VTT Bioruukki pilotointikeskus - kiertotalouden uusia ratkaisuja

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From laboratory via piloting to markets

- **Piloting enables crossing the “valley of death” for commercialization.**
- **New process industry innovations often require extensive piloting.**
- **Open access Shared Pilot Facilities**:
  - Competence in piloting and scale-up
  - Time saving with ready-to-use facilities
  - Cost savings by sharing the investment and operation costs

Our pilot plants for bio and circular economy

1 JYVÄSKYLÄ
Fibre based web production
Fluidised bed combustion
Separation technology

2 TAMPERE
Polymeric materials processing

3 ESPOO/OTANIEMI
Food and brewery
Fermentation and bioprocessing
Roll-to-roll coating

4 ESPOO/BIORUUKKI
Gasification
Pyrolysis
Textile fibre spinning
Biomass processing
Hydrometallurgy
Process chemistry

KEY FEATURES FOR VTT PILOTS

- Cover the development chain from raw materials to end products
- Two types of pilots: Process specific and multi-purpose
- Scale-up of own and customers technology development
- Main customers large companies and start-ups
- Customer projects ~ 40% of turnover

- Annually 120 -140 customers
- 1/3 from outside Finland

VTT Bioruukki Pilot Centre

An integrated enabler to accelerate higher value business in bio and circular economy

Biomass
Waste
Side streams

Thermochemical conversions

Biomass processing and textile fibres

Process chemistry

Fuels from waste
Recycled textile fibres
Chemicals from cellulose
Metal recovery from ashes
Plastics recycling to chemicals
Process data and digitalisation

https://www.youtube.com/watch?v=LRs949PDDEQ

Bioruukki Pilot Centre – Connecting industries

THERMOCHEMICAL CONVERSION PLATFORM

Gasification and pyrolysis technologies for biofuels and biochemicals. Recycling concepts. Carbon re-use and energy storage.

Started in Bioruukki
2015

BIOMASS PROCESSING and TEXTILE FIBRE PLATFORM

Innovative biomass processing and fractionation.
Cellulose based textile fibres.

Started in Bioruukki
2018

PROCESS CHEMISTRY PLATFORM

Sustainable chemistry for tailored biobased chemicals and materials, new processes, and recycling concepts. Catalytic conversions.

Starts in Bioruukki
2020

VTT Bioruukki Pilot Centre is an active partner in European networks of open access shared pilot facilities

European RI collaboration projects with active participation of VTT and Bioruukki

Pilots4U

- Combines open access pilots in industrial biotechnology, chemistry and biofuels, Database and network, BBI JU / Horizon 2020

SmartPilots

- Interreg Europe project for bioeconomy pilot cooperation, business models and political influencing

ERIFORE

- Horizon 2020 project for forest based circular bioeconomy research infra collaboration. Coordinated by VTT

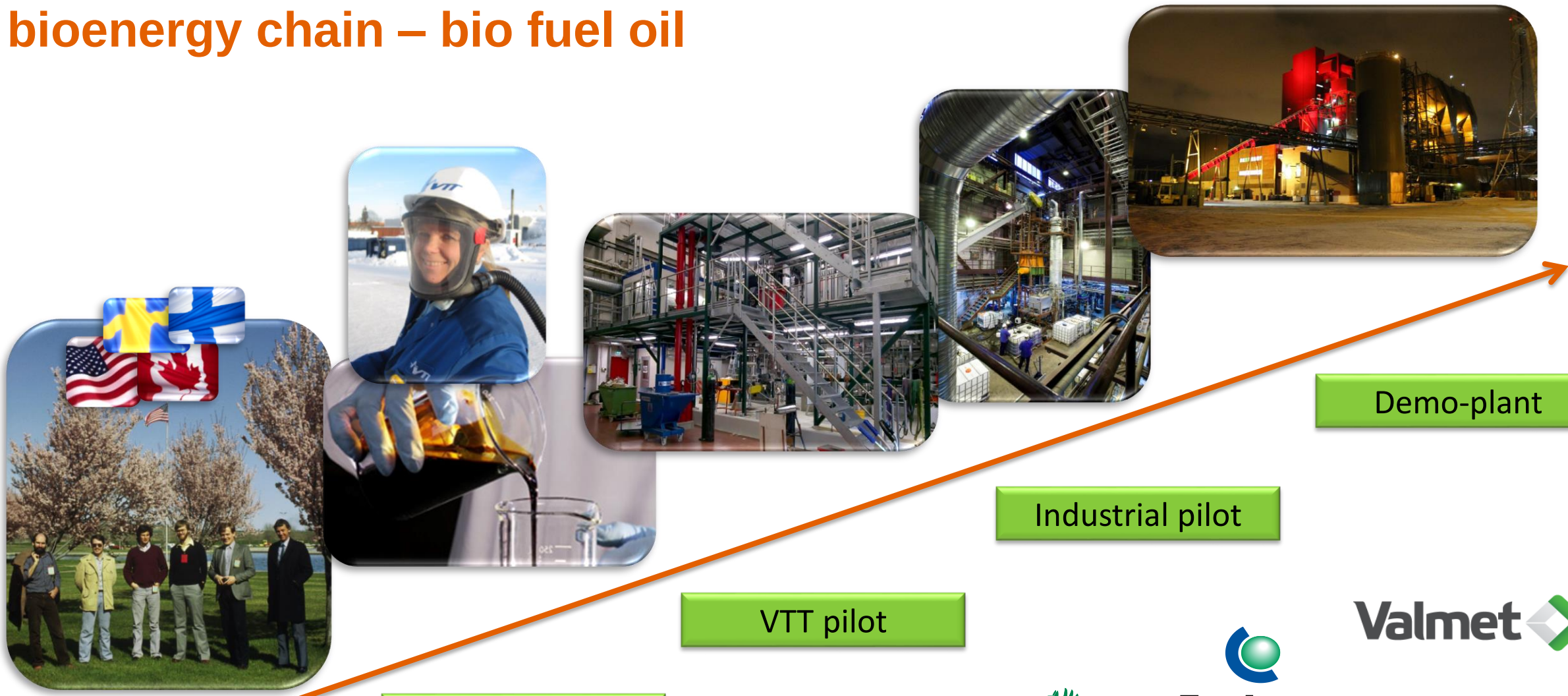
IBISBA

- Industrial biotechnology and synthetic biology, Research Infrastructure for Sharing Knowledge, on ESFRI road map, Horizon 2020.

BRISK2

- Biofuels Research Infrastructure for Sharing Knowledge, Horizon 2020.

New industrial technologies: VTT experimental resources for a whole industrial bioenergy chain – bio fuel oil



Valmet

Fortum

UPM

Pilot use example

Proof of concept studies for emerging technologies: The whole development chain of biobased barrier packaging in pilot scale

Raw materials

Polymerisation

Dispersion

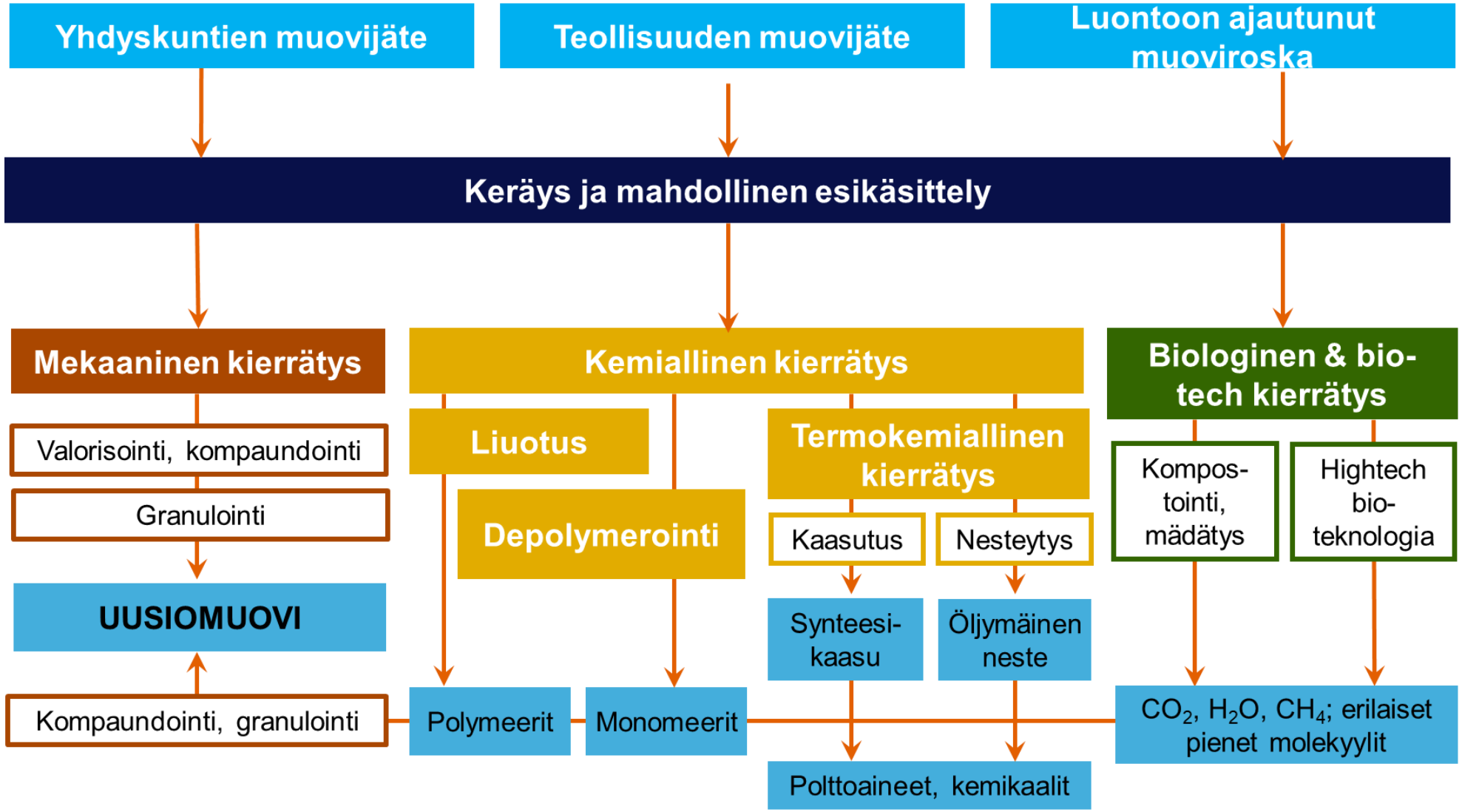
Coating

Packaging material

Applications

Pilot use example

Muovin kierrätyksen moninaiset teknologiat



Gasification of mixed plastic waste

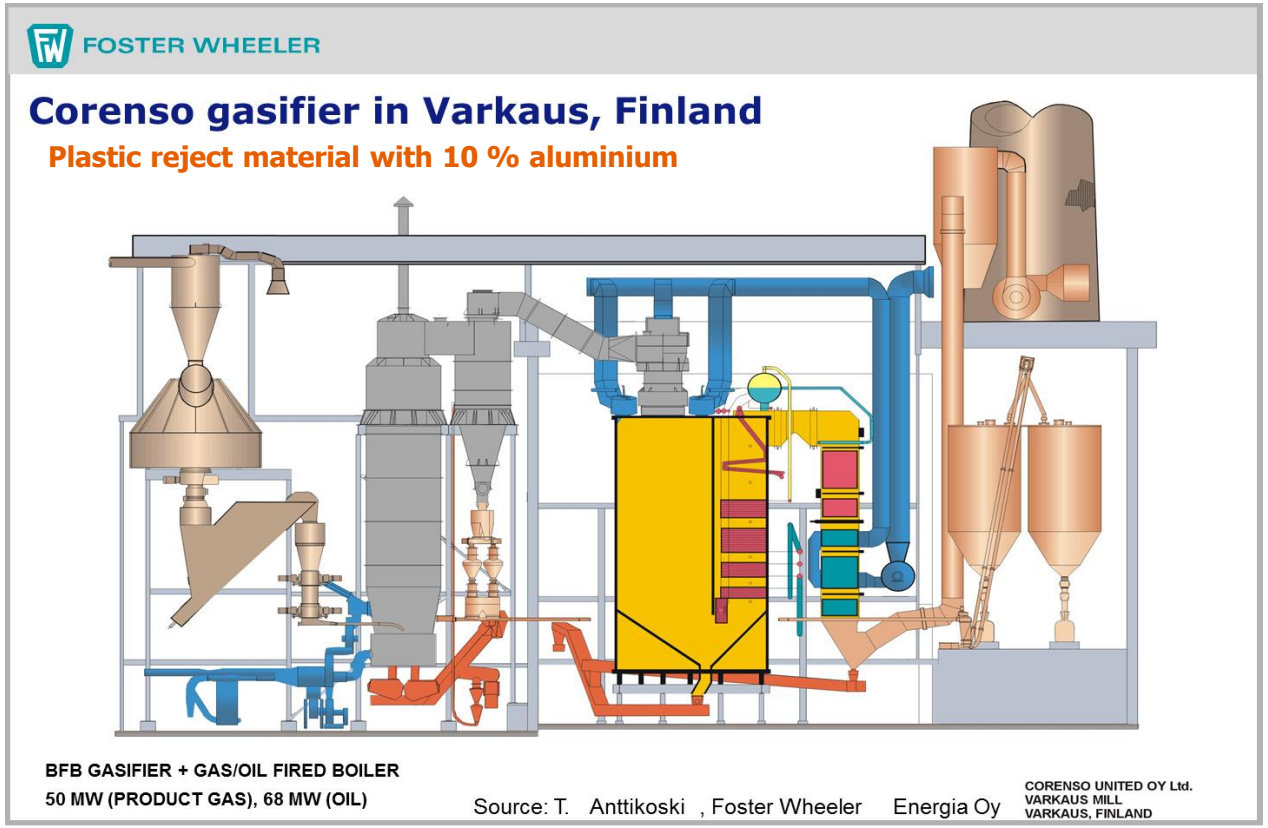
CHALLENGE

Most of plastic waste contains several types of plastics and also some other impurities disabling direct reuse of the plastic.

SOLUTION

VTT has developed and is developing further gasification and gas cleaning for utilisation of plastic waste as a fuel or as a raw material for chemicals or plastics.

BENEFIT



- Gasification enables complete recycling of mixed waste plastic waste without any special processing of waste
- The output is a gas mixture (main components CO & H_2)
- Cost of mechanical sorting and cleaning of plastic waste are minimised and rate of recycling is maximised

Further information:
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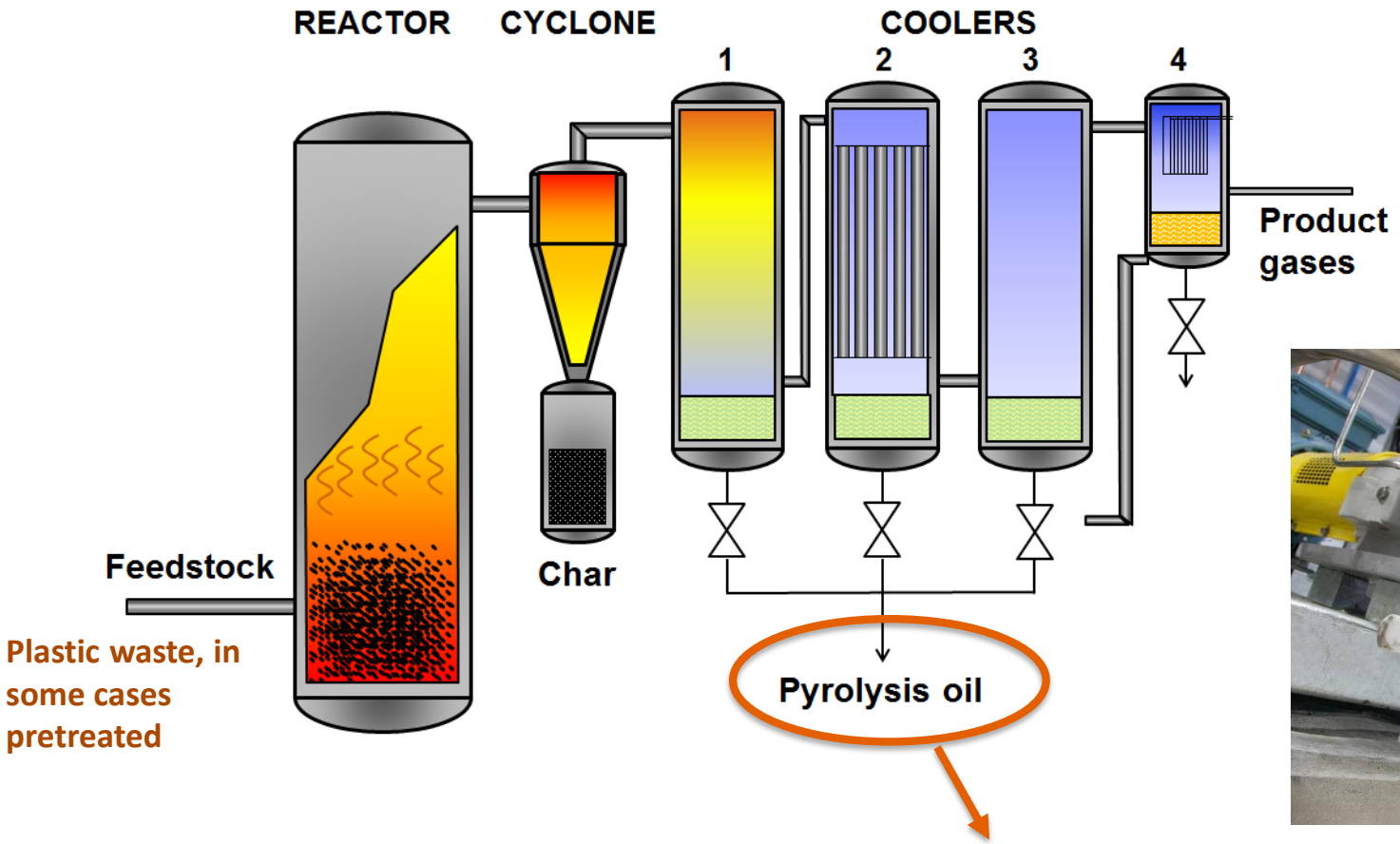
Liquefaction of plastics waste by thermolysis



20 kg/h CFB unit

Plastic waste → Pretreatment → Thermolysis → Upgrading → Products

Further information:
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A start-up company to demonstrate textile waste recycling at VTT Bioruukki Pilot Centre

Textile fibre recycling demonstrations

- Start-up company to scale-up.
- Process industry and fashion brands to commercialise.
- VTT Bioruukki provides the infra and expertise.

Textile fibre spinning pilot line

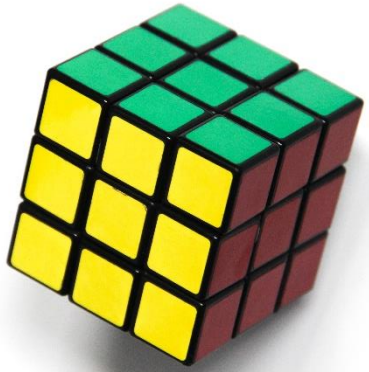
- Recycling of post-consumer textile waste.
- The key process steps in the production chain:
  - raw material pre-treatment,
  - chemical modification and fibre spinning,
  - staple fibre post-treatment.

Pilot use example

The Infinited Fiber Company®

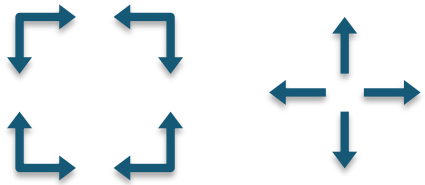
Leverage from the EU 2014–2020

European Union
European Regional Development Fund



VTT Bioruukki laajentaa 2024
Fossiilivapaan liikenteen ratkaisupaikka

Tulevaisuuteen taipuva



Modulaarinen

Adaptiivinen

Liikenteen energia uudistuu

Vety

Sähköistyminen

Biopolttoaineet

Sähköpolttoaineet

Päästöjen hallinta

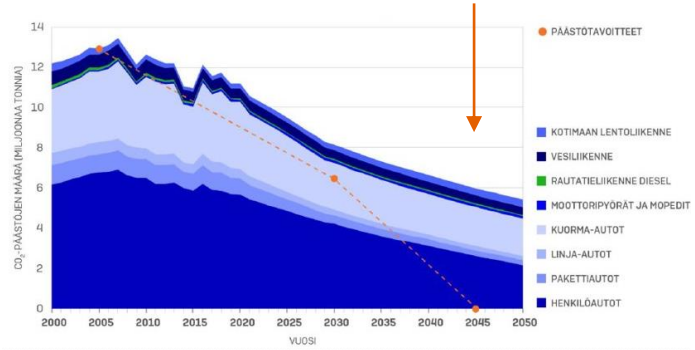
Energiatehokkuus

Simulointi ja mallinnus

Päästöt, vienti, hiilikädenjälki

- Kuljetusvälineiden ja moottoreiden vienti 2019
  - ~ 8,5 Mrd €
  - ~ 13 % koko viennistä
  - *2030? 2045?*
- Päästöt 2045? Hiilikädenjälki?

Kohti nollapäästöisyyttä

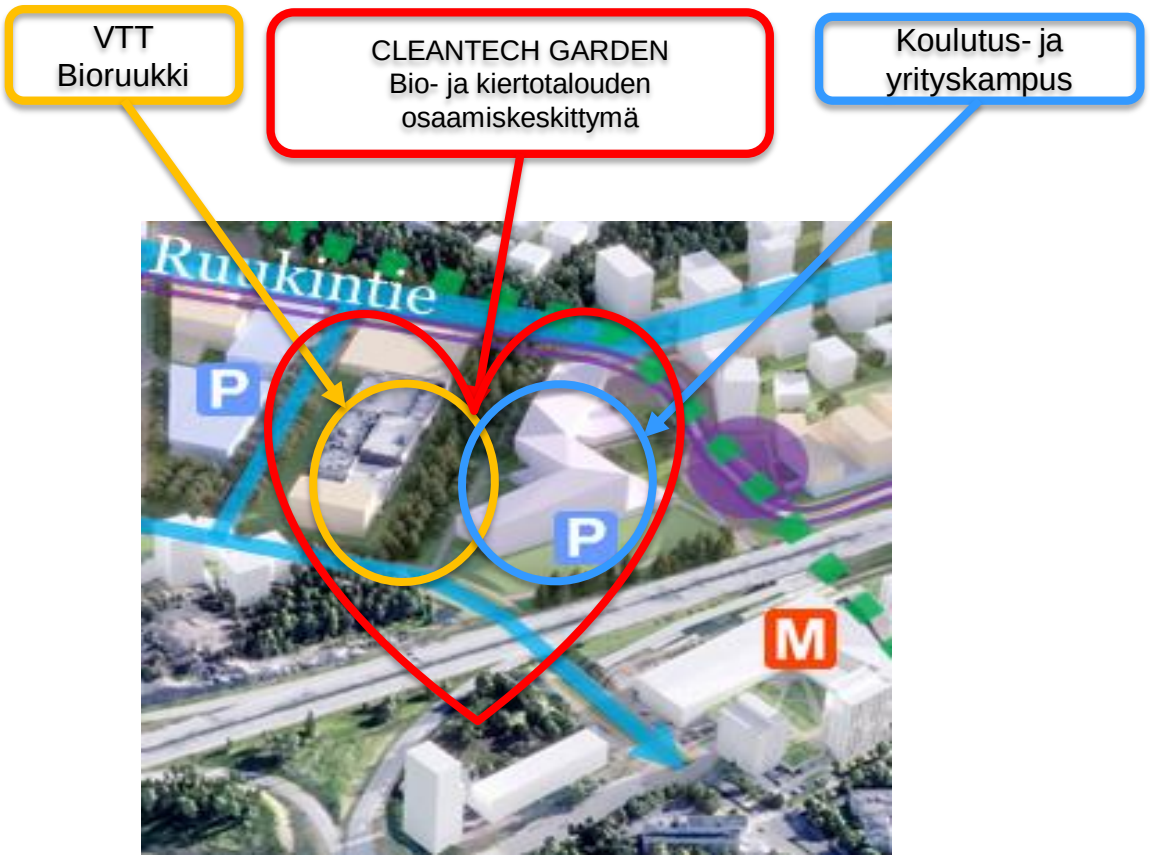


CLEANTECH GARDEN

BIO- JA KIERTOTALOUDEN OSAAMISKESKITTYMÄ

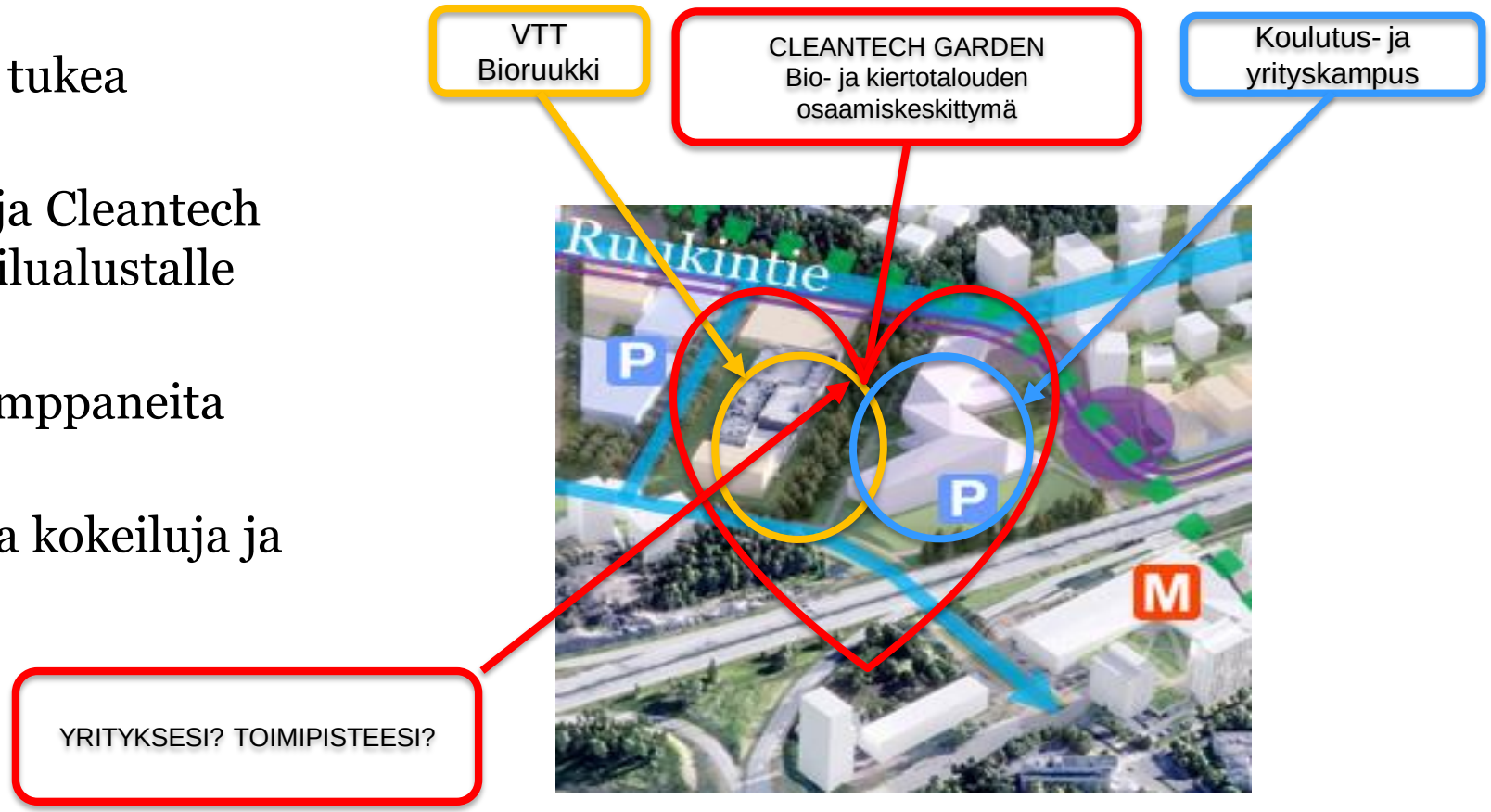
CLEANTECH GARDEN -HANKKEEN TAVOITE

- Gleantech Gardenin tavoitetilana on aikaansaada elinvoimainen osaamiskeskittymä
- Koulutus- yrityskampuksen kokonaislaajuus noin 45 000 kem2
  - ✓Omnia 18 500 m2, käytössä 2024 syksyllä.
  - ✓Bio- ja kiertotalouden yritys- ja innovaatiotiloja 4*6-7000 m2
  - ✓Asuntoja 2*3-4000 m2
- Tutkimus-, koulutus- ja yritystoimintaklusterin tukijalat:
  - ✓Biomassaan rakentuva kiertotalous
  - ✓Ruuantuotanto ja elintarvike
  - ✓Tulevaisuuden liikkumisen palvelut



CLEANTECH GARDEN – AVOIN KUTSU KEHITTÄMÄÄN EKOSYSTEEMIÄ!

- Miten Cleantech Garden voi tukea liiketoimintaasi?
- Mitä laitekantaa ja toimintoja Cleantech Garden kiertotalouden kokeilualustalle tarvitaan?
- Keitä yhteiskehittämisen kumppaneita tarvitaan mukaan?
- Miten digitalisaatio voi tukea kokeiluja ja uuden kehittämistä?



Ota yhteyttä!

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