

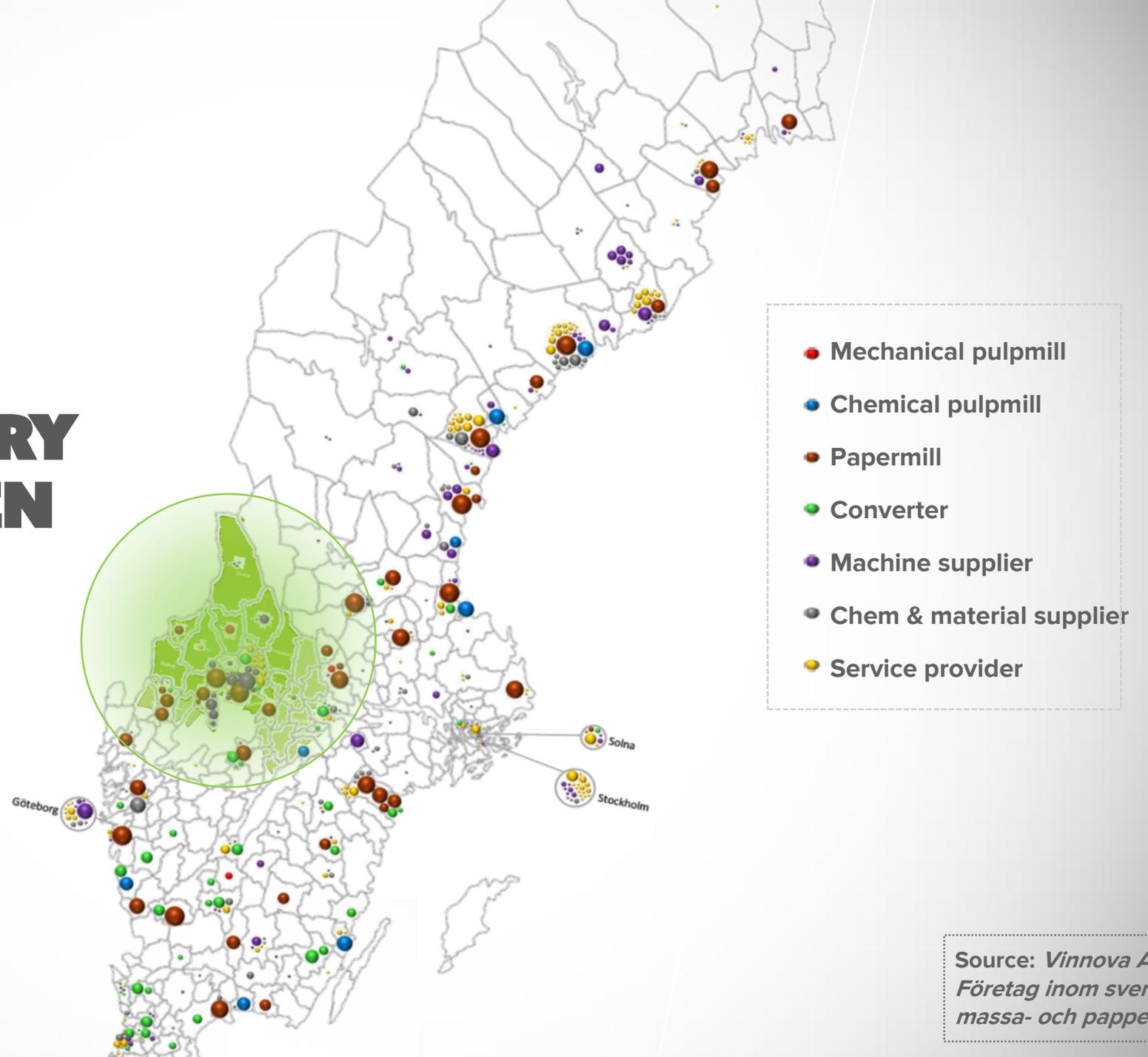
An aerial photograph of a river valley in Värmland, Sweden. The landscape is dominated by dense, dark green coniferous forests covering rolling hills and valleys. A wide, calm river winds through the center of the valley, reflecting the sky. In the lower-left quadrant, a small settlement with several buildings and a parking area is visible. The background shows distant, hazy mountain ranges under a clear sky.

Testbeds in Värmland as meeting places for researchers and regional firms

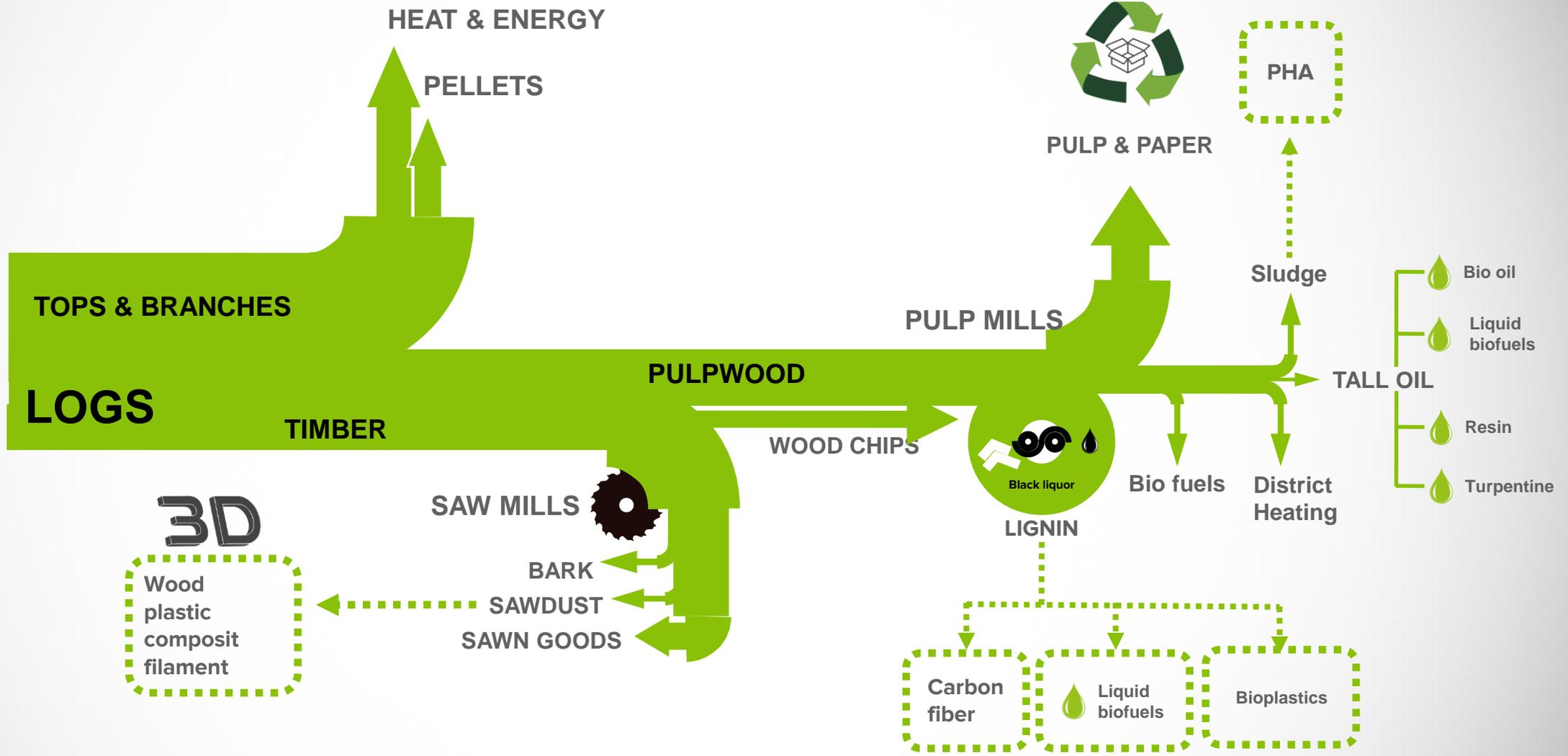
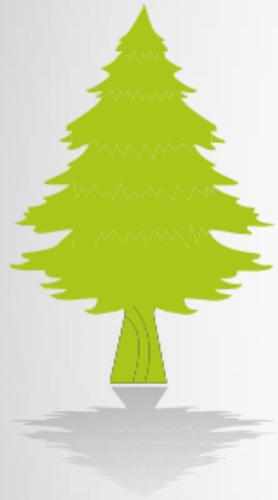
Per Myhrén
Project Manager, Paper Province



FOREST INDUSTRY HUBS IN SWEDEN



Source: *Vinnova Analys – Företag inom svensk massa- och pappersindustri*



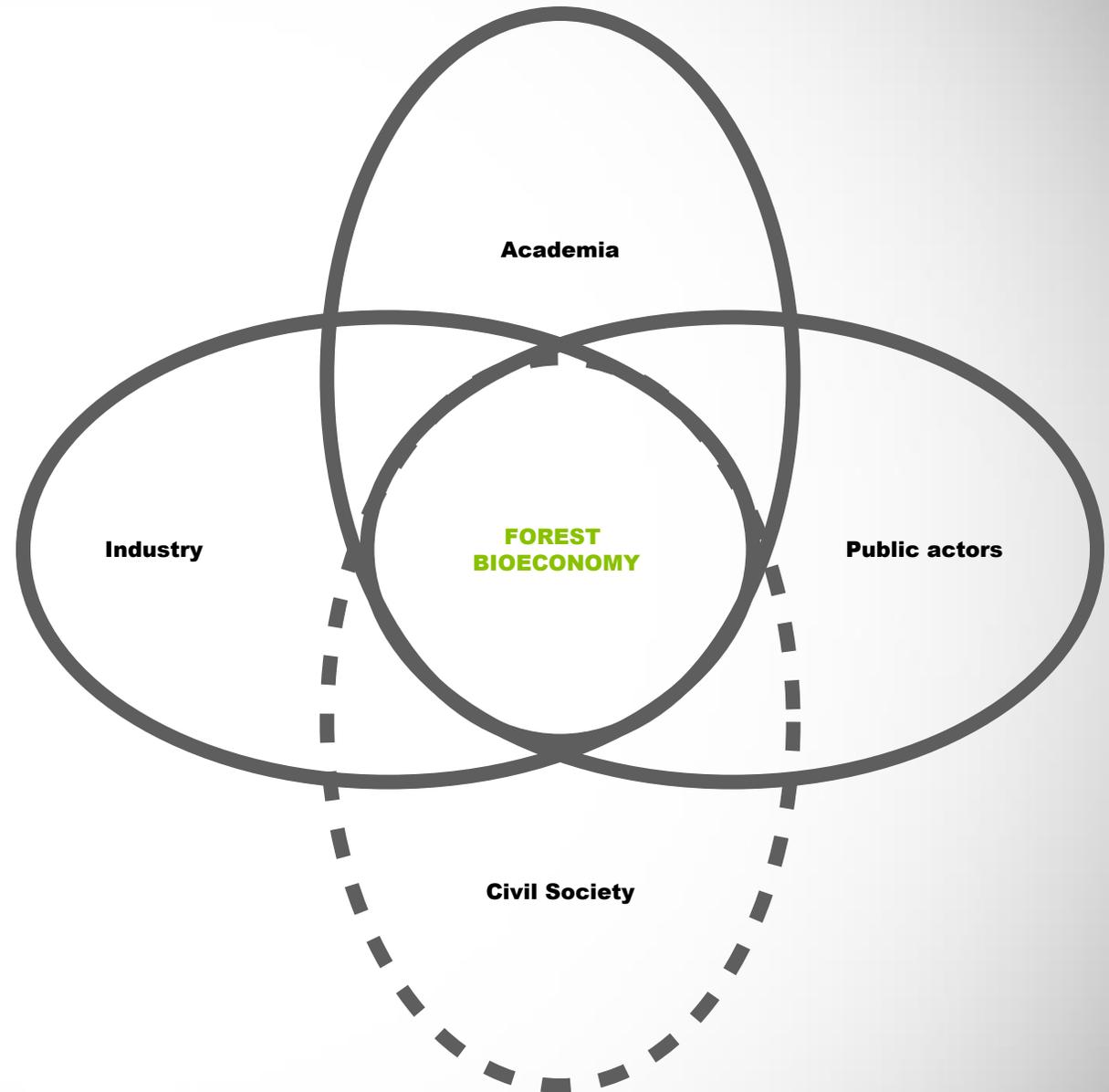
PAPER PROVINCE -

REALIZING THE FOREST BASED BIOECONOMY

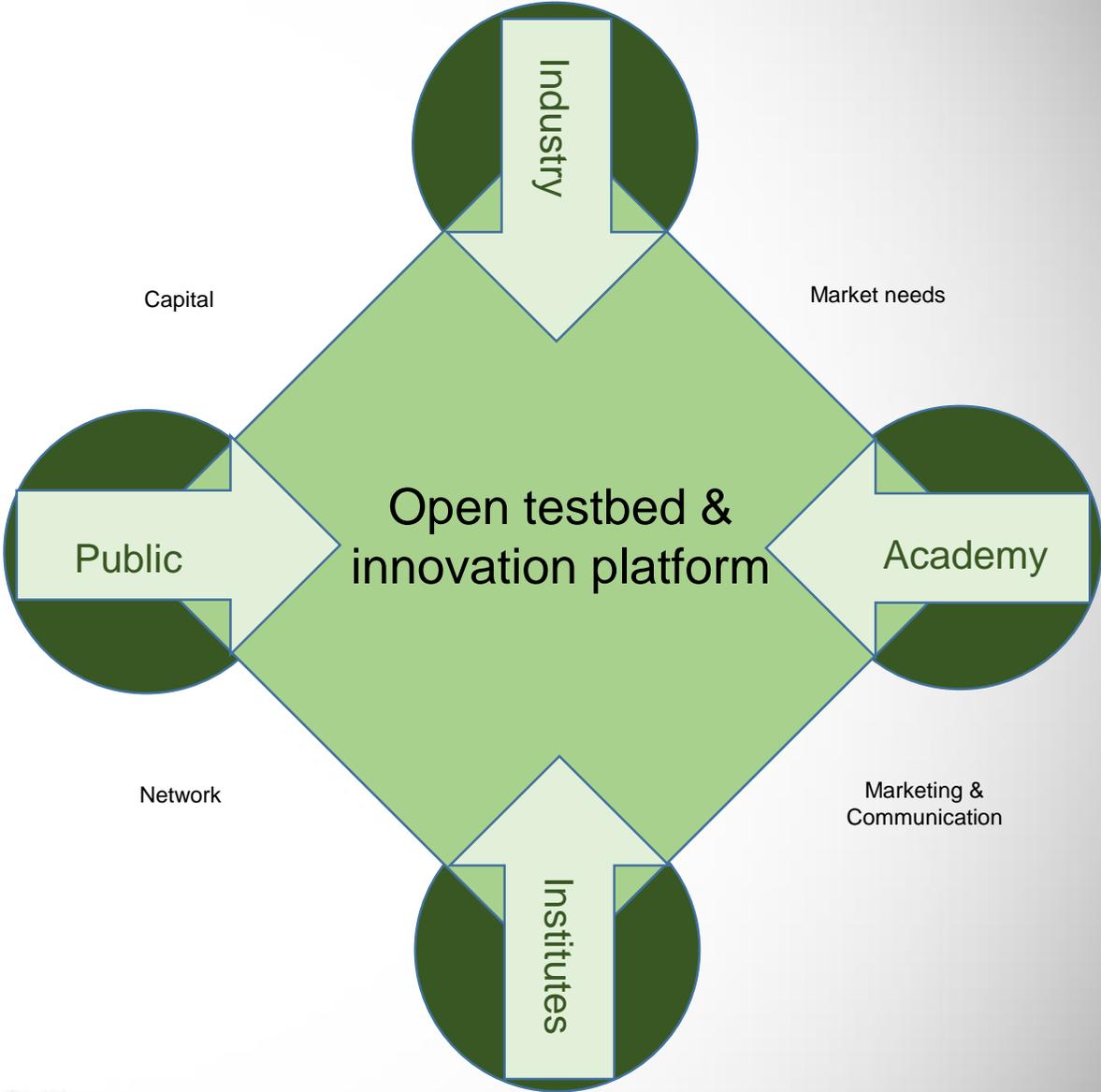
- Supporting innovation of disruptive services and technology
- Creating new knowledge essential to a sustainable future
- Cultivating international networks



Together we develop forest bioeconomy



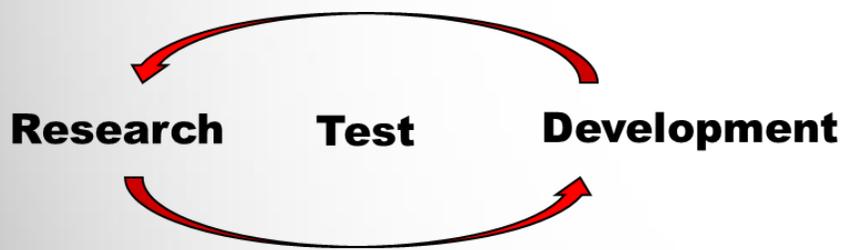
REGIONAL COOPERATION TESTBED CONCEPT



The forest bioeconomy innovation workshop!

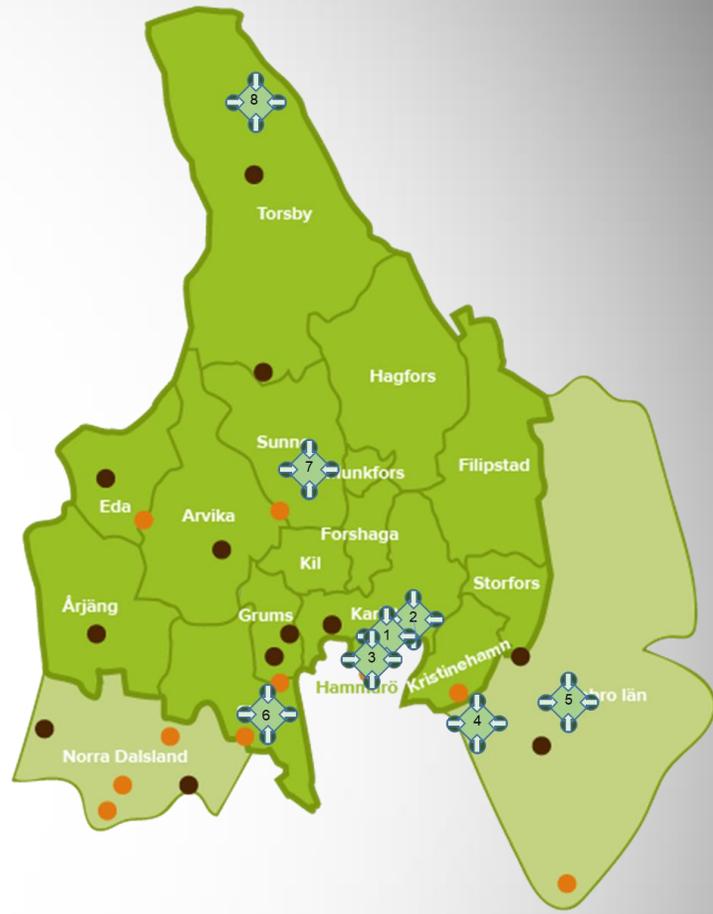
1. Karlstad university
2. Innovation Park
3. Water&Energy, drying and dewatering
4. LignoCity
5. AlfredNobel Science Park (3D printing)
6. Functional and sustainable laminates
7. BrobyGrafiska (Printing)
8. Additive manufacturing and new biomaterials

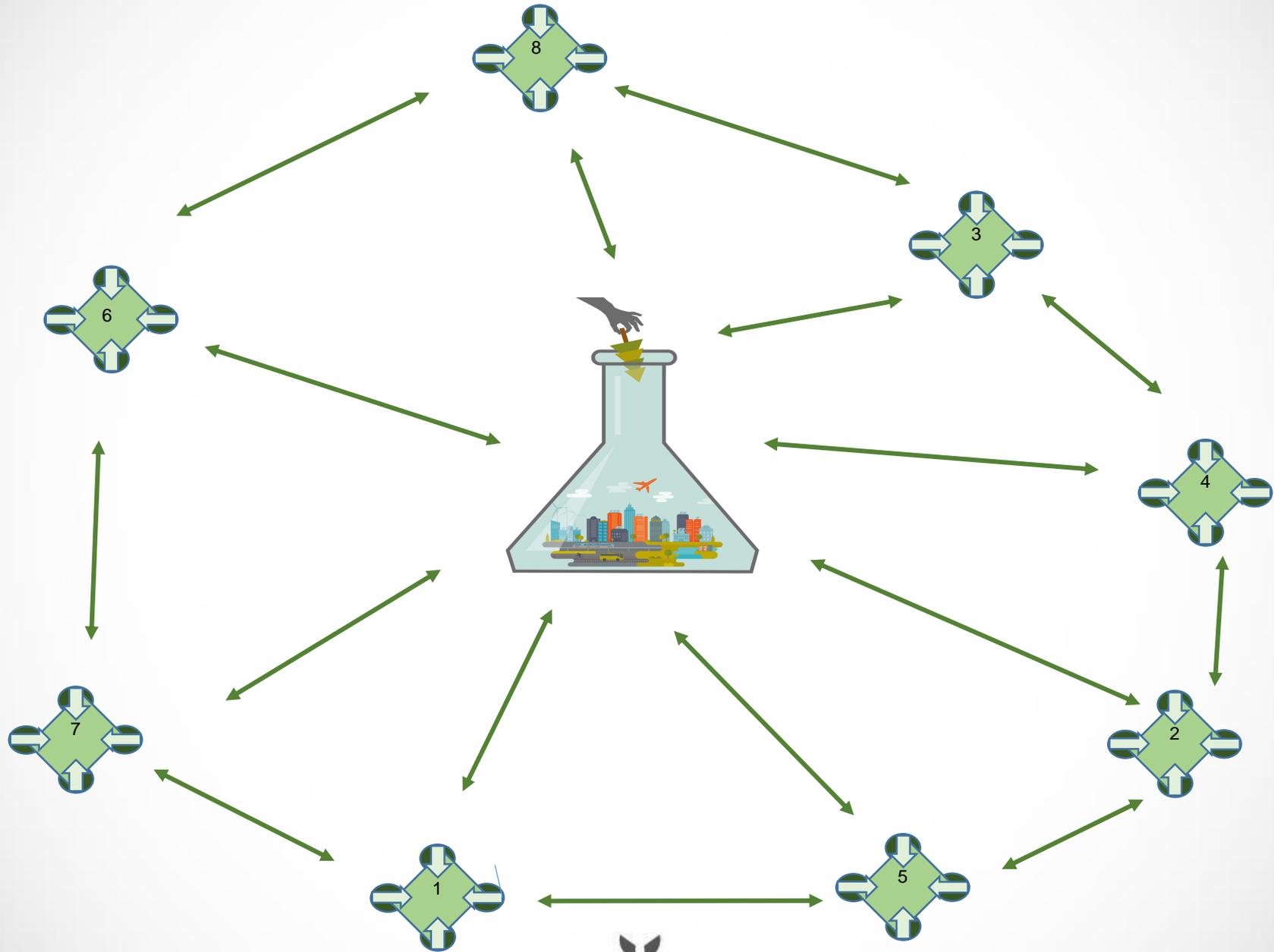




**Market introduction /
commercialization**

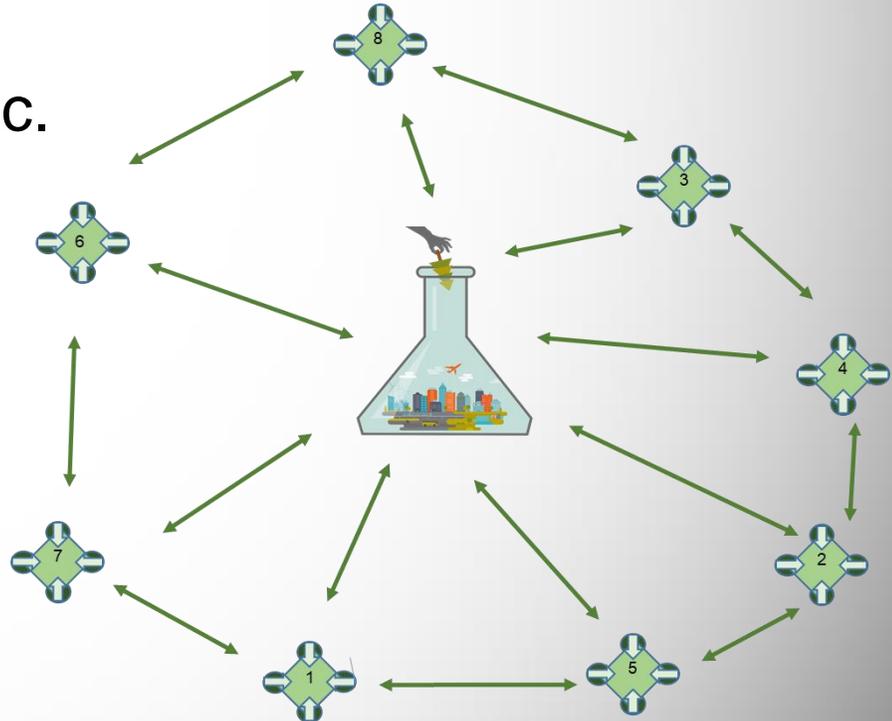
**Time to
market**





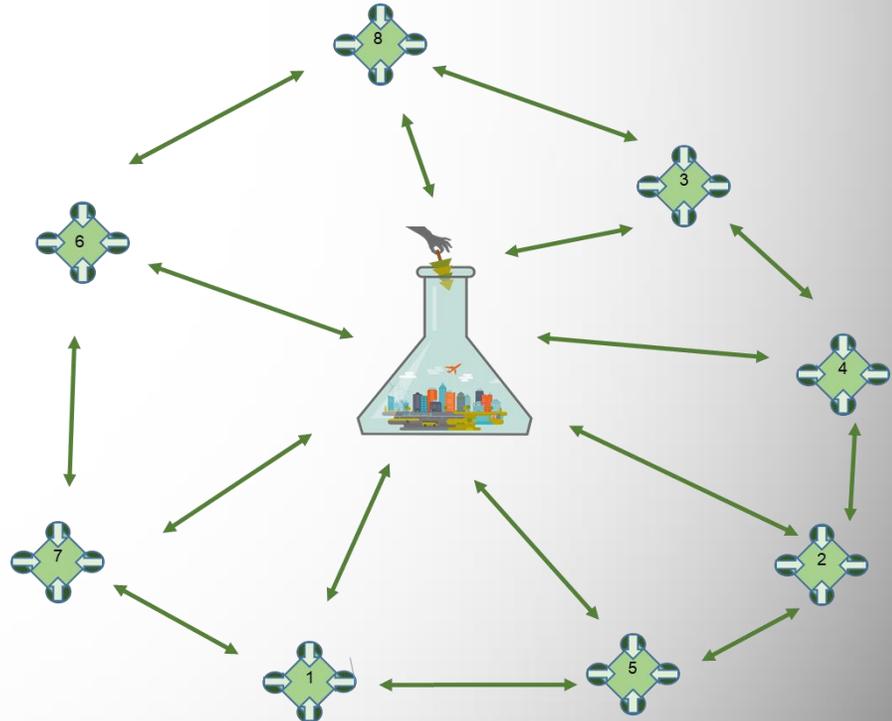
Cooperation between testbeds

- 1. Synergies
- 2. Collective learning
- 3. Common methods and tools for commercialization etc.



Current projects developing testbeds

- 1. LignoCity 2.0 (European Regional Development Fund, ERDF)
- 2. Bioinno (European Regional Development Fund, ERDF)
- 3. The Bioeconomy Region (Interreg Swe-Nor)
- 4. FFLAM (Vinnova)



The Wood Region – Material Development process



Drying fiber
moisture 55%
to 1%

Sifting
< 500 micron
500-1000 micron

Compounding
Composites

Grinding
Granules
6 mm

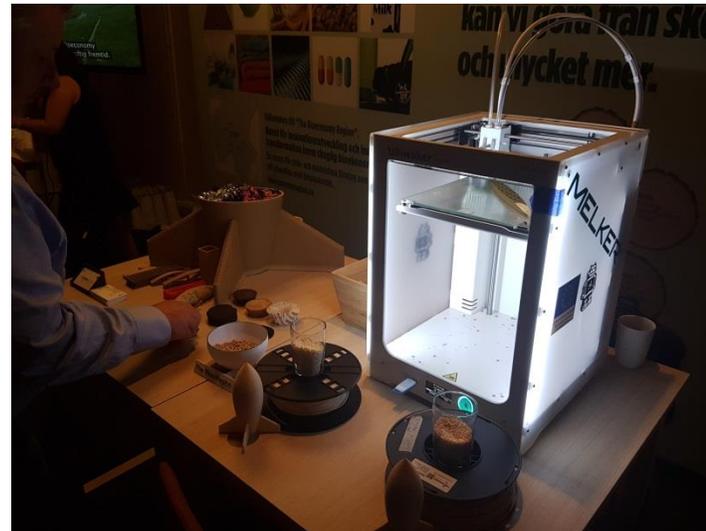
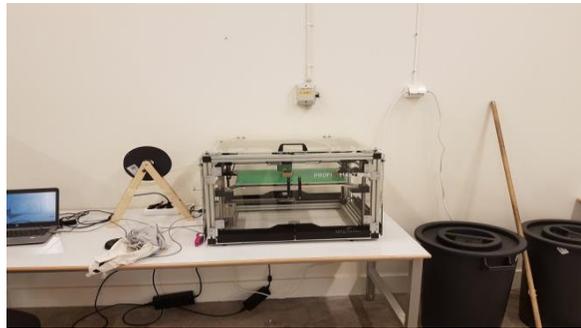
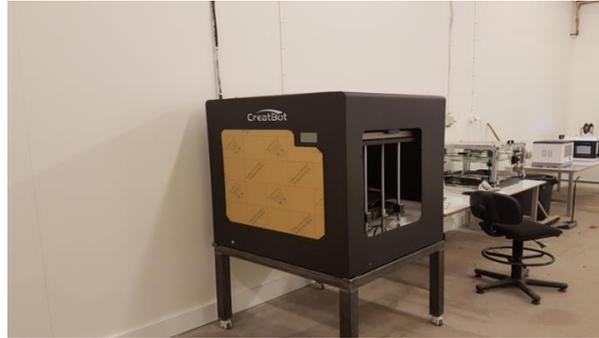
Extruding
Filament
1,75 mm



Process – Product development 3d Print

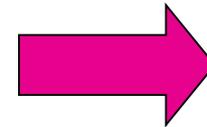
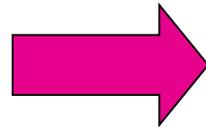


TWR – 3d Printing



Background to the LignoCity-initiative

- Separation of kraft lignin from black liquor



The LignoCity-initiative

Core: our open innovation site: verify, develop & scale up ideas

Nordic Paper, Bäckhammar (brown products)

The LignoCity Initiative
is operated by RISE

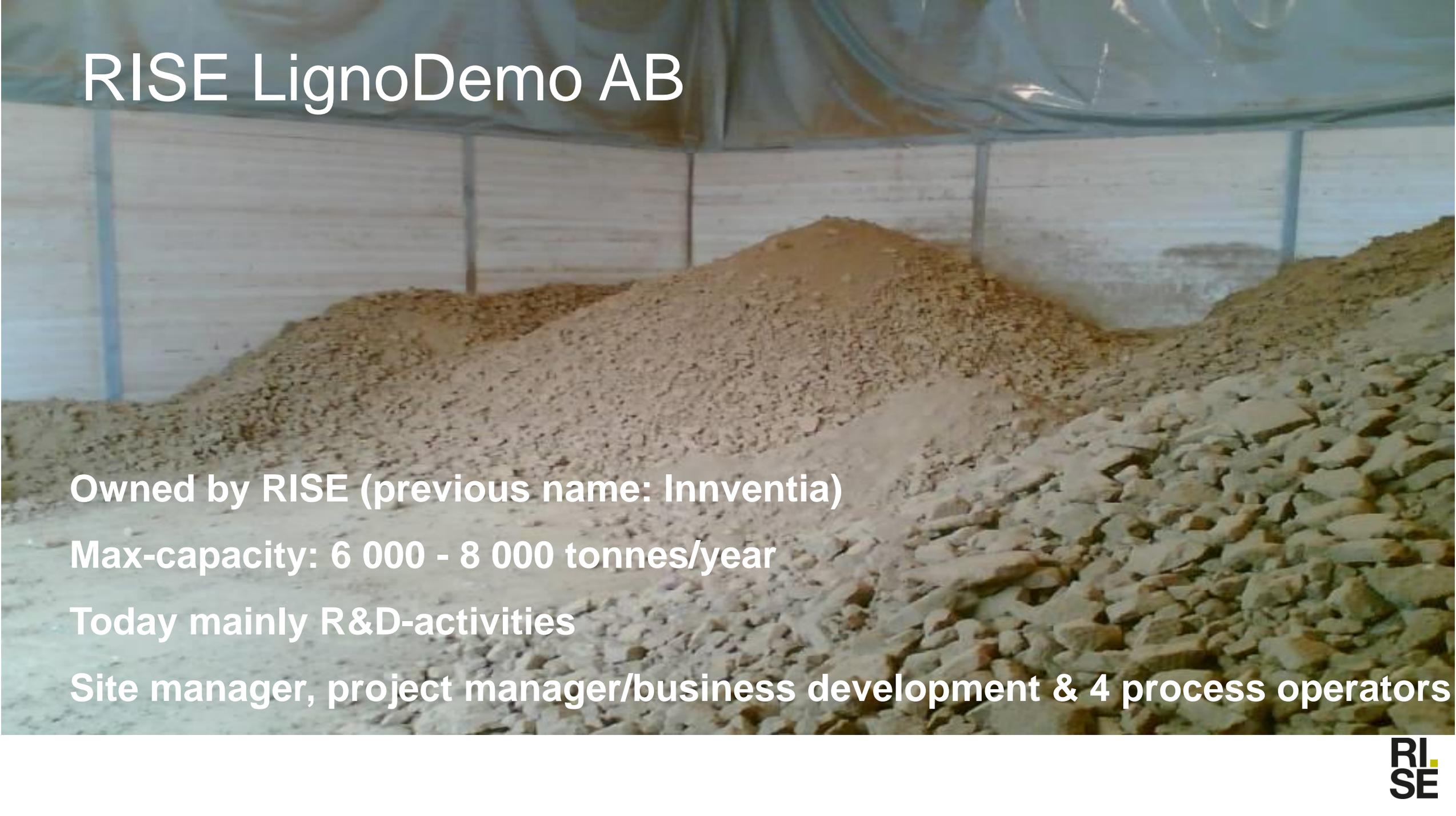


RISE LignoDemo in Bäckhammar

We offer different kind of lignin expertise, verification- & upscaling opportunities, infrastructure and production



RISE LignoDemo AB



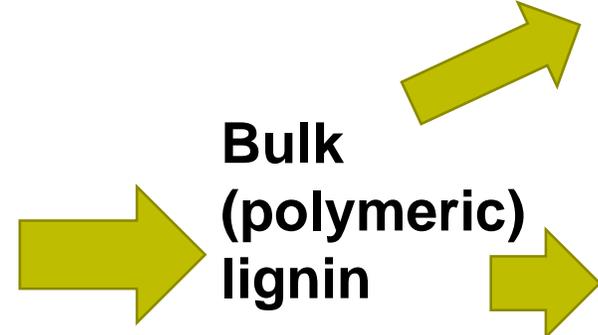
Owned by RISE (previous name: Innventia)

Max-capacity: 6 000 - 8 000 tonnes/year

Today mainly R&D-activities

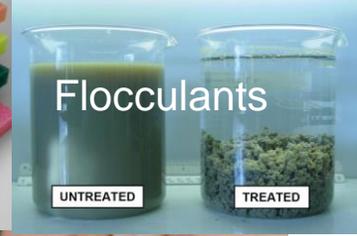
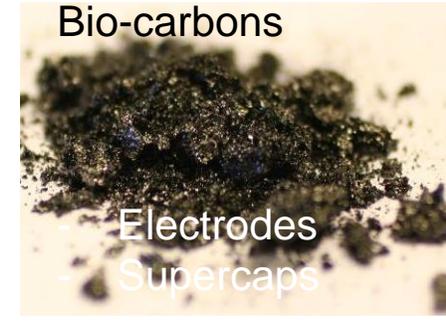
Site manager, project manager/business development & 4 process operators

Lignin or a lignin containing feedstock

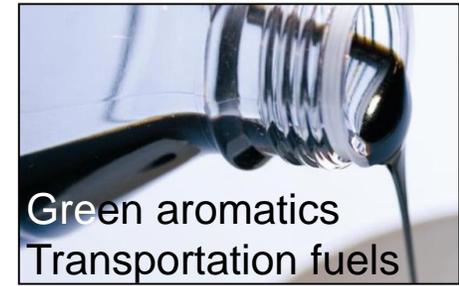


**Bulk
(polymeric)
lignin**

**Carbon
source**



**Depolymerized
lignin**





Akershus

Forskningsparken/OsloTech
Arkitektur og designhøgskolen
SINTEF – byggforskningsavdeling
NMBU – Eik idéverksted
Science for Society
ShareLab
NIBIO
Norsk Treteknisk Institutt

Hedmark

Biosmia
EON Reality
Evenstad Naeringscenter
Terningen nettverk
MAPEI i Odal

Østfold

HAMMLAB
Halden Virtual Reality Centre
Smart Innovation
Borregaard Biorefinery Demo
Saugbrugs mht

Värmland

UMV Coating Systems AB
LignoCity
The Wood Region
Karlstads universitet
Brobygrafiska
Valmet
BillerudKorsnäs PackLab

Oppland

LeanLab
Sintef Raufoss – NCE. Norsk Catapult
NISlab - Norwegian Information Security
laboratory
KlimaLab
NTNU

Dalarna

Dalarnas Villa
Teknikdalen
Byggdialog



WE DEMONSTRATE BIOEC♻️NOMY



**{ BIOECONOMY STARTS
WITH A SEED }**