The role of shared pilot facilities in the deployment of biorefinery concepts

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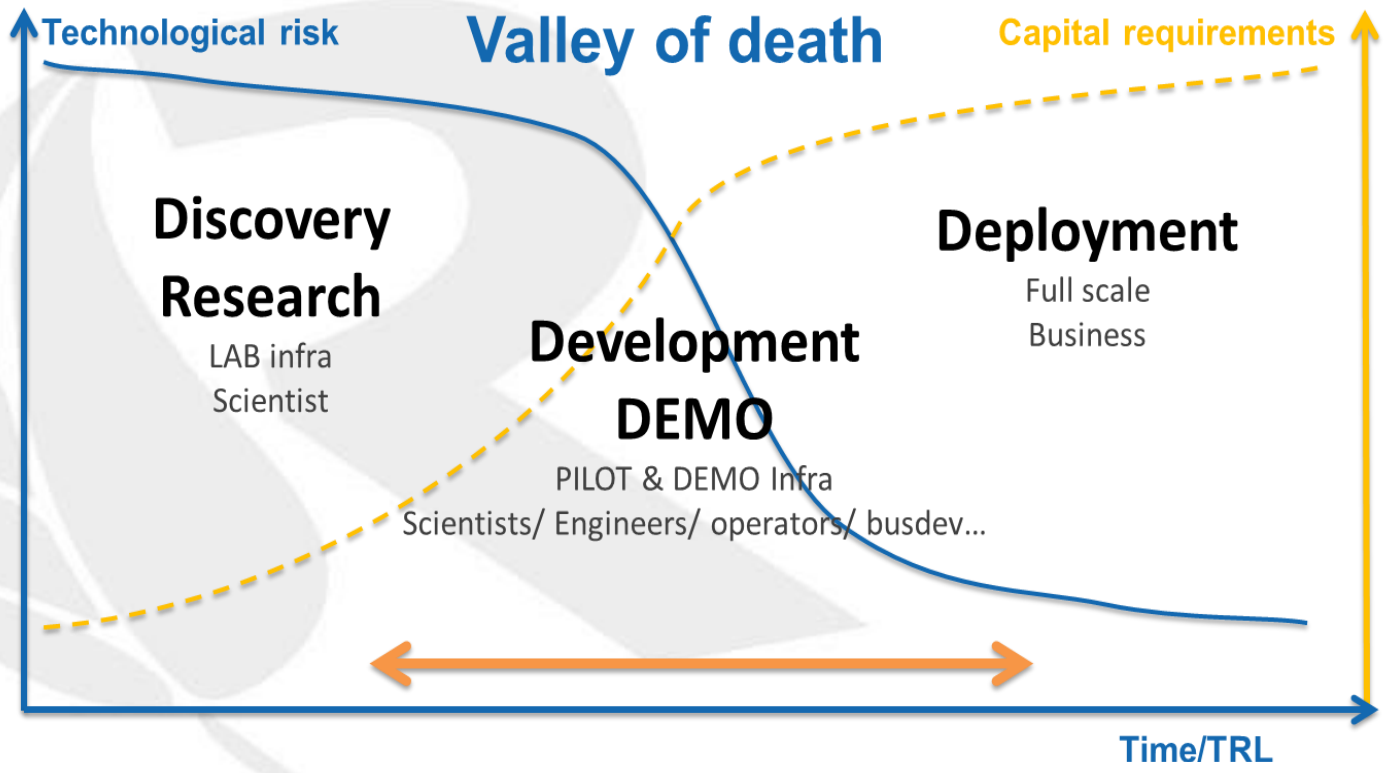
What's hampering Industrial Biotechnology?



Shared Pilot Facilities

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risk sharing & reduction

Example of cost-effectiveness

- New Company Bio-Optimist (fictive) developed new bioplastic at laboratory scale
- Bio-Optimist wants to scale up their lab process to 15.000 L scale to:
  - Demonstrate the technology, convince investors
  - Produce substantial amounts of sample material
  - Use the demonstration data for LCA and TEA studies

Example of cost-effectiveness

- What is needed?
- Together with a consultant the define the following program:
  - 10 fermentations at 150 L scale + downstream purification feasibility tests
  - 5 fermentations at 1.500 L scale + validate 2 downstream processes
  - 3 fermentations at 15.000 L scale + 1 downstream process to obtain product and data

Rehap

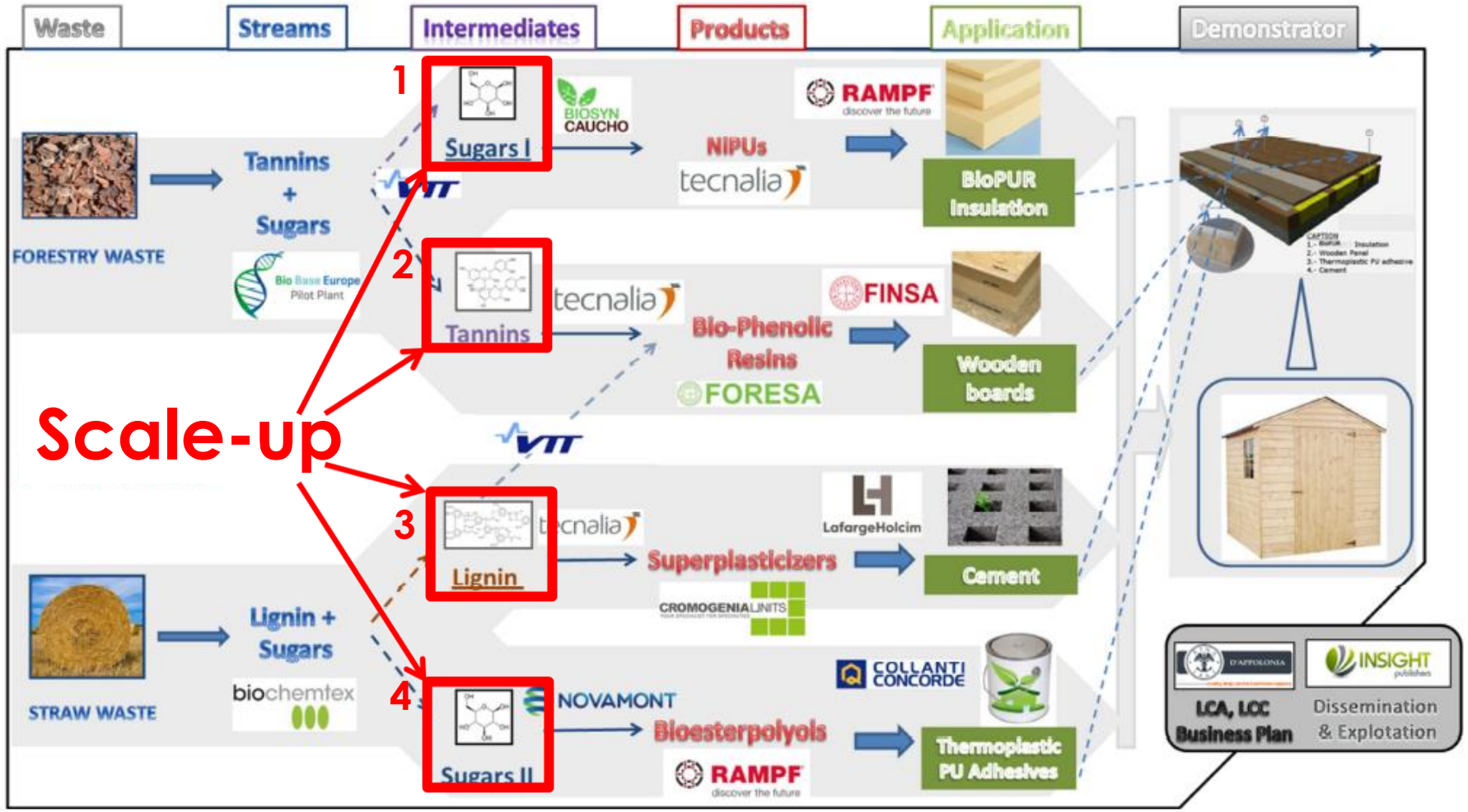
Own pilot and demonstration units	Partner with a shared facility
• Design phase: 3 months • Construction phase: 1 year • CAPEX: 15-25 million euro • OPEX: 5 million euro	• Design phase: 0 months • Construction phase: 0 year • CAPEX: in most cases 0 euro • Service fee: 1 million euro

FASTER: clear and reliable timelines, KEY to be ahead of competition

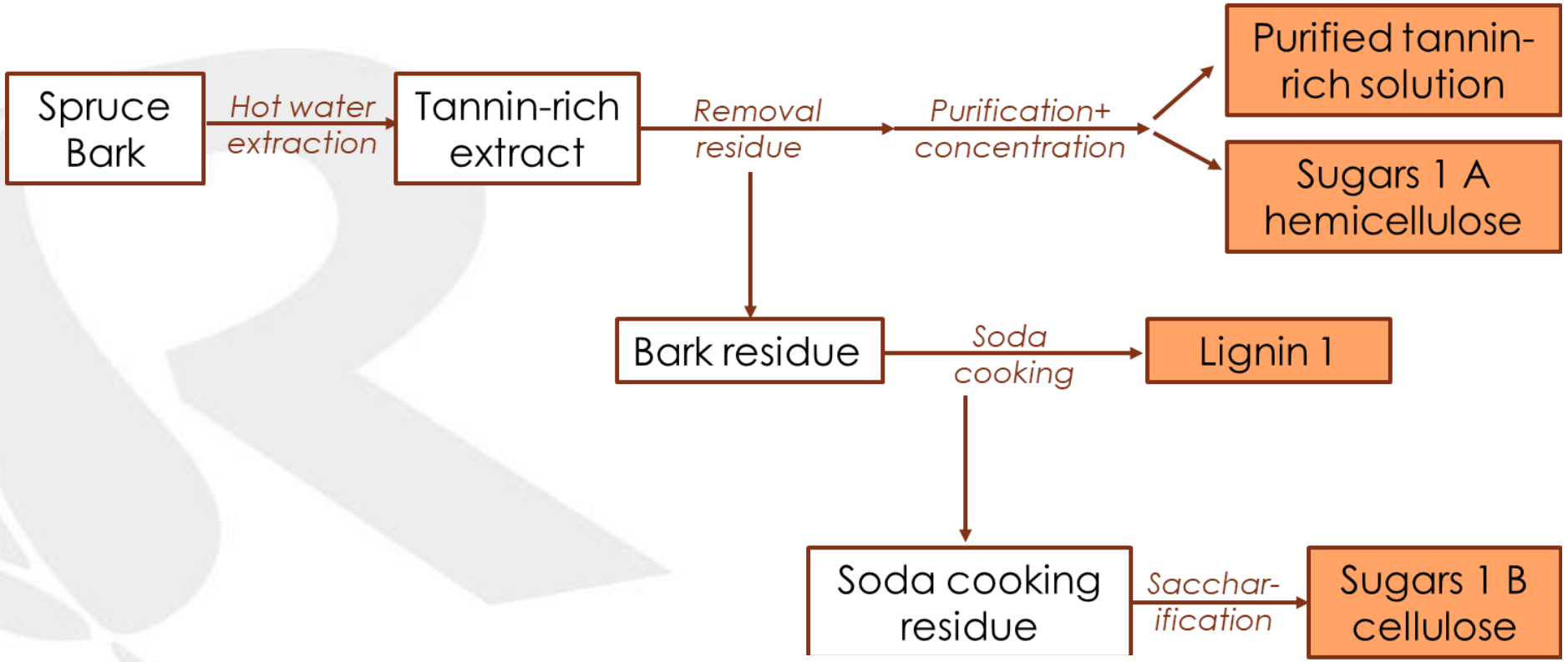
CHEAPER: a fraction of the cost

BETTER: scale up is the CORE business of a shared pilot facility

Rehap


Waste
Streams
Intermediates
Products
Application
Demonstrator
FORESTRY WASTE
Tannins + Sugars
Bio Base Europe Pilot Plant
1
Sugars I
BIOSYN CAUCHO
NIPUs
tecnalia
RAMPF
discover the future
BioPUR Insulation
2
Tannins
tecnalia
Bio-Phenolic Resins
FORESA
FINSA
Wooden boards
Scale-up
VTT
3
Lignin
tecnalia
Superplasticizers
CROMOGENIA UNITS
LafargeHolcim
Cement
STRAW WASTE
Lignin + Sugars
biochemtex
4
Sugars II
NOVAMONT
Bioesterpolyols
RAMPF
discover the future
COLLANTI CONCORDE
Thermoplastic PU Adhesives
LCA, LCC Business Plan
INSIGHT publishers
Dissemination & Explotation

Extraction of tannins, lignin and carbohydrates from Spruce bark



Extraction of tannins from Spruce bark

Hot water extraction of biomass (90 °C): basically ‘making tea’

=> Should be quite easy…

HOWEVER

Handling bark particles is not that convenient: they love jamming pipes, pumps and valves!

Extraction of tannins from Spruce bark

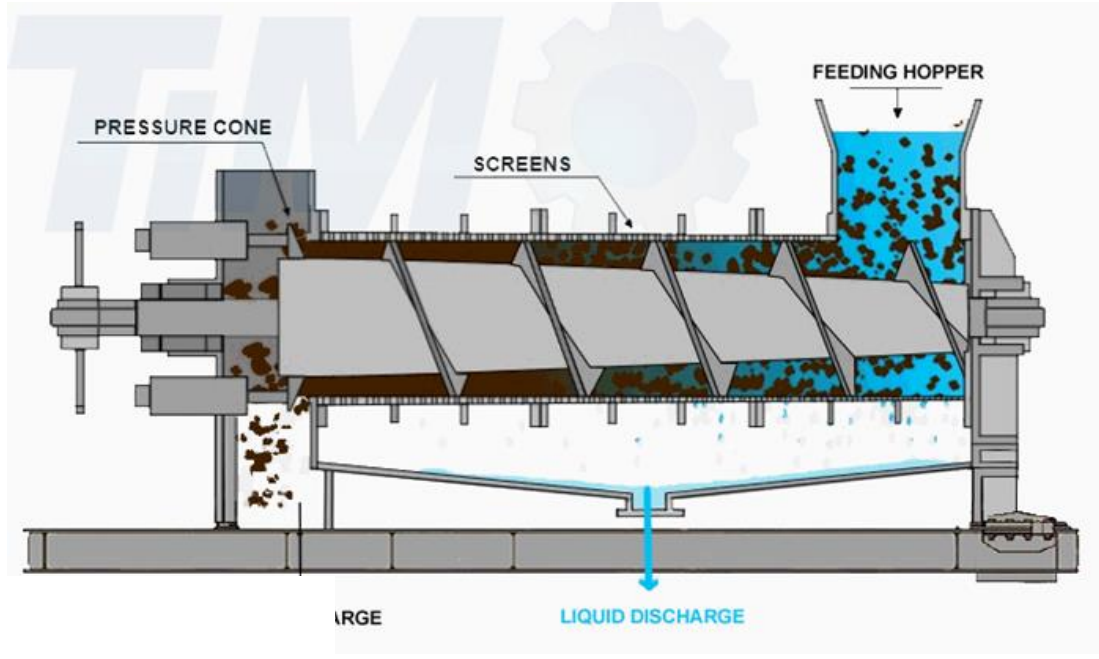
How to separate bark residue from tannins?

- Filter press
  - 500 L membrane-squeezed filterpress
  - Challenges:
    - →Clogging of feed line
    - →Only partly filled chambers

Extraction of tannins from Spruce bark

How to separate bark residue from tannins?

- Screwpress
  - Fairly dry bark residue obtained
  - Challenge: high solids load in SN



Extraction of tannins from Spruce bark

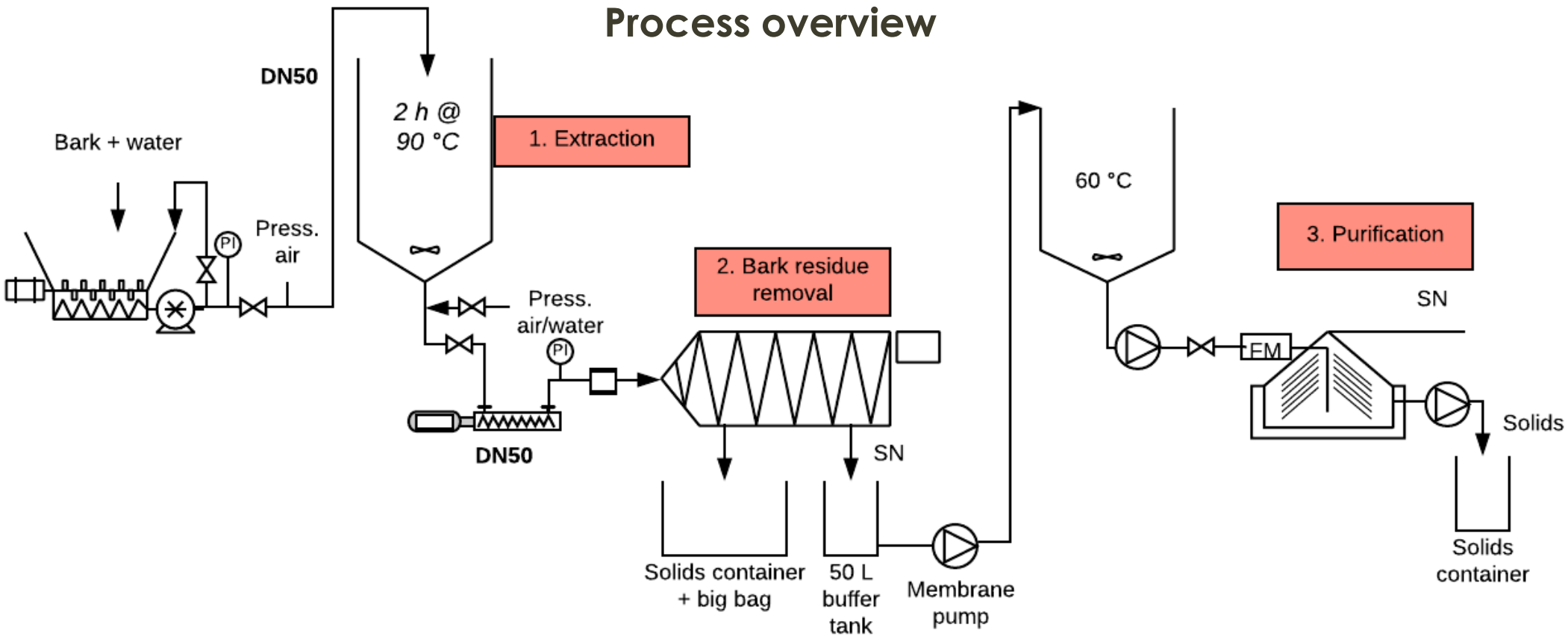
- Decanter centrifuge
  - Decanter centrifuge, Alfa laval NX 416
  - >90% of particles removed: remaining pellet **2 v%**
  - Feed rate up to 3000 L/h
  - Dry matter content bark residues : 32 %

Extraction of tannins from Spruce bark

How to get rid of remaining solids?

- Continuous centrifugation:
  - Alfa Laval VNPX 510
  - Further clarification up to 0.02 v%
  - Tannin recovery: >90 %

Extraction of tannins from Spruce bark



Enjoy the flight…

Bio Base Europe
Pilot Plant