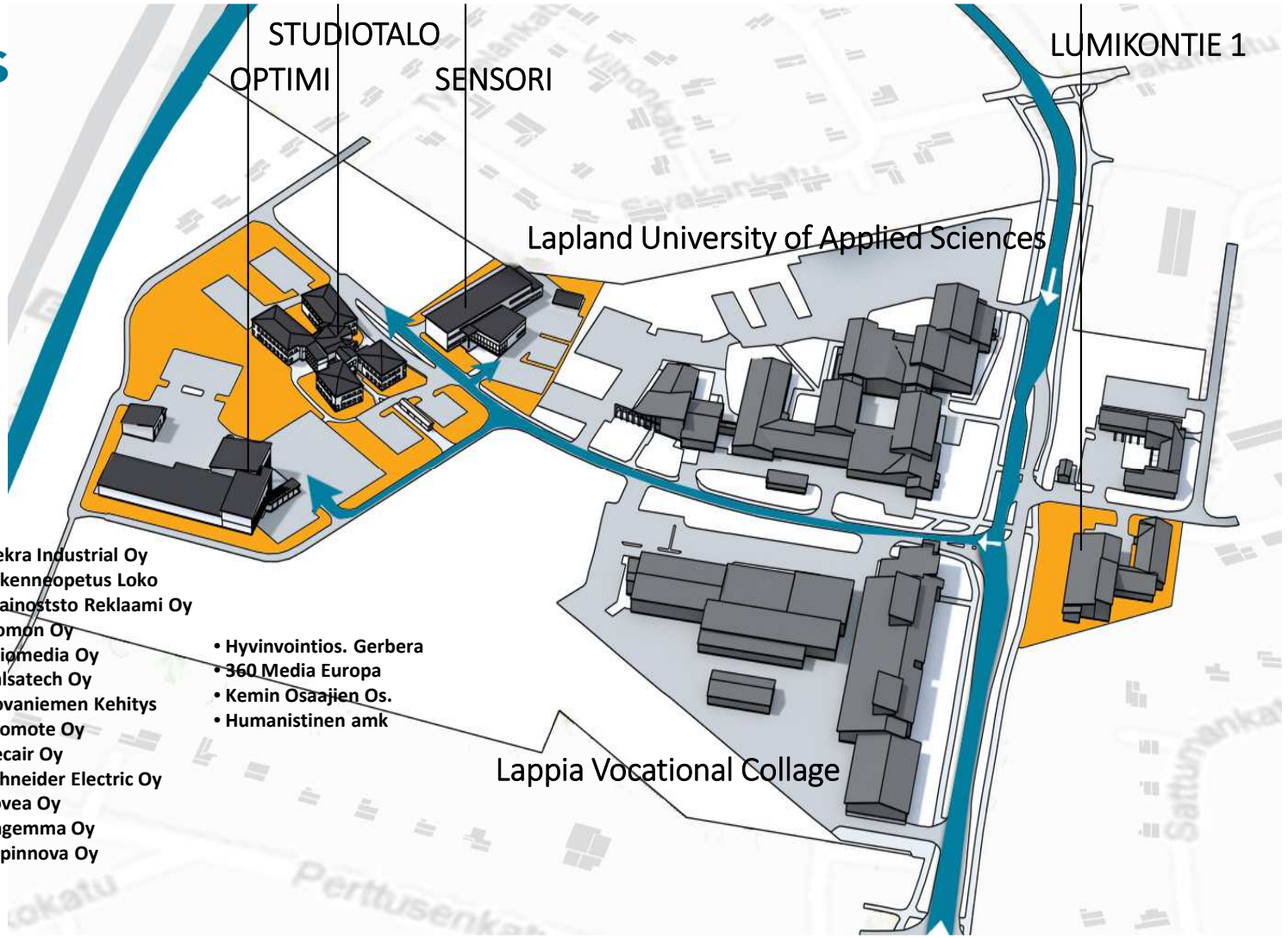
- Relacom Finland Oy
- TDR Finland Oy
- ISS Palvelut Oy
- Valmet Automation Oy
- Metso Flow Control Oy
- Endress+Hauser Oy
- Metsä Group
- Eltel Networks Pohj. Oy
- Meri-Lapin Rätinki Oy
- Kemin Teollisuuskylä Oy
- Meri-Lapin kehittämiskeskus
- Ruokapaikka Kasari
- YLE – Radio Kemi
- Ahma Ympäristö Oy
- Aino Health Management Oy
- Andritz Oy
- Coronaria Kuntoutus Oy
- Atlas Copco
- e-Devel.fi Ky
- Fujitsu Finland Oy
- Ins.tsto 3D-Hacklin
- Ins.tsto Ases Oy
- Isoworks Oy
- Ixonos Finland Oy
- Kemin Digipolis Oy
- Krans Consulting Oy
- Karolan Korpomodifo
- Sähköpooli Oy
- TKH Logistics Oy
- Eventum Oy



- Dekra Industrial Oy
- Liikenneopetus Loko
- Mainoststo Reklaami Oy
- Nomon Oy
- Oliomedia Oy
- Palsatech Oy
- Rovaniemen Kehitys
- Promote Oy
- Recair Oy
- Schneider Electric Oy
- Sovea Oy
- Engemma Oy
- Lapinnova Oy

- Hyvinvointios. Gerbera
- 360 Media Europa
- Kemin Osaajien Os.
- Humanistinen amk

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

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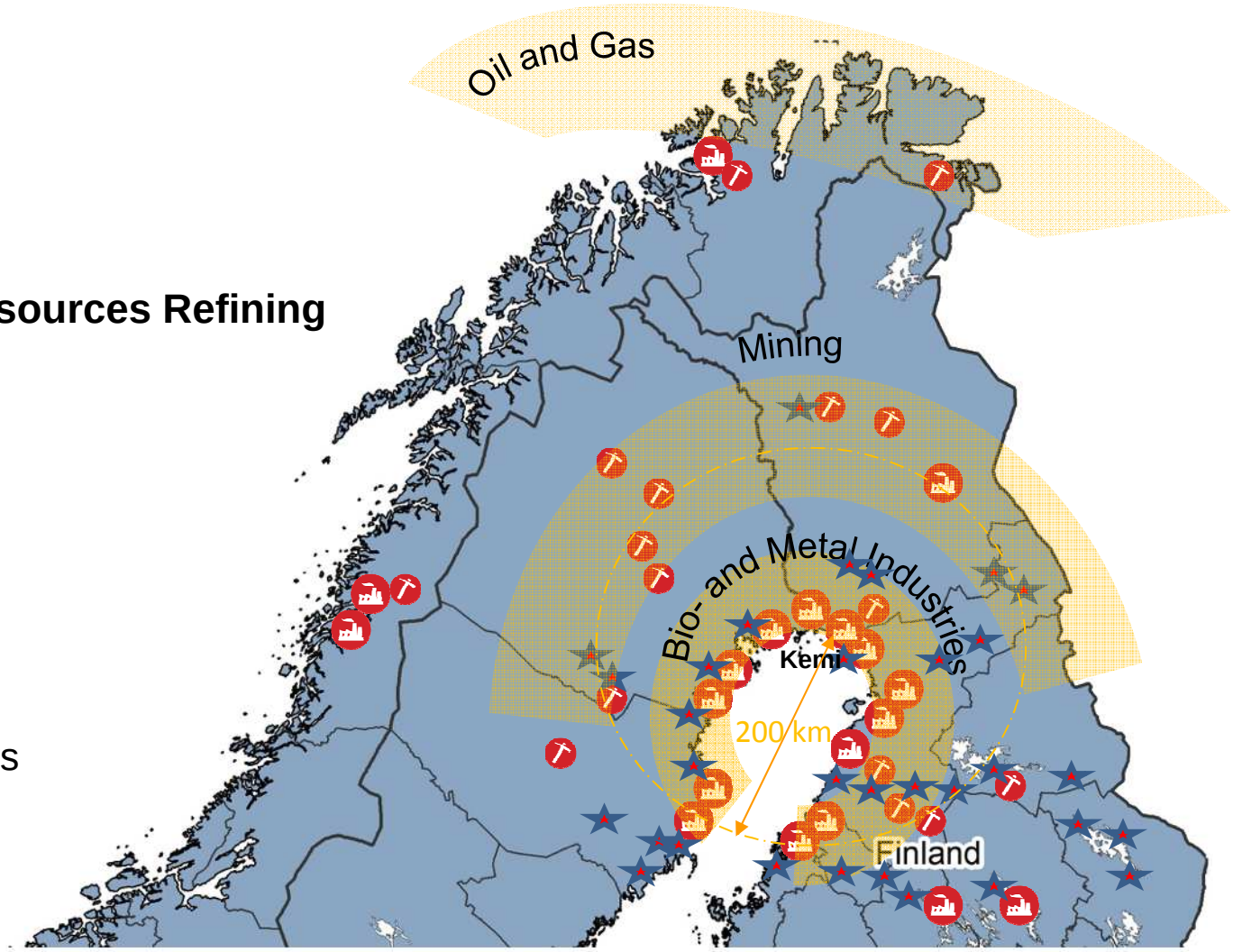
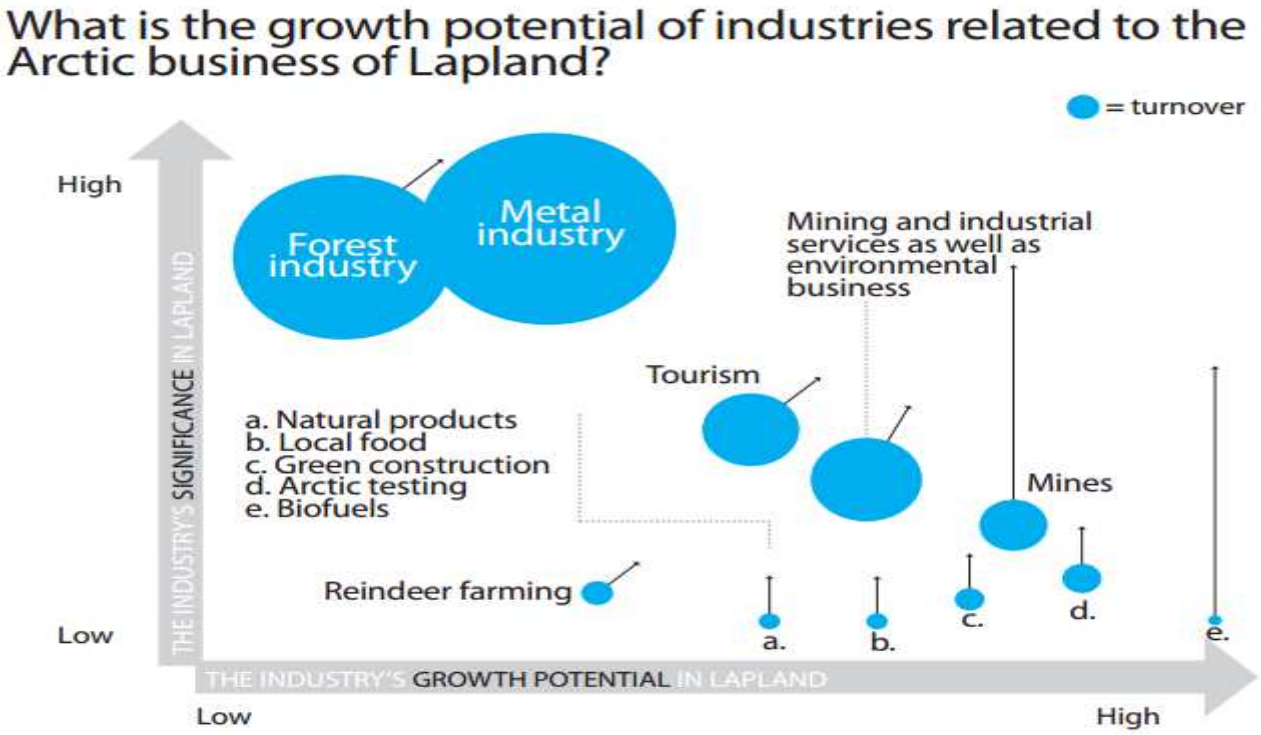
Nordic Industries

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



LAPLAND IS THE REGION OF BIOECONOMY



Source: The Arctic specialisation programme 2013, page 24

ARCTIC INNOVATIONS

ECOSYSTEM OF THE ARCTIC INDUSTRY

Kemi-Tornio's circular economy innovation platform

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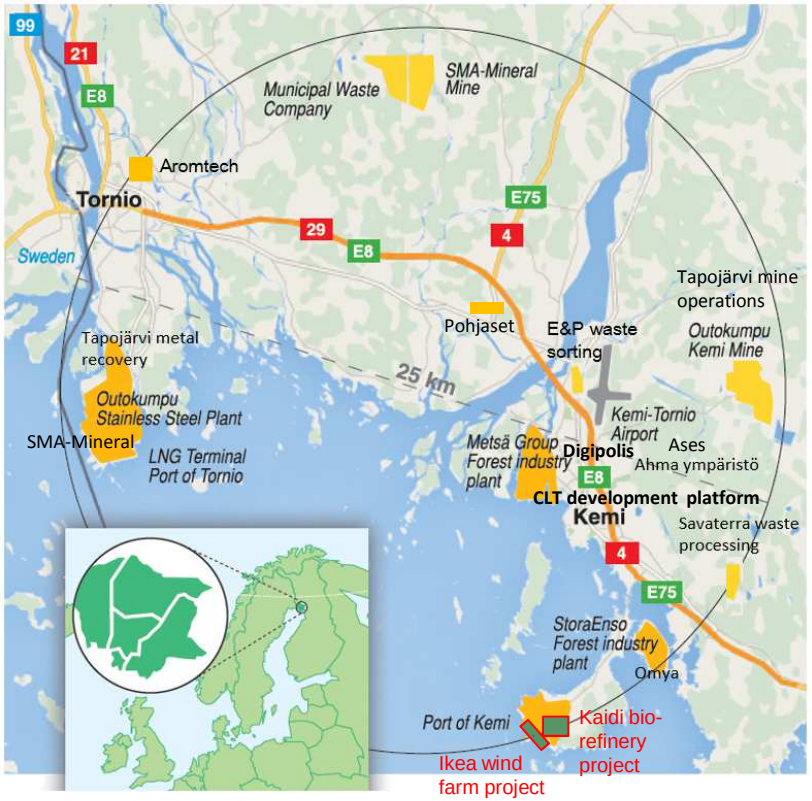
- Worlds northernmost hub of bio-, mining -, metal industry and services
- 1,7 Mt of by-products and residues (without waste rock)
- Responsible for 80% of Lapland's industrial production, with over 5 billion EUR of exports annually (7-8 % of the total export value of Finland)
- Industrial symbiosis 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

Prioritisation of development tasks

4/2013

Priorisation of development tasks with key players of industries and industrial services

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

27 side-stream recognition, total volume:

1.4 million tonnes annually = Over 100 trucks daily

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.

2017

Implementation of Sitra's action plan

Industry byproducts utilised

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European Union

Leverage from the EU 2014–2020

LAPIN AMK

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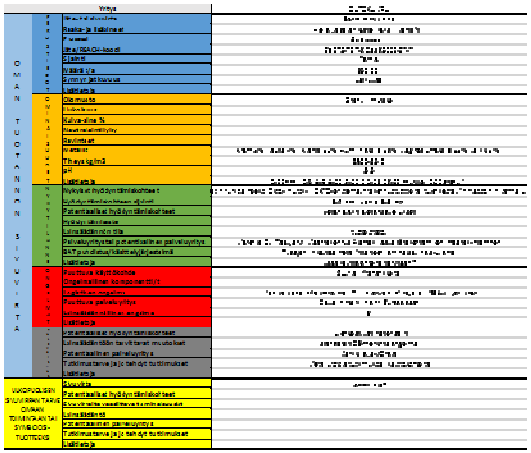
1 700 000 t of Industrial by-products

Identification

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 Liqour Dregs	6300
Filter Dust (Lime)	5000
Green Liqour Dregs	5000
Bottom Ash	4000
Fly Ash	3000
Knot Reject	2500
Bottom Ash	2400
Burnt Lime	2000
MgO-C Bricks	2000
Bottom Ash	1500

Characterisation



Recognition

Classification

Classification	Examples of utilization
Supporting materials	Agriculture and road construction, concrete aggregate, mining areas
Bases	pH control, liming and soil amendments
Organic matter	Landscaping, combustion
Ashes	Agriculture and road construction, soil amendments, mine filling
Packing materials	Sealing layers of landfill sites
Symbiotic products	Multiple uses

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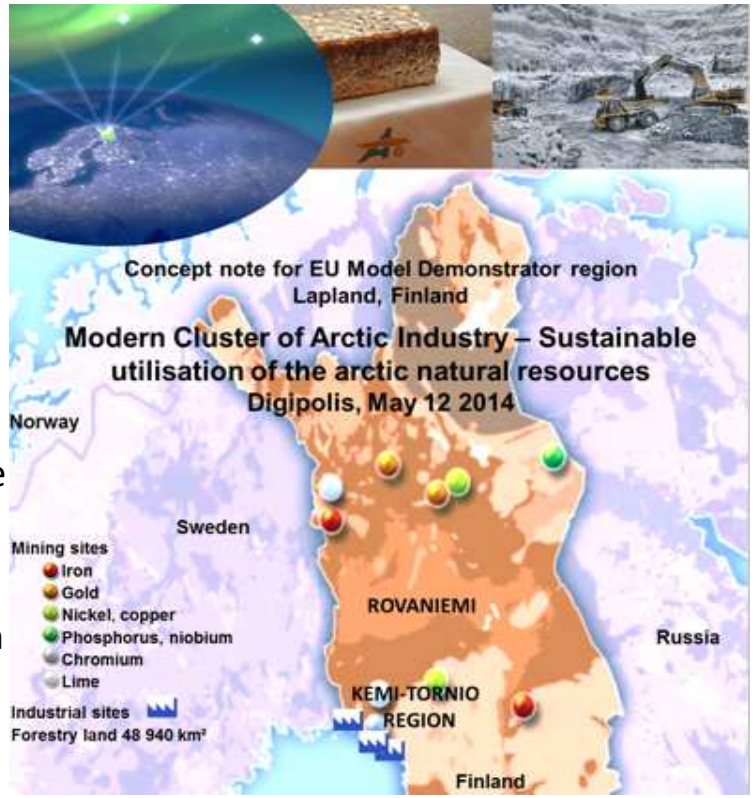
Modern Cluster of Arctic industry – Sustainable utilisation of the arctic natural resources

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

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metso
AngloAmerican
SPINVERSE
Manga Lng
KAIDI
EIGENOR
aromtech
sma mineral
AGNICO EAGLE
FINLAND
REPOLAR
storaenso
Caverion
ASES
KEMIN SATAMA
MetsäFibre
outokumpu
SAVATERRA
Kemi Shipping
TAPOJÄRVI
KEITELE
group
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Hannukainen Mining
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European Regional Development Fund
LAPLAND
Above Ordinary
Sustainable utilisation of arctic natural resources

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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

SITRA

Digipolis key actor in Finland's Circular Economy roadmap

THIS IS HOW WE BUILD CIRCULAR ECONOMY IN FINLAND

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)*

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

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NORDIC COUNCIL OF MINISTERS' SUSTAINABLE NORDIC BIOECONOMY CASE IN CIRCULATE CATEGORY

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!

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Interested in to do co-operation?

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