Bio Base Europe
Pilot Plant

Importance of open acces pilot and demonstration infrastructures within the development of Bio economy and industrial biotechnology and how to finance

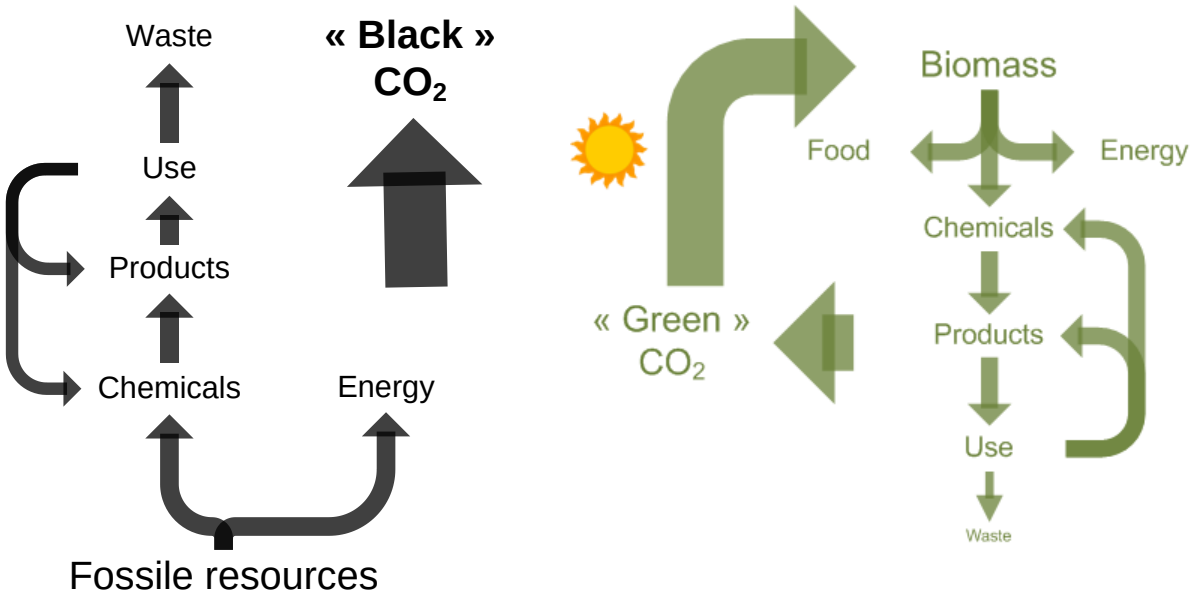
Synergies workshop ESIF & H2020
Brussels october 11th 2016
Brecht Vanlerberghe,

Outline

- IB & Bio Economy
- What's missing
- Shared Pilot facilities
- Bio Base Europe Pilot plant
- Sum up & Outlook
- SMARTPILOTS project

Bio economy & ket IB

adressing societal challenges:
GHG reduction, jobs, re-industrialisation, resource indepency



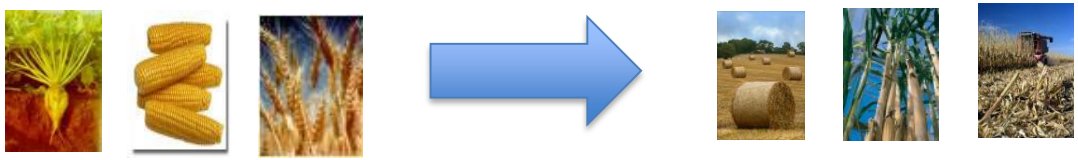
Bio Economy: *from fossil to (local) renewable resources*

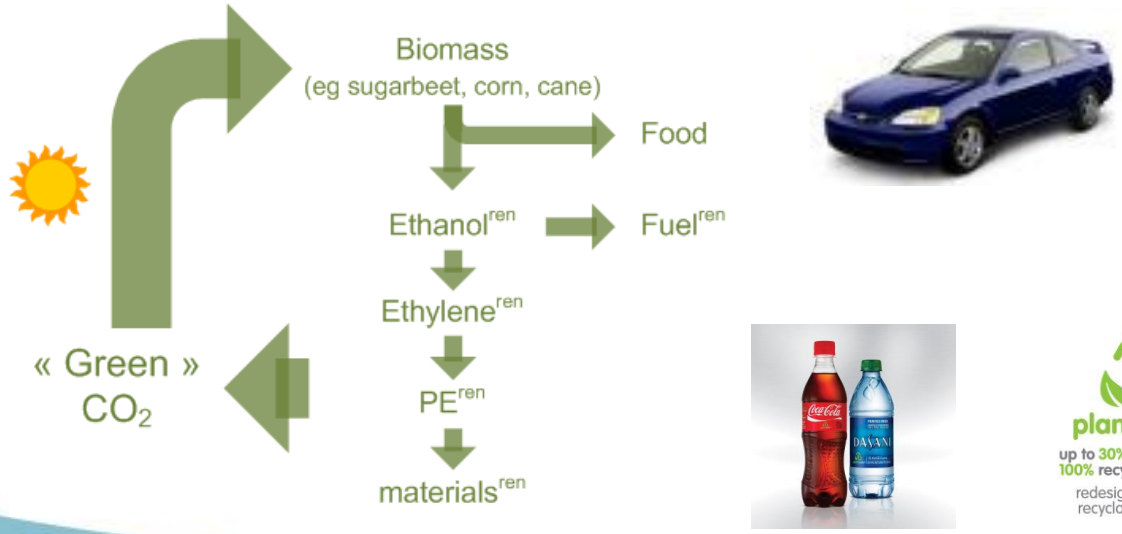
Ket IB & Bio economy

Bio Base Europe
Pilot Plant

White Biotechnology :

The use of microorganisms and their enzymes to produce chemical substances, materials and bio-energy from renewable resources





Deployment IB & Bio economy: What's missing?

Bio Base Europe Pilot Plant

RESEARCH:

- mainly (bio) catalyst development (IP)
- typically lab enviroment
- scientists

INNOVATION

- Techno economical feasibility, LCA?
- Market validation & value chains >> Prototypes

Or

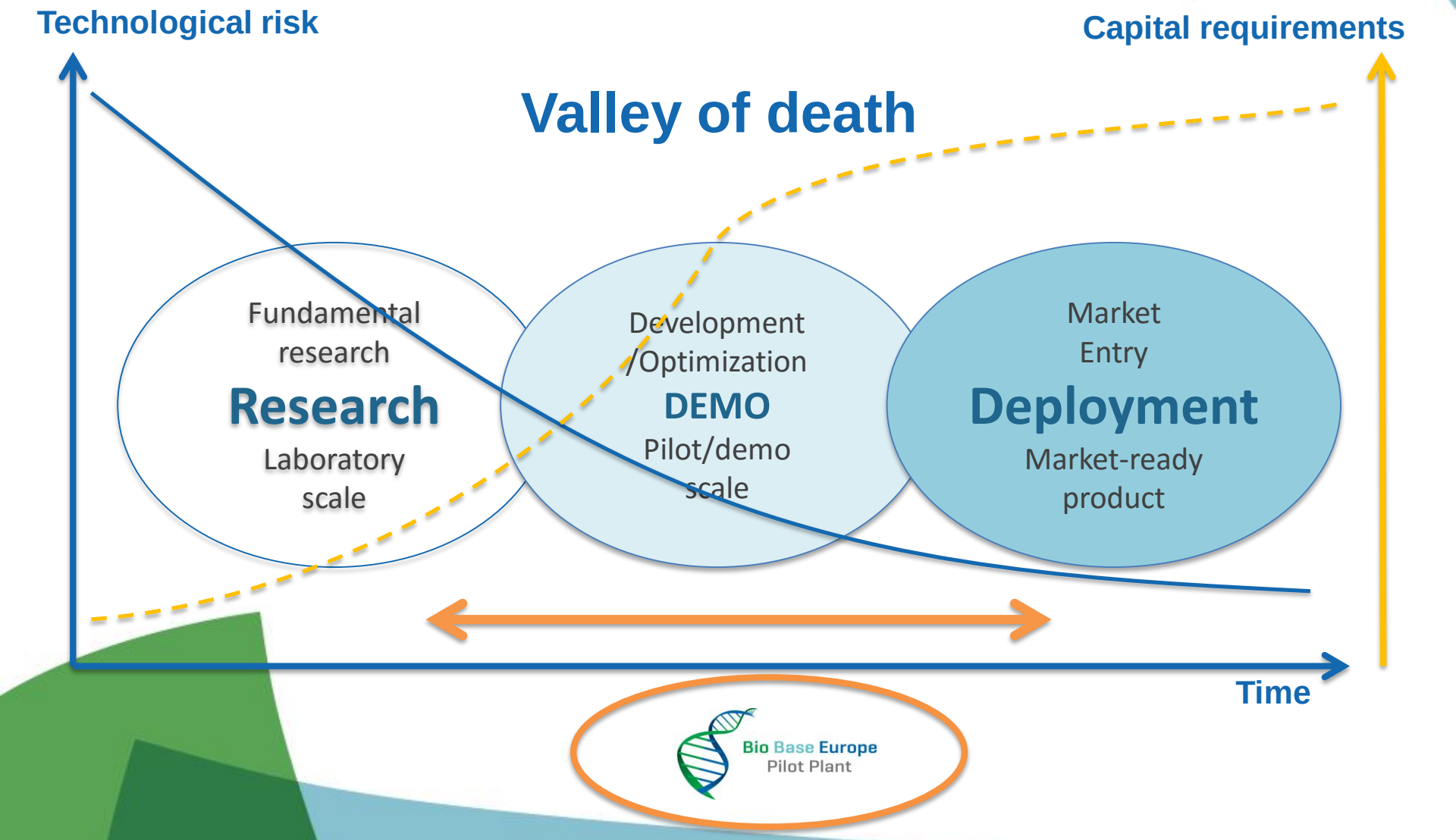
Process & down stream process development & engineering

>> expertise, skills / "software" or people

>> larger infrastructure/ hardware

>> Money & time

Deployment bio economy: What's missing?



Bio Base Europe Pilot plant: a shared pilot facility

Innovation in IB & Bio economy:

- **Risky:** uncertain political climate (CO2 taxes, incentives, penalties, ….)
- **Low risk premium & longer payback time :** profit margins lower than in Pharma or red biotech

>> difficult to convince management and/or private investors

Shared Pilot Facilities = risk sharing/reduction

Bio Base Europe Pilot plant: a shared pilot facility

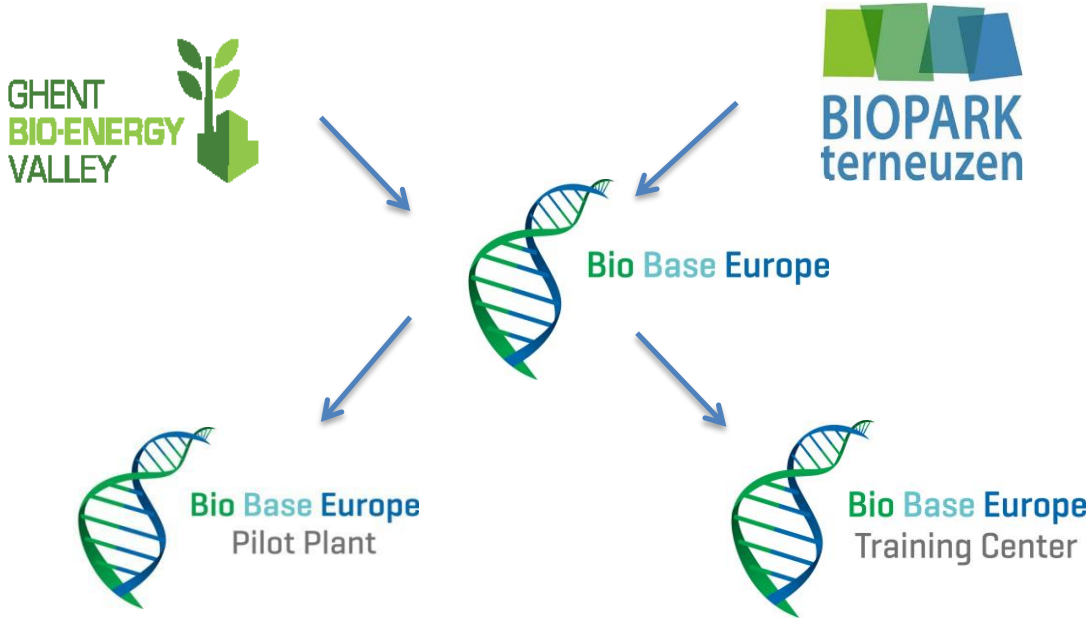
- shared investments in innovation infrastructure, equipment, capabilities & expertise >> 24/7 activity with needed critical mass
- open access test sites that bring innovations from the laboratory into industrial practice.
- Open to (all) companies and research institutes
- bridging the valley of death

Project Bio Base Europe
Interreg IV Vlaanderen-Nederland

Interreg Vlaanderen Nederland
Europa investeert in uw regio

Bio Base Europe Pilot Plant

Bio Base Europe iVZW was founded in 2008 as a joint initiative of:



Project Leader: prof. dr. ir. Wim Soetaert

Project Bio Base Europe
Interreg IV Vlaanderen-Nederland

Bio Base Europe Pilot Plant

GHENT BIO-ENERGY VALLEY

Public Organisations:

UNIVERSITEIT GENT

STAD GENT

PORT OF GHENT

POM Provinciale Ontwikkelingsmaatschappij Oost-Vlaanderen

Industrial Members:

alcobiofuel Energy by nature

bioro biodiesel refinery

Cargill

oleon A NATURAL CHEMISTRY

EDF luminus

Electrabel

OWS Organic Waste Systems

Oiltanking

WATERLEAU water·air·waste·newenergy

GENENCOR® A Danisco Division

SEA-invest

Capricorn VENTURE PARTNERS

Grontmij Industry

desmet ballestra

rethink. storaenso

electrawinds POWERED BY NATURE

FABRICOM GTI SUEZ

spe

induss you know why

Project Bio Base Europe
Interreg IV Vlaanderen-Nederland

Bio Base Europe Pilot Plant

BIOPARK terneuzen

Public Organisations:

Provincie Zeeland

Zeeland Seaports Port Authority

Gemeente Terneuzen

ROC WESTERSCHELDE

Industrial Members:

DOW

Valuepark Terneuzen

HEROSENERGY

warmco2

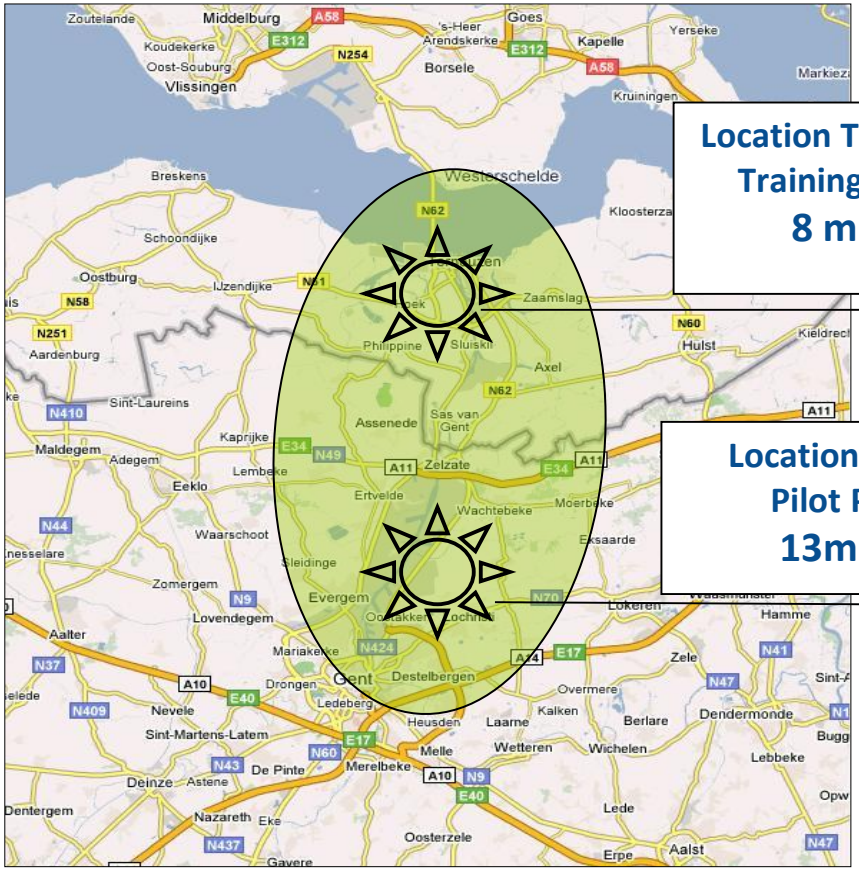
YARA

Cargill

Royal Nedalco

RosendaalEnergy Renewable energy

Project Bio Base Europe
Interreg IV Vlaanderen-Nederland



Location Terneuzen:
Training Center
8 mio €

Location Ghent:
Pilot Plant
13mio €

Project Bio Base Europe
Interreg IV Vlaanderen-Nederland

Bio Base Europe Pilot Plant

Bio Base Europe is supported by:

Interreg Vlaanderen Nederland
Europa investeert in uw regio

Europese Unie
Europees Fonds voor Regionale Ontwikkeling

Vlaanderen In Actie Pact 2020

Agentschap Ondernemen

Ministerie van Economische Zaken

Provincie Oost-Vlaanderen
Voor ieder van ons

Provincie Zeeland

Zeeland Seaports
Port Authority

ROC WESTERSCHELDE

PORT OF GHENT

DELTA
the multi-utility company

UNIVERSITEIT GENT

Project Bio Base Europe
Interreg IV Vlaanderen-Nederland

Once the money raised, the building starts
Idle fire station:

Bio Economy: a lot of steel and concrete

Hall 2: White Biotech ~ fermentation and DSP

Hall 3: Green Chemistry and ATEX proof DSP

Bio Base Europe Pilot Plant

- **Multi-purpose** pilot facility for **bio-based** products and processes in Ghent (Belgium)
- **Independent** organisation **without** industrial shareholders
- Current number of employees: 47

Bio Base Europe Pilot Plant

Bio Base Europe
Pilot Plant

GHENT BIO-ENERGY VALLEY

bioro
biodiesel refinery

alco BIOFUEL
power of nature

Electrabel

Cargill

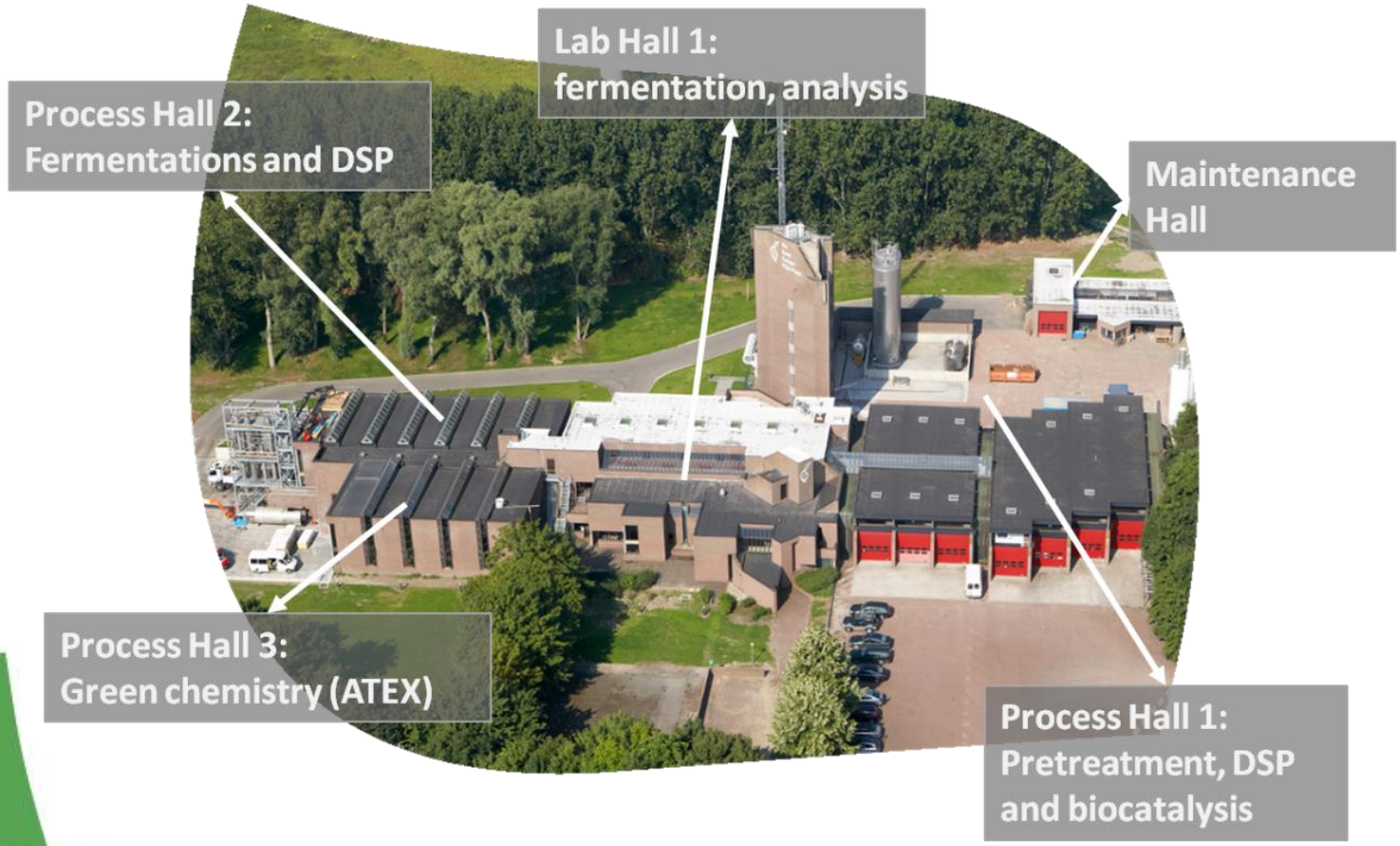
EuroSilo

Oiltanking

Rodenhuizedok:

300 000 ton	Bio diesel
200 000 m³	Bio ethanol
200 MW	Bio electricity

Bio Base Europe Pilot Plant:



Bio Base Europe
Pilot Plant

Process Hall 1

Biomass pretreatment, biocatalysis and DSP

Bio Base Europe
Pilot Plant

Process Hall 2

Fermentations and DSP

Bio Base Europe
Pilot Plant

Process Hall 3

Green chemistry and ATEX proof DSP

Bio Base Europe
Pilot Plant

Laboratory

Analysis and process development

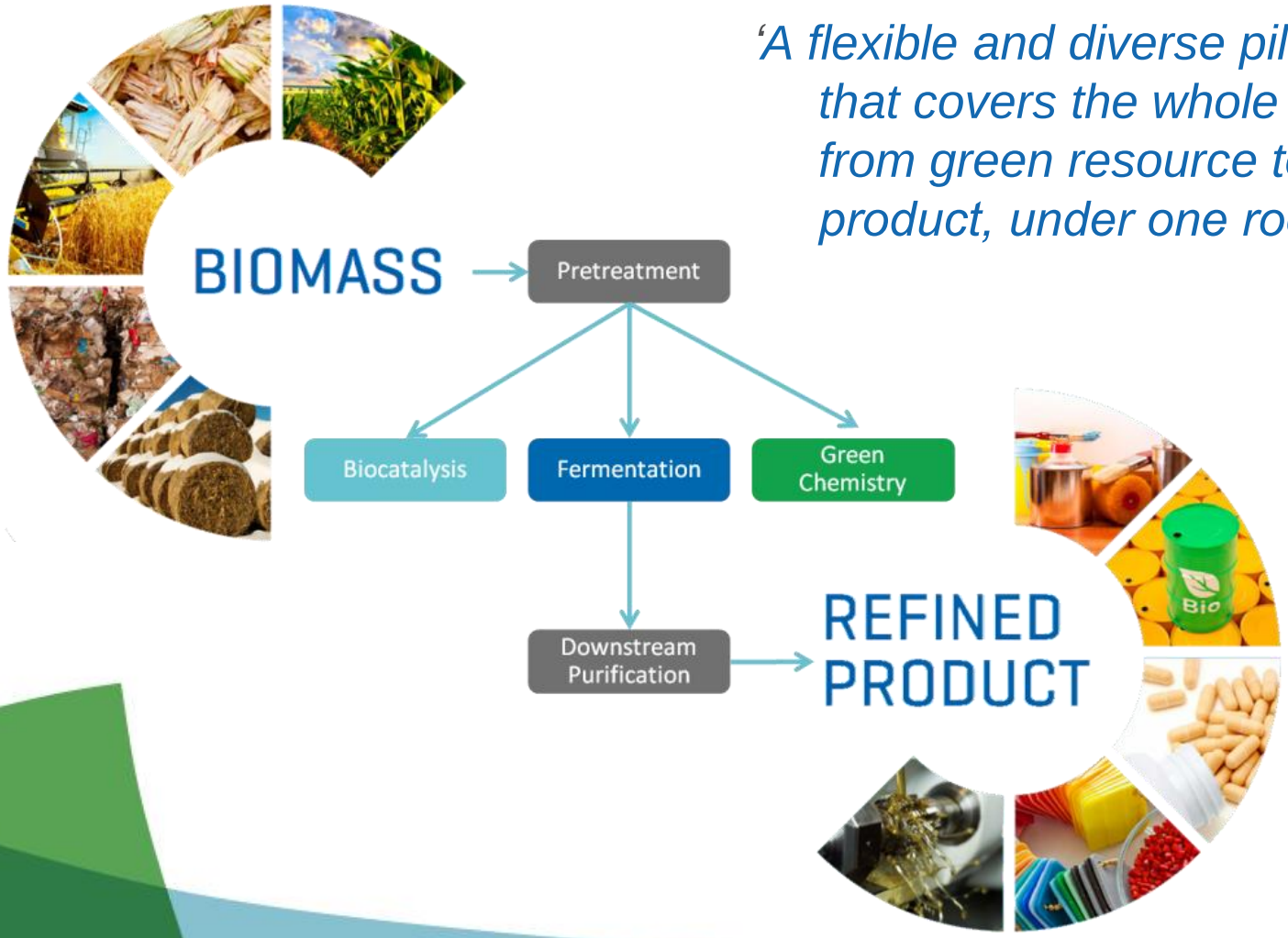
Bio Base Europe
Pilot Plant

Storage

Storage of different kind of biomass

Bio Base Europe Pilot Plant
Our unique offer:

'A flexible and diverse pilot plant that covers the whole proces, from green resource to final product, under one roof'



Bio Base Europe Pilot Plant
What we do!

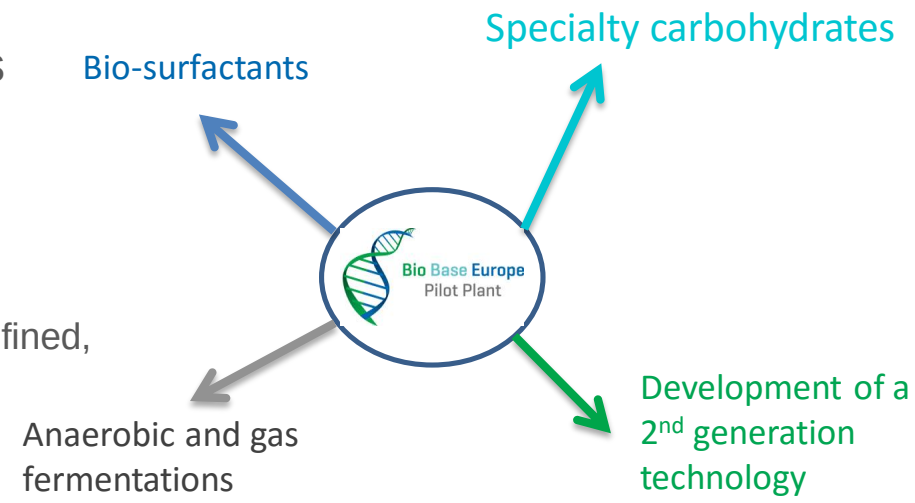
PRIVATELY FUNDED PROJECTS

Confidential

PUBLICLY FUNDED PROJECTS:
Technology development, scale up and
Creating awareness & building new value chains

- (financial) stability midlongterm
- building expertise
- communication/ publicity/ awareness
- developping IP, “creates FTO”

No manure, waste waters, no undefined, toxic, untraceable,… feedstocks
No Anaerobic digestion



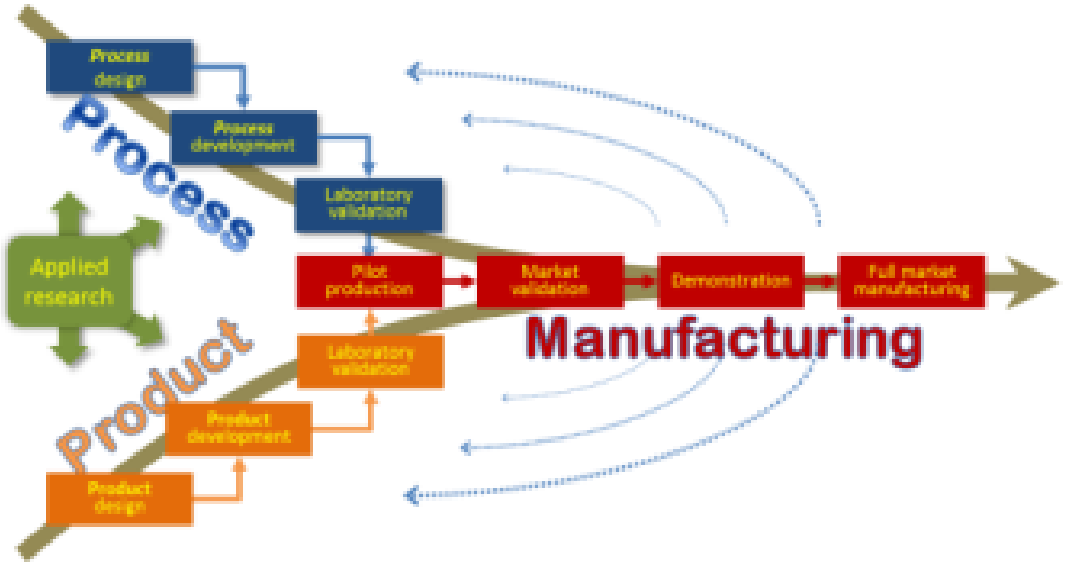
Bio Base Europe Pilot Plant
What we do!

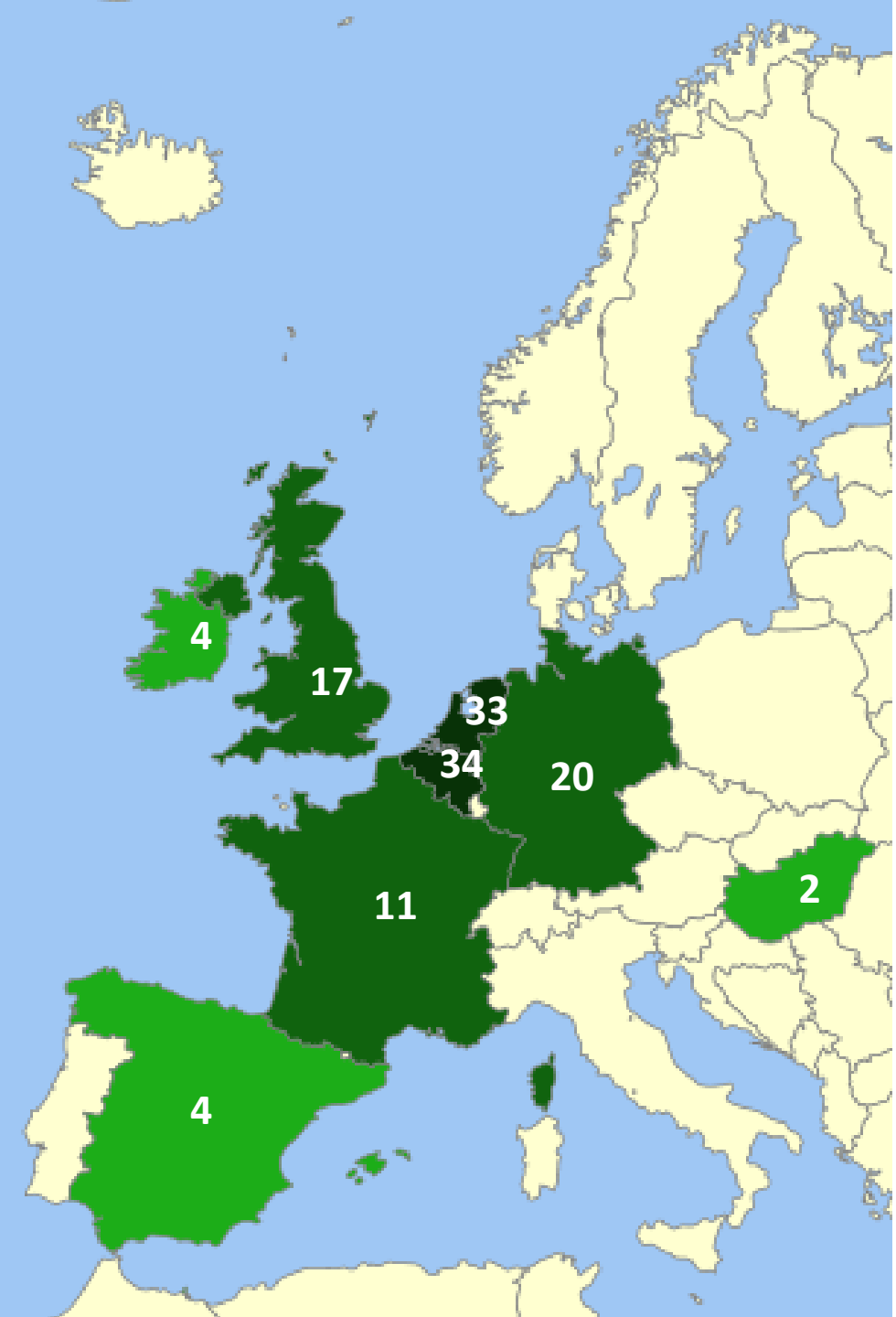
Bio Base Europe
Pilot Plant

PRIVATELY FUNDED PROJECTS

Confidential

- Process development & optimisation:
  proof op concept, opex, capex, LCA
- Upscaling mg to g, kg, ton scale
  product validation, market validation
- First series production
  Market development

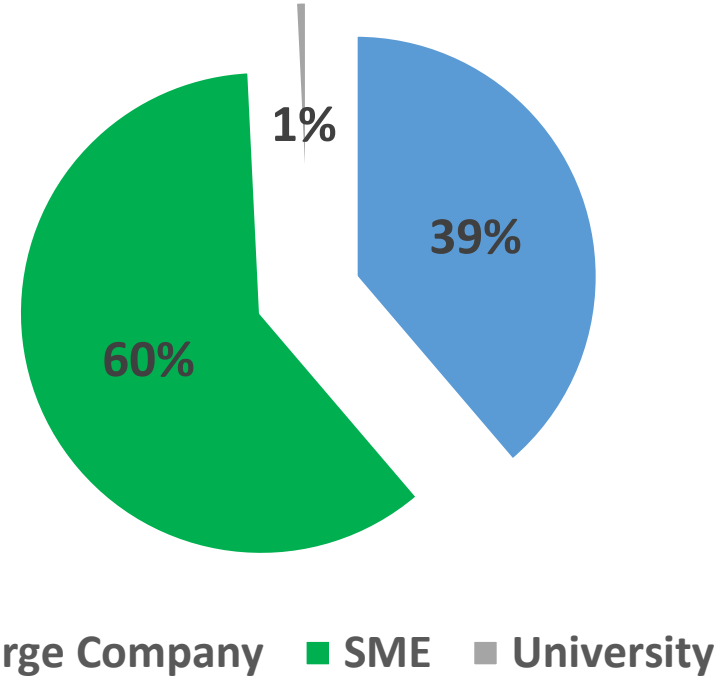




2013-2014-2015

Bilateral collaboration with industries
129 projects

Rest of the world:
Canada: 1
Hong Kong: 1
Japan: 3
US: 2



PUBLICLY FUNDED PROJECTS:
Technology development, scale up and Creating awareness & building new value chains

CURRENT:

FP7 :
NANO3BIO (**chitosan**)

H2020:
2GBIOPIC (**2G ethanol**)
Marisurf **(marine biosurfactants)**
ERIFORE **(circular economy forestry based)**
Life+ RENEWPACK: **biofilms from coproducts**
REHAP **(valuable compounds from forestry residus)**
Superbio **(support actions for biobased value chains)**
NanoPack, DAFIA, FALCON: GA negotiation

H2020 BBI-joint undertaking:
Pulp2value (Demo) **(valorisation coproducts)**
Carbosurf (R&IA) **(speciality carbohydrates & biosurfactants)**
DEMETER (demo) **(enzymes for anaerobic digestion)**

INTERREG NWE:
Bio Base 4 SME **(Support actions to SMEs)**

Interreg EU:
SmartPilots **(network shared pilot facilities for Bio Economy)**

Interreg VI-NDL:
BioHart **(renewable aromatic molecules)**

UNDER EVALUATION:
FISCH-ICON (FL): Enzymase
H2020-BBI-2016: 6 projects (Pilots4U, RESOLVE, APPROACH, AFTERLIFE, WISER, MIND)

IN PREPARATION:
H2020- INFRAIA-02-2017 (2nd stage): RIs for Gasfermentation
H2020-Biotec-05-2017: gasfermentation
H2020-Biotec-06-2017: optimisation cell factories
H2020-SC5-14-2017: enhanced mineral recovery

PUBLICLY FUNDED PROJECTS:
Technology development, scale up and Creating awareness & building new value chains

PAST Projects

FP7 : BIOSURFING (**biosurfactants**); NOVOSIDES (**novel glucosides** via biocatalysis); IB2Market (**biosurfactans & specialty carbohydrates**)

ERA-IB: Chito bio engineering **(chitosans)**

IWT: VISIONS (**2nd generation** technologies for **organic waste streams**)

INTERREG NWE: Bio Base NWE (support activities for the biobased economy with focus on **SME's**)

INTERREG VL-NDL: Bio Base Europe (BBEPP & BBETC)

EFRD: investment in **15m³ bioreactor** and auxilairy equipment

Enterprise Flanders: Ghent Syngas cluster (**syngas** to **chemicals);** DEMOPROBIO (**in situ product recovery** linked to ABE fermentation); BIOKATALYSE (**biocatalysis)** BIOCLUSTER **(renewable products)**

EU DG Enterprise: Mkets-pilotlines: analysis actual situation & **policy recommendations** for pilotlines for KETs

Consortia projects

Geographical distribution of European project partners within consortia based projects

SUM UP:

Bio Base Europe Pilot Plant

our history:

- Investment in infrastructure (2009 – 2012)
  - European Structural & Investment Funds (ESIF):

    Interreg project Vl-NL (2009 – 2013): 13 M€

    Interreg NWE (2013-2015): 1,3 M€

    EFRO (2014-2015):1,3 M€
  - Interreg Vl-NL (2016-2019):0,2 M€
- Operational costs of demonstration projects (2011 - now)
  - Private funding (direct collaboration with companies)
  - Public projects (FP7, Horizon2020, national programs,…)

The Future:
What does it take?

Critical mass to service companies:

- People & Expertise
- Equipment: state-of-the- art & new technologies

Challenges for us:

- Continuity in projects/funding to
  - keep growing team employed and
  - to pay the bills
- Further (support for) investment in “hardware” required

The Future:

What does it take? Our recommendations for the future

- Further Investment in open, multifunctional (ideally independent) pilot & demo infrastructure by public funds (e.g. EFRD).
  (*Bear in mind: it's not the SPF who get's the benefits of the innovation! Societal impact)*

- Pilot & demonstration activities to be funded by public (e.g. H2020) or private funding.

- Avoid scattering of resources/ euros :
  a few well equipped open pilot & demo infrastructures with sufficient critical mass

- dedicated pilot lines, demonstration plants and certainly flagship plants if not multifunctional: they are product & process specific, beneficiaries are therefore largely "private" and should be funded accordingly

SmartPilots
Interreg Europe

European Union
European Regional
Development Fund

Smartpilots:

Improving policies in support of shared pilot facilities to increase their impact on the Key Enabling Technology Industrial Biotech and the European Bio-economy

Brecht Vanlerberghe

October 11th Brussels | Synergies Workshop ESIF & H2020

Partnership

Shared Pilot Facilities & their respective regions:

- **Bio Base Europe Pilot Plant (Flanders, Belgium) with EWI**
- **Centre for Process Innovation (Tees Valley, United Kingdom)**
- **VTT (Helsinki Uusimaa, Finland),**
- **Bioprocess Pilot Facility (Zuid-Holland, The Netherlands) with the province Zuid-Holland**

as Region without SPF:

Innovhub SSI for Lombardy (Italy).

As partners/case studies to the consortium:

- ARD (France)
- Fraunhofer CBP (Germany)

SMARTPILOTS:
Subobjectives

1. **Optimizing direct support mechanisms for SPF**:
   - Investments in hardware/infrastructure , maintenance and replacement of equipment needs
   - regions will exchange direct support practices - best value for money for each region

2. Optimizing indirect support for SFP:

By promoting innovators to use of SPF

- Innovations have an increased chance to make it to the market
- the long term viability of the SPF are supported

Best practices including impact analysis will be exchanged between the regions

3. Facilitate interregional cooperation for pilot activities:

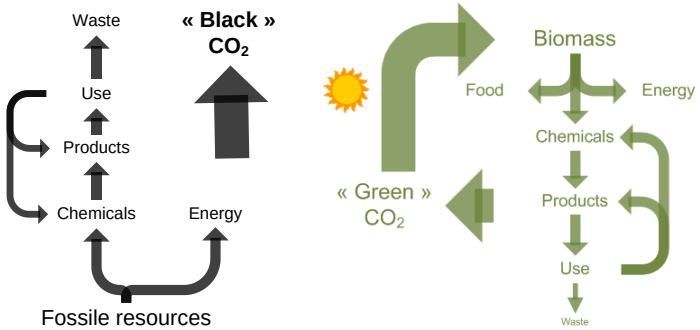
- by promoting regional innovators to use an SPF from outside the region
- by co-investment of different regions in the same SPF

Key Messages
Interreg EU project SMARTPILOTS

Adressing societal challenges!

Message 1:
Bio economy & industrial biotechnology as KET address societal challenges such as developing a sustainable, innovative and knowledge-based economy in Europe, creating jobs and meeting climate targets.

Shared Pilot Facilities are a crucial element to make it happen



from fossil to renewable resources

Why is it not happening? The Valley of death!

Message 2: Shared Pilot Facilities (for the KET IB / Bio-economy) are open access research and demonstration facilities investing in a broad spectrum of state-of-the-art equipment and offering required expertise with the aim to help innovative companies scale-up their successful research to an industrial scale. (= Shared Pilot Facilities are ***shared investments in equipment and expertise***).

Message 3: The long lead time associated with commercialization of novel industrial biotechnology processes causes many companies to fail. Shared Pilot Facilities help companies to bridge this 'valley of death' by scaling up innovations ***from lab scale to industrial scale***.

Message 4: Collaboration, in an early stage of innovation, with open access shared pilot facilities maintaining a high level of innovation capability ***substantially lowers the financial risk*** for the innovating company and ***speeds up the commercialization*** of their new product or process.

Message 5: Europe recognizes too much R&D is deployed outside of Europe. Funds for support of the demonstration phase of promising innovations in the field of industrial biotechnology / bio-economy, are available, but companies find it difficult to access these funds. ***Shared Pilot Facilites can help companies to access these funds.***

Why " SMARTPILOTS"?

Message 6: SmartPilots brings together the main six European Shared Pilot Facilities (SPF) for the Key Enabling Technology Industrial Biotechnology, with the aim to discuss and ***share best funding/operating practices and improve policies in support of SPF.***

Message 7: Engaging with SmartPilots will provide effective mechanisms for open discussion between policy makers and managing authorities of policy instruments with intermediaries and beneficiaries of the funds.

Message 8: To be effective and relevant, ***critical mass*** is required both in hardware and people (=equipment and expertise). As SPFs get no risk premium for the continuous and large investment needed to remain state-of-the-art, a ***full commercial business model is not viable***. Therefore ***public investment in SPF is indispensable*** and there is a need to develop a ***specific business model*** for such facilities.

Message 9: ***Public investment*** in Shared Pilot Facilities ensures that the ***high cost*** of pilot and demonstration actions can be ***mitigated for SMEs*** through the availability of ***open access*** capabilities.

Solutions the " SMARTPILOTS" project offers

Message 10: If ***operational programs*** are not ***amended*** and implemented so they allow direct and indirect funding for SPF and their users, SPF will disappear, which will hamper companies to innovate.

Message 11: Regions should ***keep investing in existing facilities*** to safeguard their expertise and to keep their state-of-the art equipment up to date. Starting new initiatives risks diluting available technologies and expertise.

Message 12: The international nature of the bio-based economy can restrict access to regional funds, limiting the benefits to regional economies.

Message 13: To maximize the impact of SFP, regional policy makers should create mechanisms to allow support for ***international collaboration (cross border) between SPF, their users and regions.***

More Info?

SmartPilots
Interreg Europe

European Union
European Regional
Development Fund

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