



BISCI 2023 Annual Event
'Dare to be Circular'
Chemical Ecosystem Breakout





NIVEAU DU GLACIER
EN 1985

Anton van Beek



Dow Chemical Company – Group President UK, Nordic and Benelux, France, Spain and Portugal

Amcham EU – Board Member

Everlam – Board Member

Smart Delta Resources – Chairman

Safety First Netherlands – Chairman



Chemelot – Executive Director

Arcus College – Supervisory Board

Brightlands Agrifood Ventures – Chairman

Chemelot Ventures – Chairman; Interim CEO/CFO



Circular Plastics NL – Managing Director

Geostick – CEO

Wurth Dinol – CEO

Wurth Diffutherm – CEO

AkzoNobel – various roles



Invest-NL – Lead Biobased and Circular Economy

The Ocean Cleanup – General Manager Plastics

Research International Benelux – CEO

Orange – Various Roles

Philips Electronics – Manager Product Strategy and Planning

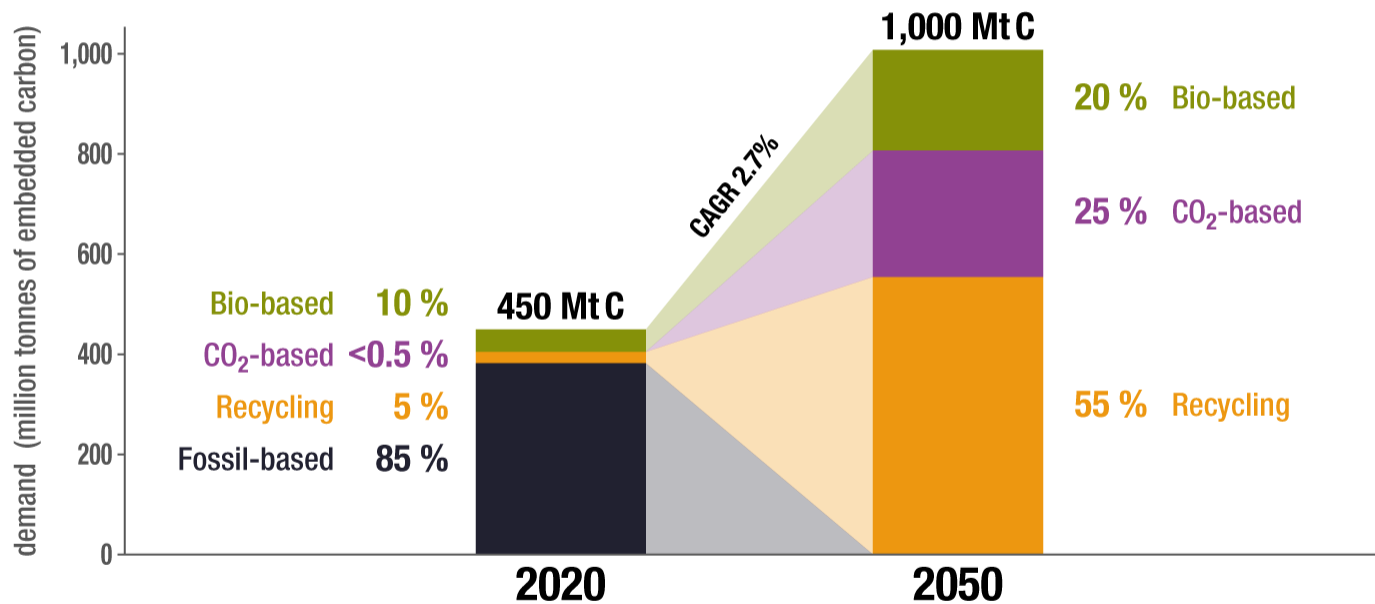
DSM – Various Roles

Question 1

How much Carbon will be required globally for materials in 2050?

- A. 10 mln tons**
- B. 100 mln tonnes**
- C. 350 mln tonnes**
- D. 1000 mln tonnes**

Global Carbon Demand for Chemicals and Derived Materials in 2020 and Scenario for 2050 (in million tonnes of embedded carbon)





1000 mln tons Carbon

=

1200 mln tons Materials

=

4400 mln tons CO₂ (material)

~

15000 mln tons CO₂ (life cycle)

Question 2

How much plastic packaging materials do you use every year?

- A. 1 kg**
- B. 30 kg**
- C. 100 kg**
- D. 300 kg**



Question 3

How much plastic material is recycled ?

- A. 1%**
- B. 5%**
- C. 10%**
- D. 50%**

Optimisation value chain necessary to unlock feedstock volumes

In which step should the contaminants be removed?



Supply: 'input waste' is either mixed with residual waste or highly contaminated



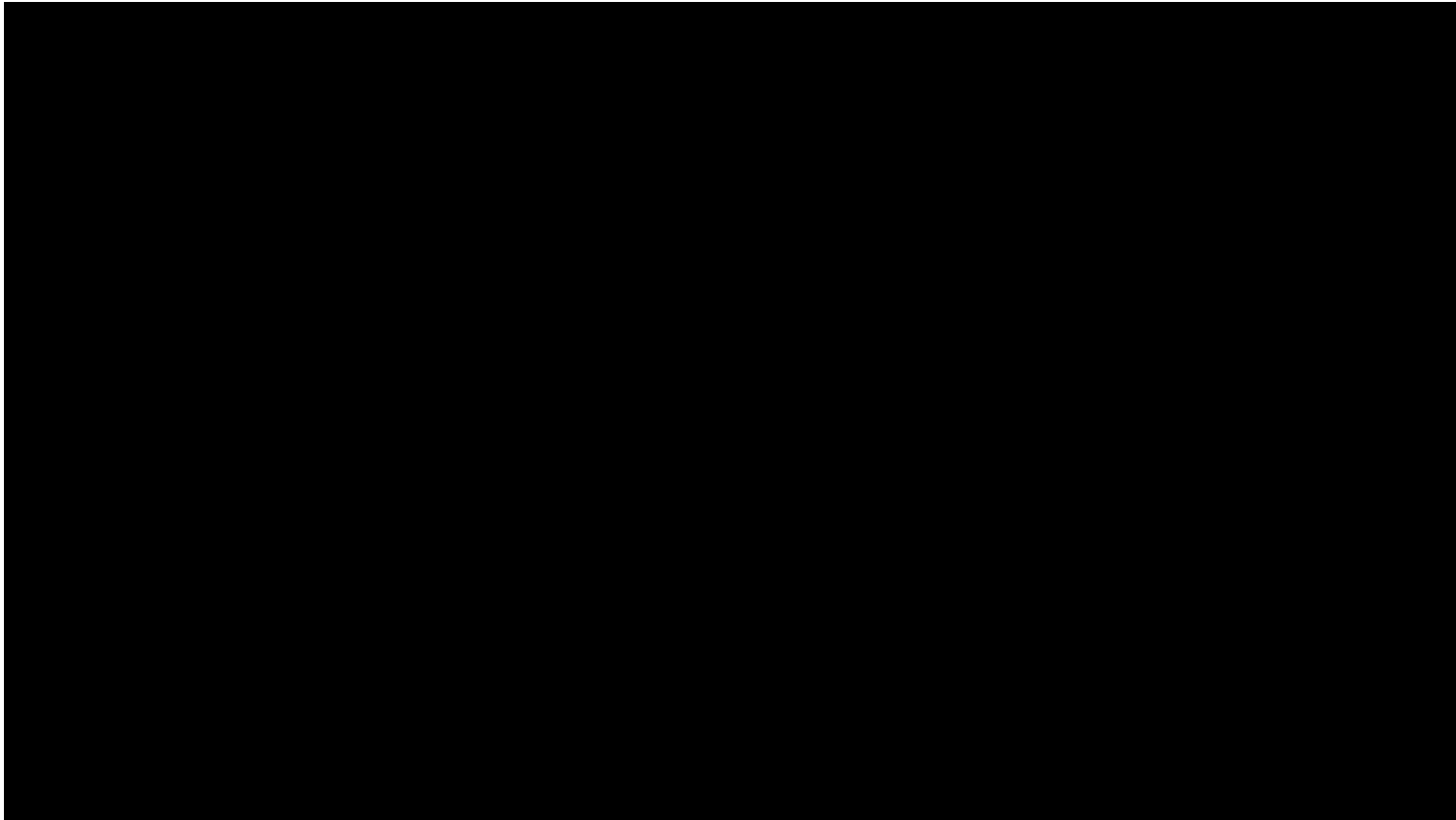
Demand: Cracker 'input spec' for pyrolysis oil demand very low contaminants





Arnold Stokking

Chairman Groene Chemie Nieuwe Economie



Anton van Beek



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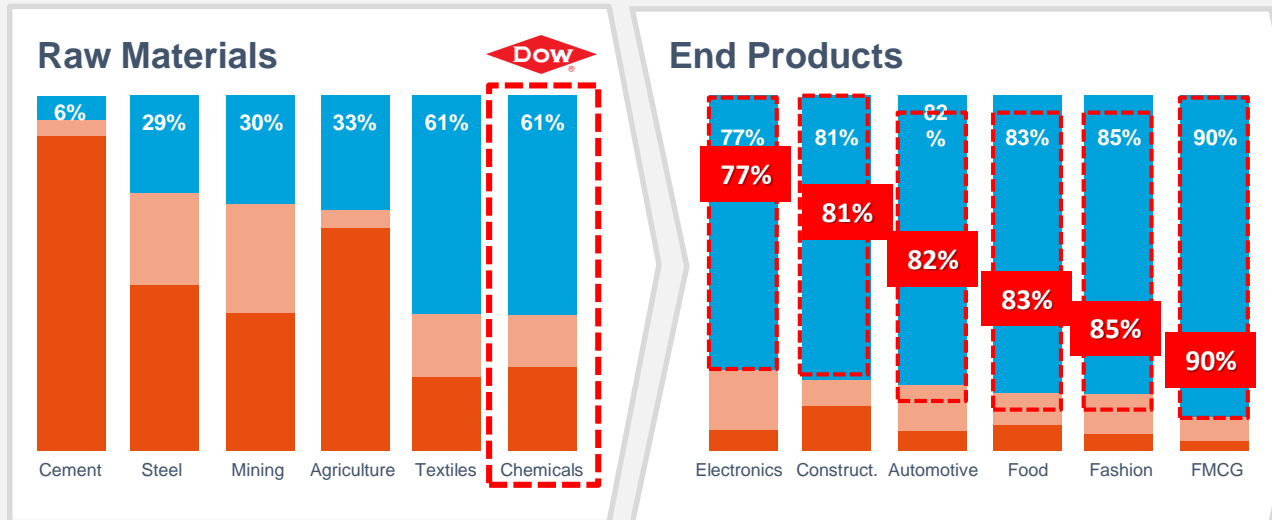
Safety First Netherlands – Chairman

PATH TO ZERO JOURNEY: CHEMISTRY IS KEY

Dow Carbon Neutral & Circular Materials Have an Impact to Cut Customers CO₂e Emissions (Scope 3)

Emission split in Scopes 1, 2 and 3 upstream for selected industries (CO₂e, 2019)

- Supply chain (Scope 3 upstream)
- Purchased power, etc. (Scope 2)
- Operations (Scope 1)



Note: Top companies selected based on number of reported Scope 3 upstream categories and industry fit; FMCG = fast-moving consumer goods

Source: CDP, BCG

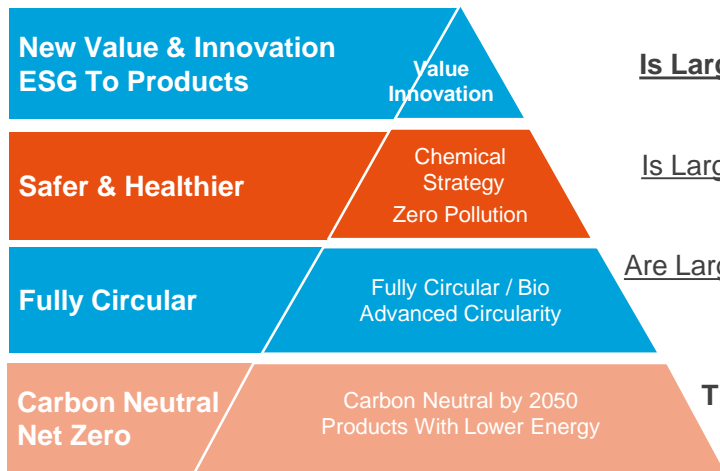
SUSTAINABLE & DIGITAL TRANSFORMATION: NEW GROWTH & INNOVATION MODEL



Sustainable Transformation Sustainable Chemistry

New Growth Business Model

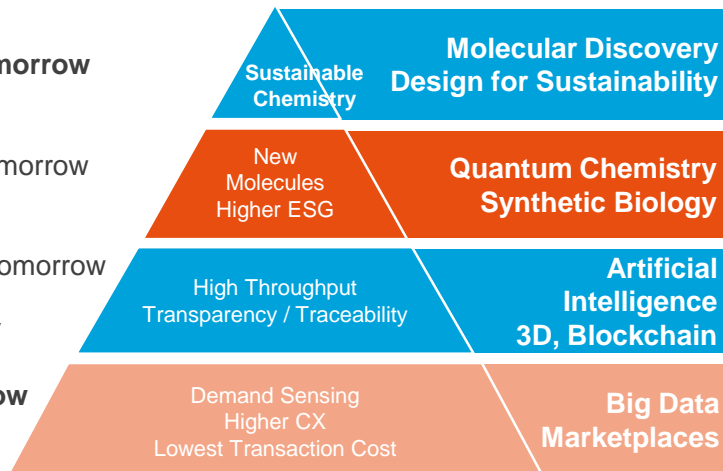
Digital Transformation Chemical Industry



The Value of Today
Is Largely Not the Value of Tomorrow

The Industry of Today
Is Largely Not the Industry of Tomorrow

The Crackers of Today
Are Largely Not the Crackers of Tomorrow



The Molecules of Today
Are Largely Not
The Molecules of Tomorrow

WARNING:
**Large & Disruptive
Biz Opportunity**

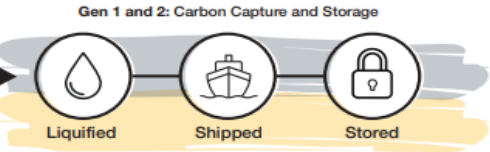
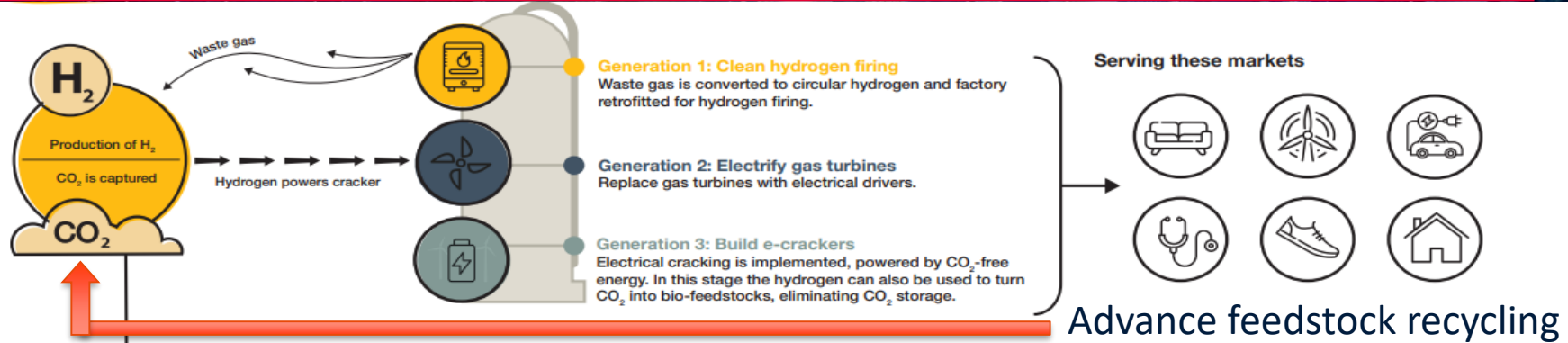
Sustainable Transformation

Digital Transformation

Source: The Chemical Industry under 4th Industrial Revolution by Andrew Hagan & Rafael Cayuela Wiley-VCH Verlag GmbH, 2020 ISBN 3527344012, 9783527344017



PATH2ZERO & PATH TO CIRCULARITY TERNEUZEN



Making investments that will endure for decades

Dow Terneuzen
3,600 Dow employees
Collaborating with MKB to develop and build new facilities

2,000 Engineering and construction jobs created
400-500 Permanent jobs created

35% **Gen 1: 2026**

1.4 million tons of CO₂ reduction a year
the equivalent of 300,000 cars

1.4% tightening of the ETS benchmark

~10% of the Netherlands' industry 2030 target

~25% of Zeeland's 2030 target

42.5% **Gen 2: 2030**

Gas turbines replaced by **Electrical drivers**

1.7 million tons of CO₂ reduction a year

100% **Gen 3: 2030-2050**

4 million tons of CO₂ reduction a year

E-cracking powered by renewables

CO₂ Synthetic feedstock



Chemelot – Executive Director

Arcus College – Supervisory Board

Brightlands Agrifood Ventures – Chairman

Chemelot Ventures – Chairman; Interim CEO/CFO

Chemelot

Loek Radix
2 maart 2023

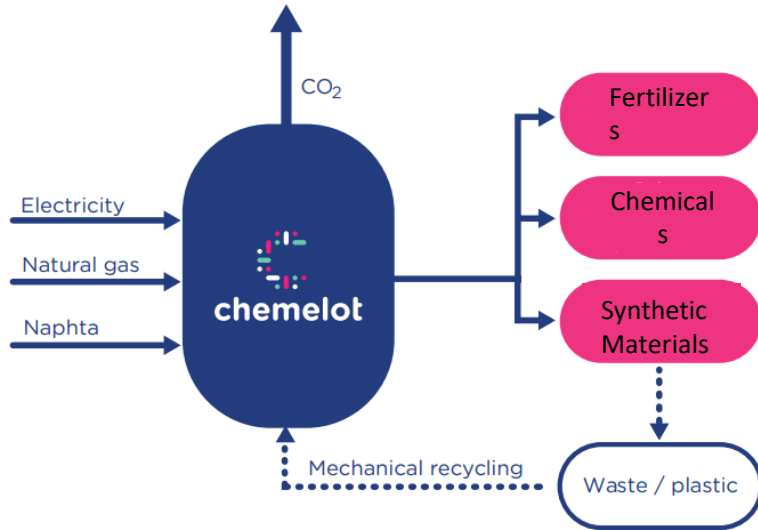


Chemelot

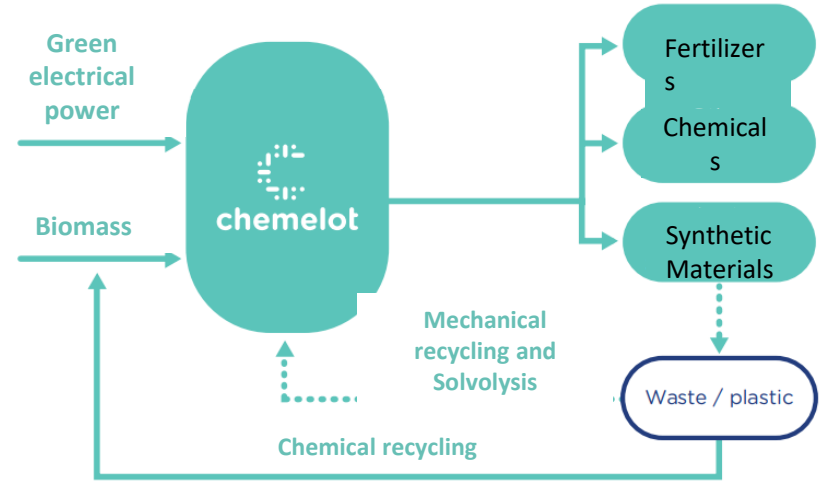
- 60 plants, 17 companies
- Highly integrated in energy and product flows (ammonia, ethylene, propylene)
- Chemelot is one system
- Chemelot is the starting point for almost all industrial/agricultural activities in Europe



Chemelot's development towards carbon neutrality



Chemelot 2018



Chemelot 2050



Projects

- QCP (LyondellBasell/SUEZ): mechanical recycling
- SPEAR (SABIC/Plastic Energy): pyrolysis mixed plastic waste
- Black Bear Carbon: pyrolysis car tires
- RWE/FUREC: gasification mixed household waste
- Syclus: bioethanol to bioethylene



Circular Feedstock imply:

- From “hassle free” natural gas and oil to an additional manufacturing step to produce feedstock
- From liquids and gas to solids
- A huge logistical challenge





Circular Plastics NL – Managing Director

Geostick – CEO

Wurth Dinol – CEO

Wurth Diffutherm – CEO

AkzoNobel – various roles

Circular Plastics NL

Dare to be Circular Conference

M.J. Spekrijse – managing director CP NL

MECC Maastricht, March 2nd , 2023



www.circularplasticsnl.org

Mail: info@circulaplasticsnl.org

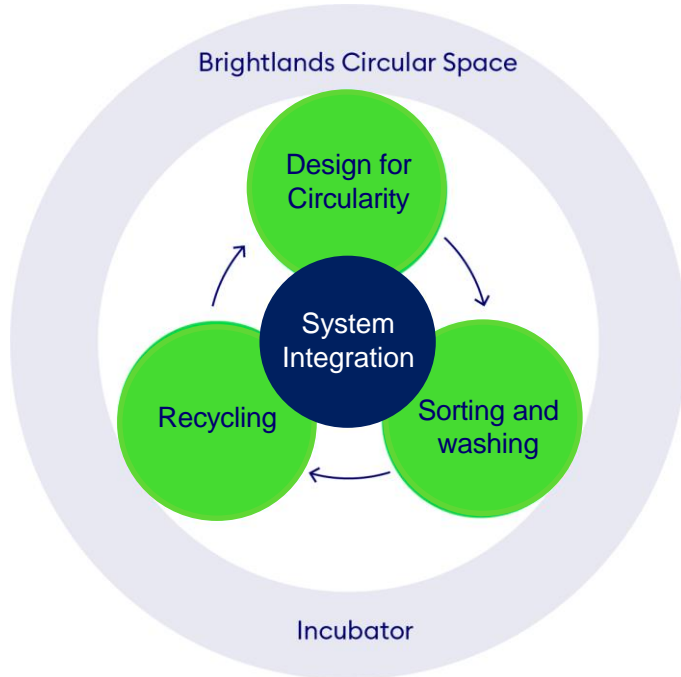
LinkedIn: Circular Plastics NL

The NGF Circular Plastics NL program:

- Make plastics fully circular: 50% in 2030 and towards 100% in 2050
- Use subsidies to accelerate the transition by realizing material and process innovations
- Focuses on bottlenecks in different value chains to close the cycles for existing plastics
- Program in 3 phases: 2 + 2 + 4 = 8 years
- In total € 220 M available, of which € 124 M for the first phase
- Covering a wide array of TRL levels
- Research projects, show cases and pilot / demonstration facilities
- Strengthen the NL Eco system on circular plastics!

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Overview of the program



PROGRAMS

Show Case

P1a. System Integration

P1b. Design

P1c. Microplastics

P2. Characterization, sorting and washing

P3. Mechanical recycling of polyolefin packaging

(L)DPE, HDPE/PP

P4. Recycling of styrenics

PS, ABS, HIPS

P5. Chemical depolymerization

PET, Textile, PU, tyres

P6. Thermochemical recycling

From waste streams

P7. Brightlands Circular Space

P8. Incubator

The challenge: 1 million tonnes of waste



Courtesy of NTCP



< 15%



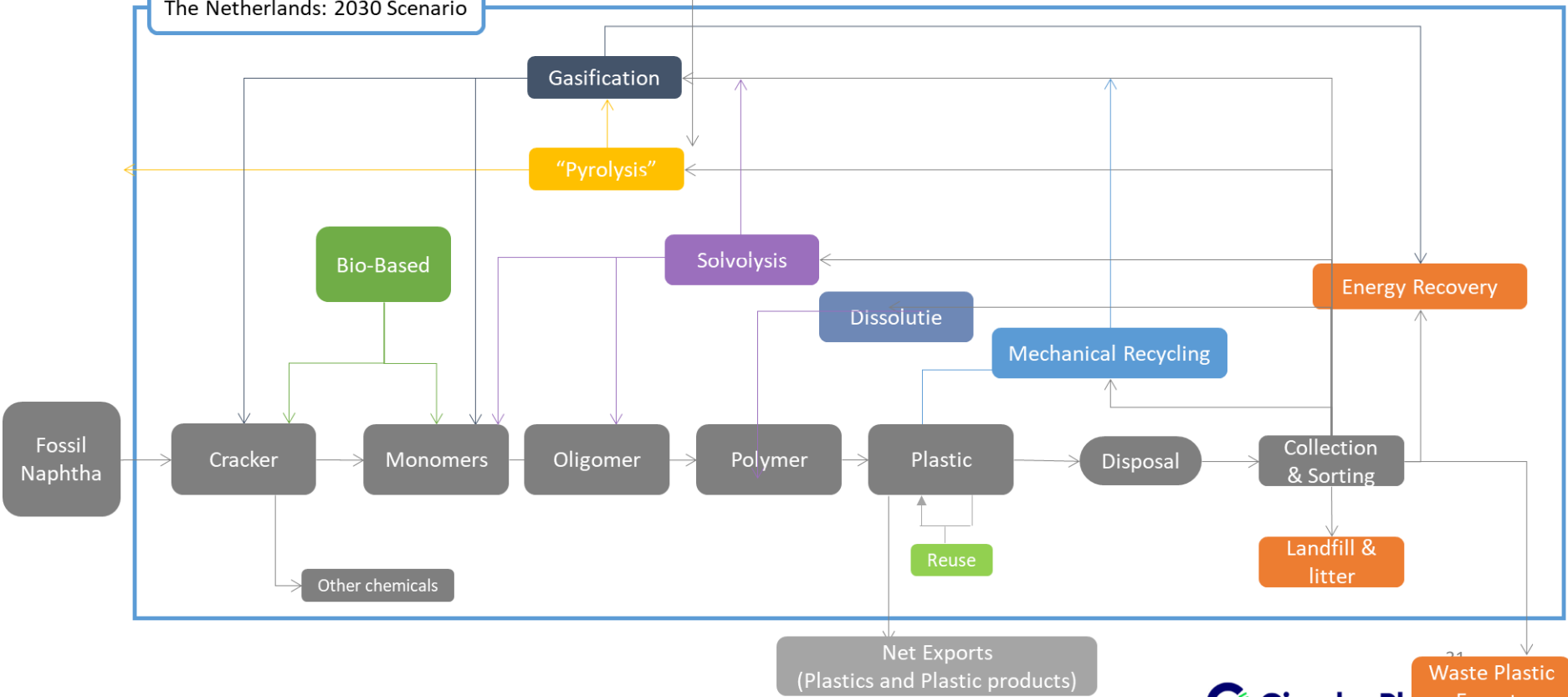
67 %



System integration: *scenario for circular plastics*

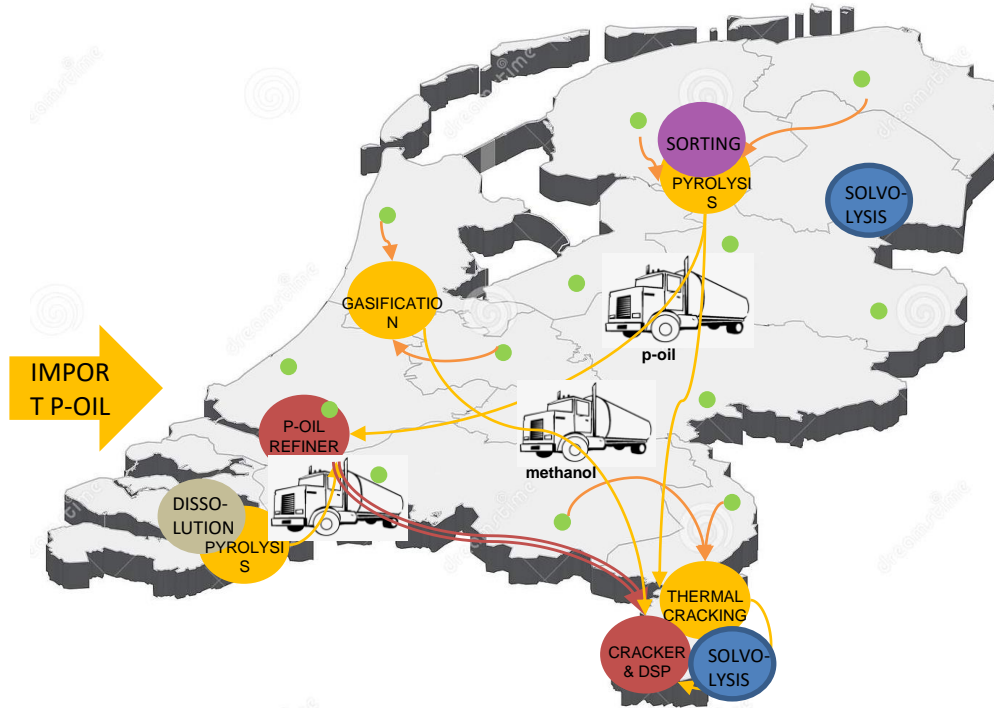
Import
pyrolysis oil

The Netherlands: 2030 Scenario



› The logistical challenge:

- commoditization
- thermochemical recycling
- existing assets



TODAY:

- 17 million people
- 50% Randstad
- 4 KSI's in NL

1M tonnes of waste NL

800k tonnes import
600k tonnes export!

Plastic supply chain & innovation required!

- What are the ideal locations to recycle?
- Finding the right balance: output = input, supply & demand
- Efficient transport of large volumes / efficient compacting
- Track & trace?
- Enormeous increase in required capacity / volumes to be recycled
- Security of feedstock supply
- ...
- ...

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Circular Plastics NL

Thank you

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www.circularplasticsnl.org

Mail: info@circulaplasticsnl.org

LinkedIn: [Circular Plastics NL](#)



Invest-NL – Lead Biobased and Circular Economy

The Ocean Cleanup – General Manager Plastics

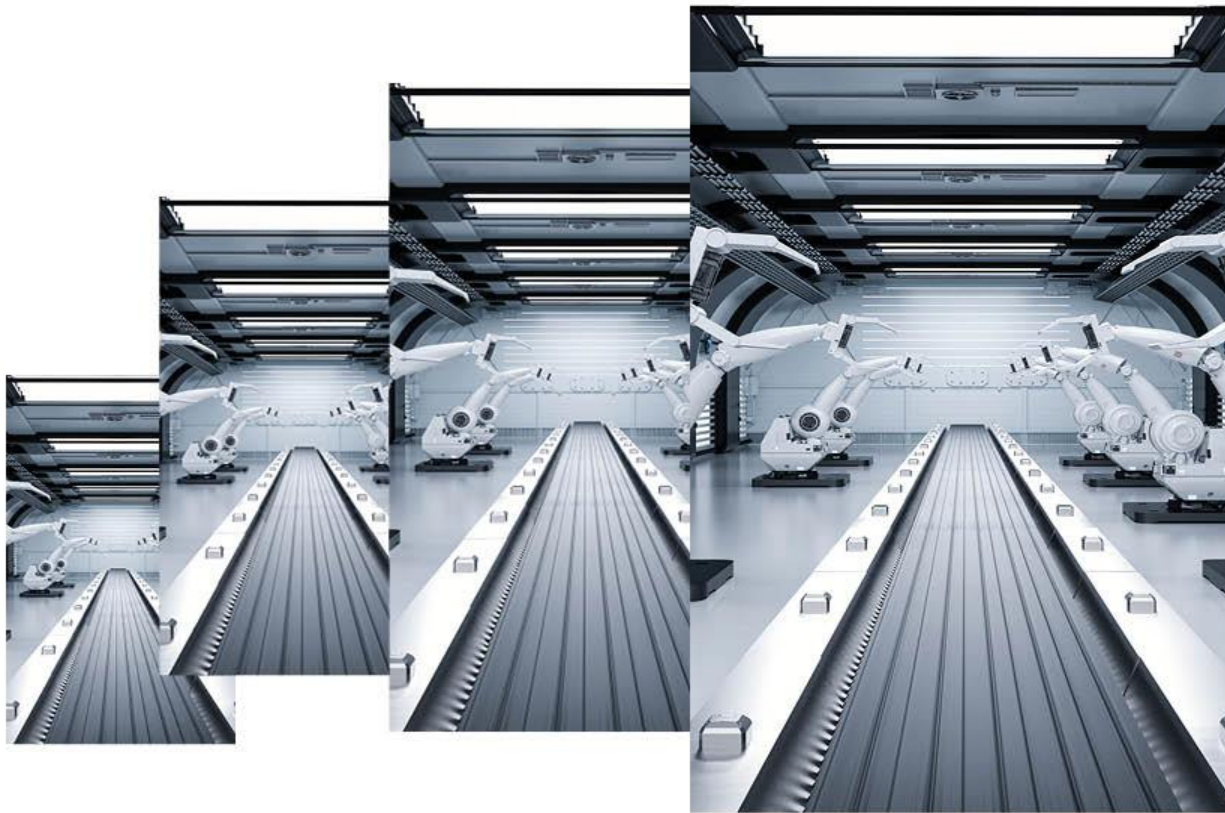
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IN



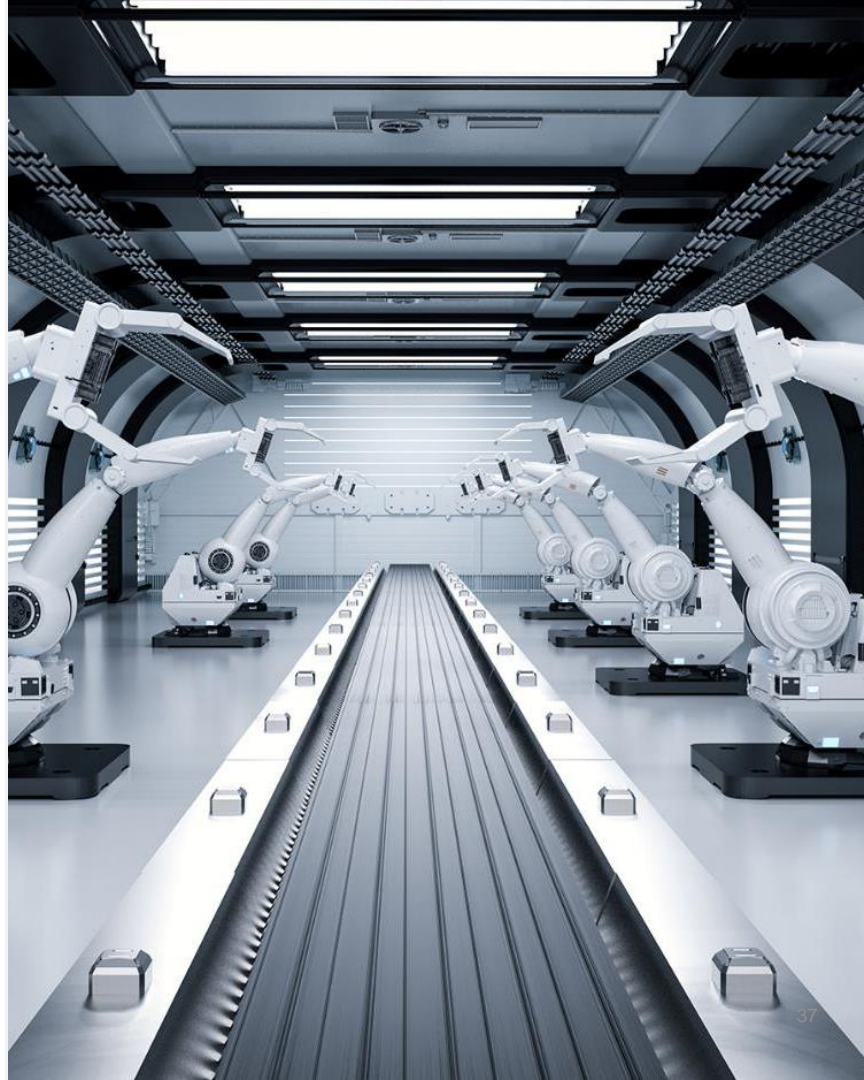
NL

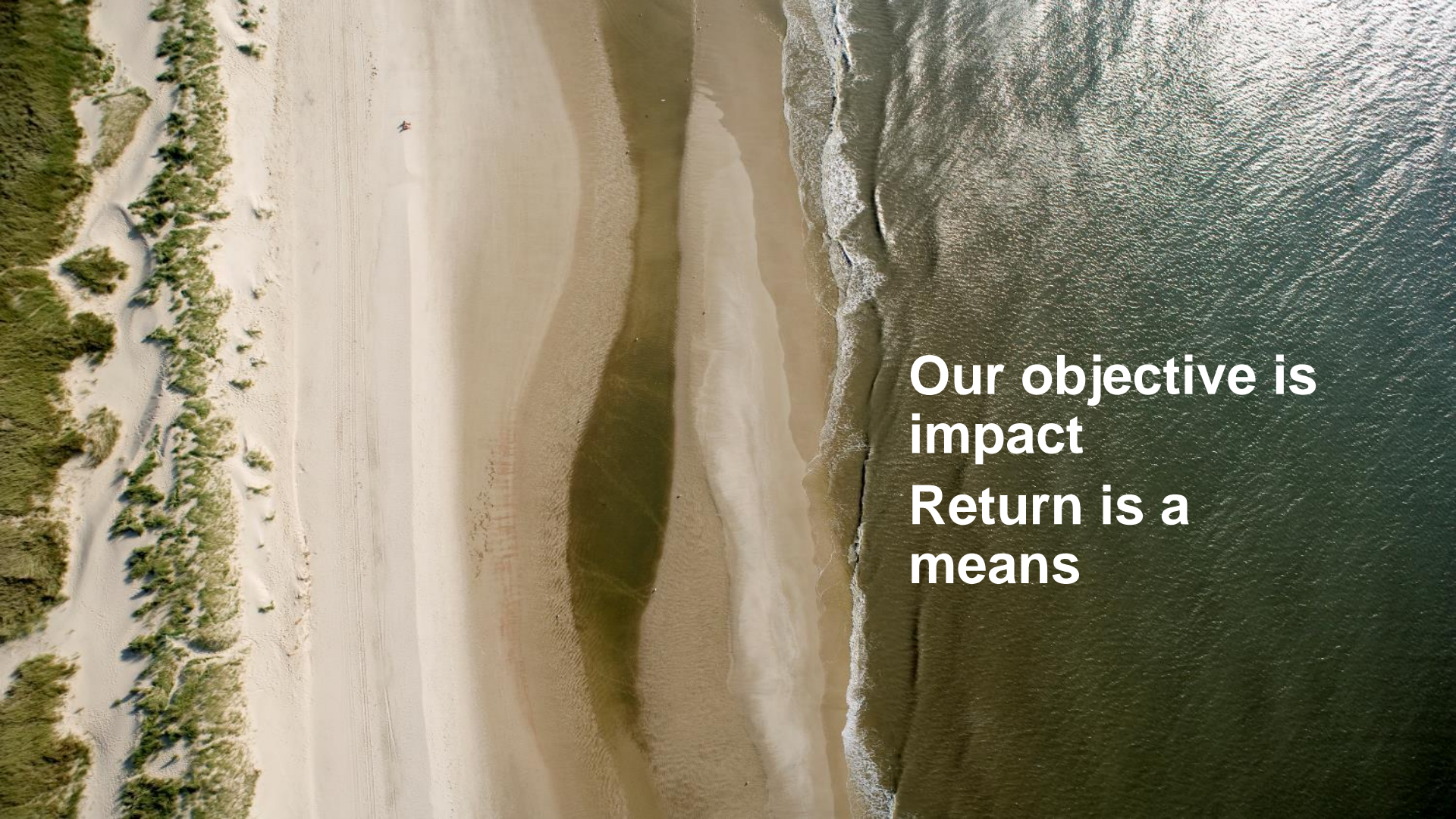
INVESTNL

impact investors

About Invest-NL

- Invest-NL NV is a private impact investor, investing with public funds
- Single shareholder is the Ministry of Finance
- Invest-NL is created by law and has a specific mandate
- Within mandate, the investment policy is independent from political guidelines
- Invest-NL is governed by a Board consisting of members from the private sector

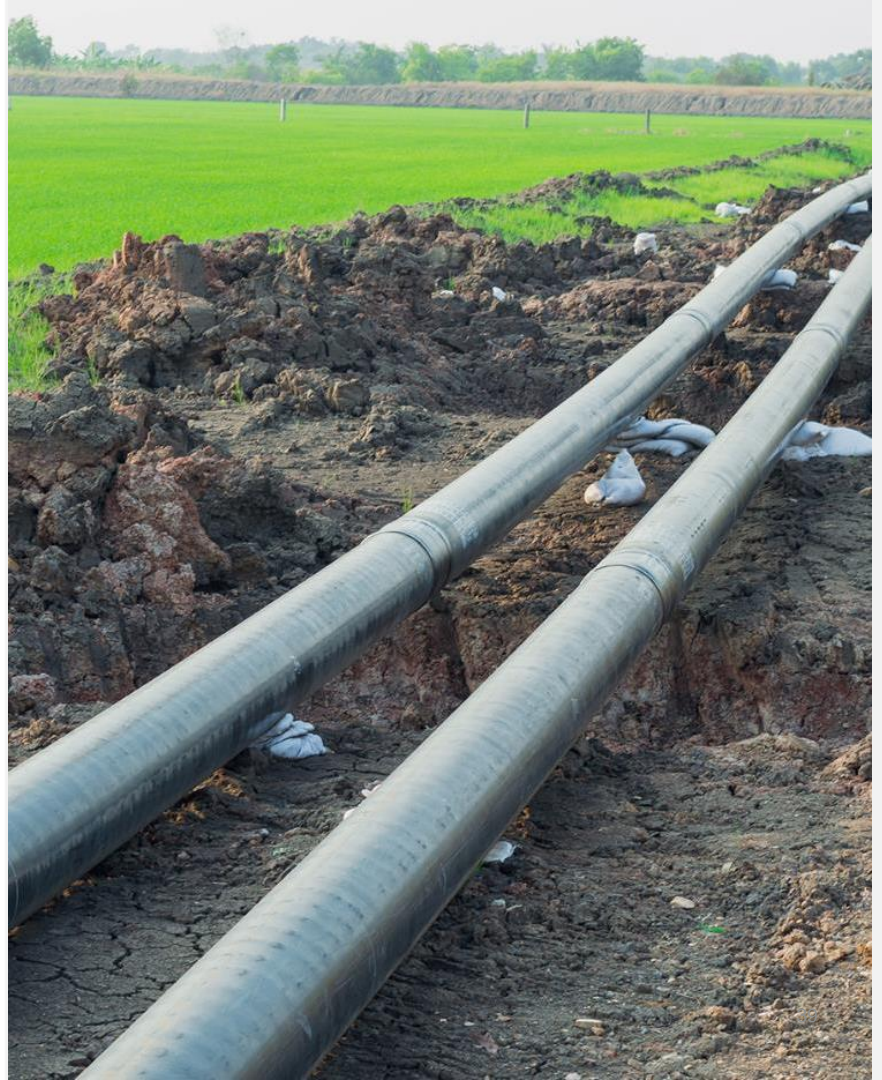




**Our objective is
impact
Return is a
means**

We enable financing for businesses and projects that seem impossible to finance

- We exist to support society's transitions:
 - Energy transition
 - Transition to a biobased and circular economy
 - Affordable care for all





Business Development

Works together with government, financial institutions, and the private sector to enable financing of projects and ventures, targeting transitions



Capital

Supplies patient capital for high risk ventures that increase sustainability and innovativeness of the Netherlands; targeting individual companies

Focus areas

Carbon neutral economy



Biobased and circular economy



Innovative scale-ups



Affordable care for all



Focus on a carbon neutral economy

For example:

- **Industry**
CO2 neutral heat sources, e.g. elektrification, biofuels or hydrogen
- **Transport:**
CO2 neutral shipping
- **Built environment:**
Collective heat systems
- **Agrifood:**
Protein transition





Focus on a biobased and circular economy

Circulaire technologies and business models that accelerate the transition to an economy without waste, closing the loops

- ❑ Projects and companies that address a substantial reduction of waste and CO₂ in the fossile **plastics** value chains
- ❑ Development of markets and technologies for **biobased materials** and applications
- ❑ Development of circular value chains of **critical raw materials** for the energy transition
- ❑ Specific **product sectors** like textiles or electronics

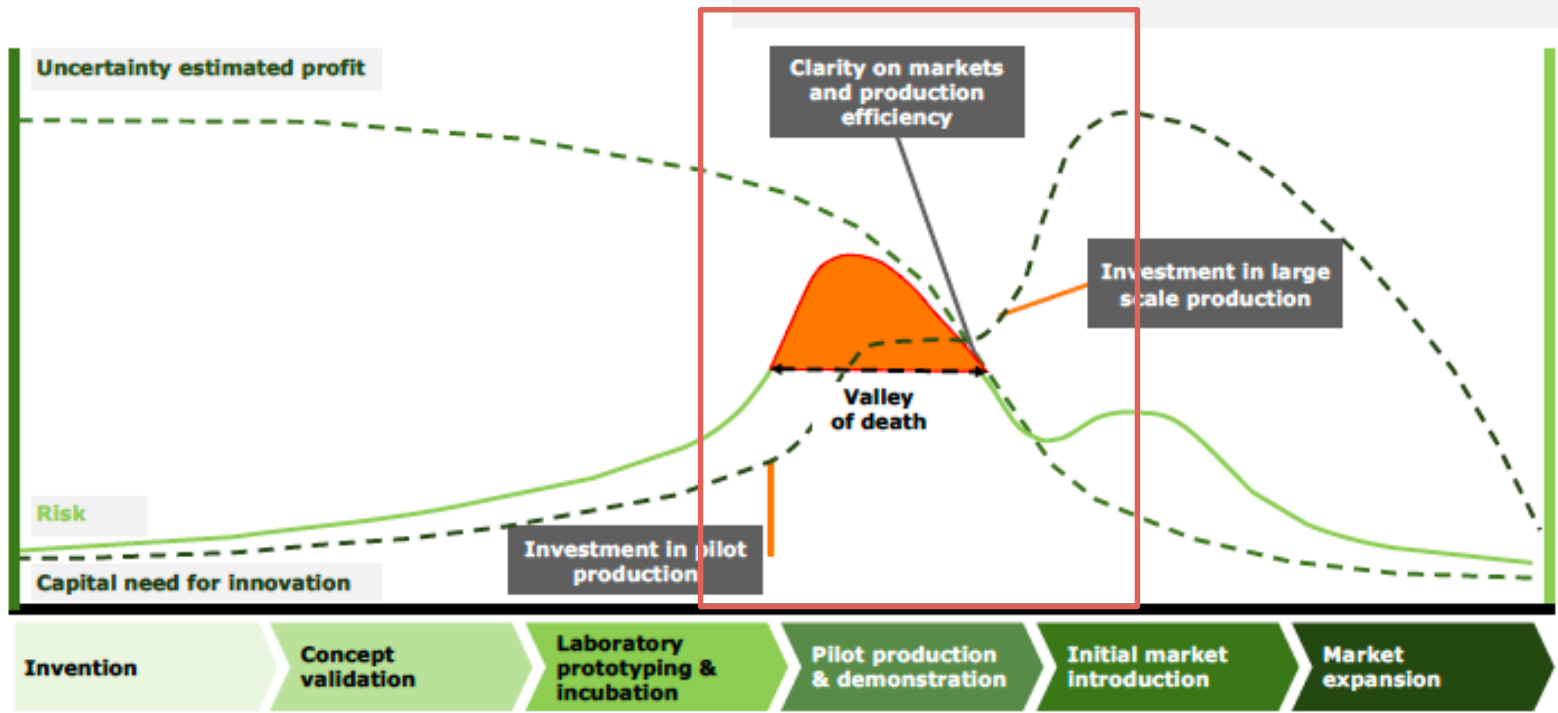
Financing companies in focus areas

Equity and debt

- Max. 50% of risk capital invested by Invest-NL (at least € 5 mln); total finance request exceeds €10 mln
- Entrepreneurs have skin in the game
- We require professional co-investors to participate
- We are additional – private investors cannot supply the total capital needed



Sweetspot: financing the valley of death of capital intensive innovative startups



Financing investment funds

Direct from Invest-NL, or through the European Investment Fund (EIF).

- Participations between € 5 mln and € 25 mln per fund
- Invest-NL prefers to step in in the first round as cornerstone investor, enabling the fund to start
- We support experienced and unexperienced fund investors



Innovation Industries



Dutch
Future
Fund



imec xpand



DACI
Dutch Alternative Credit Instrument



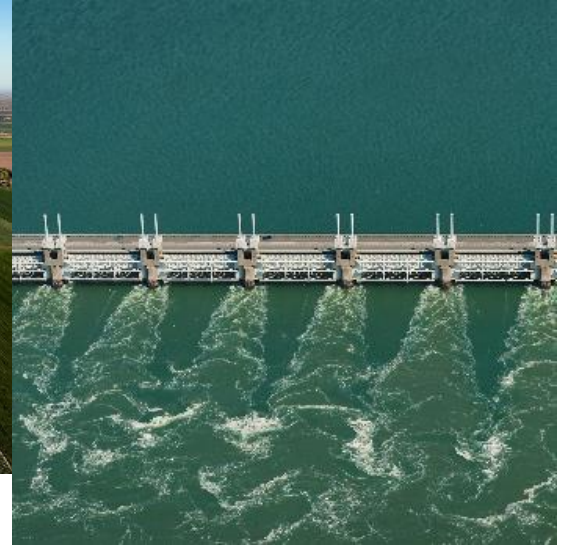
Business Development



Marktonwikkeling



Financiële productontwikkeling



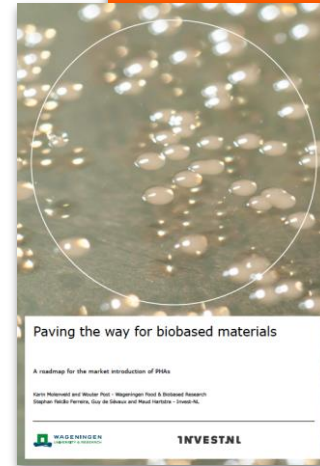
Propositiebegeleiding

Market research and development, lobbying

- Towards a circular plastics industry
- Biopolymers from a regulatory perspective (Ecomatters)
- Innovation strategies in biobased plastics (WUR)
- Scenarioplanning for chemical recycling (TNO)
- True Price of Plastics (Impact Institute)
- End-of-Waste issues (Ecomatters a.o.)
- Plastics Recycling Technologies (NTCP, HCP)
- Support to partner research, such as Chemrec/DPI
- A Circular Industry Transition, on CRM (Copper8 cs, Alliander)

External Costs of Plastics

Proposal v2 – December 2021



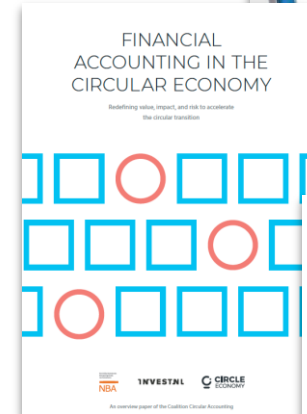
Enabling and participating in industry networks

- NL Circulair / Versnellingshuis
- Versnellingstafel Chemische Recycling
- Groene Chemie Nieuwe Economie
- Plastic Pact
- European connections
 - European institutions (EIB, EIF, EIT, EIC, ERMA etc.)
 - Sister companies (ELTI)
- Initiatives to create new industry and raw materials policies in the Netherlands
- Investment communities



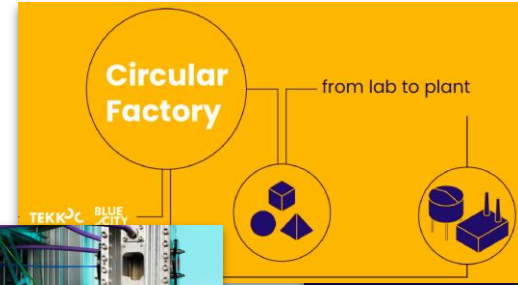
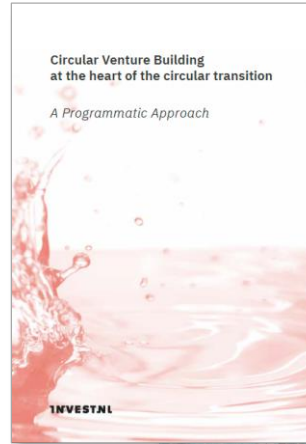
Enabling access to finance for circular companies and value chains

- Blended finance for Groeifondsaanvragen
- Project finance – translated in small tickets
- Coalition Circular Accounting:
 - Financing Products-as-a-service
 - Preventing double VAT,
 - Reframing end-of-life value
- Workgroups with ministries, DNB, banks, insurers to facilitate financing the circular economy
 - Circular metrics
 - Fit for Finance
 - Circular financial instruments
 - Risk (re)modelling for circular
- Sustainable Finance Lab - CiSE platform (PaaS)
- Dedicated targeted fund development with EIB
- Connecting to EU funding for the circular economy



Start&scaleup support

- Review and structuring business cases
- Accelerators
 - Circular Factory
 - Groene Chemie Nieuwe Economie
 - Hydrogen economy
 - Fastlane (Food&Agro)
- Best practices in Circular Venture Building
- Support to Nationaal Groeifonds consortia, a.o.
 - Materialen.nl
 - ABC/BBC
 - FutureCarbon
- Support in solving sector specific issues
 - Positioning of bioplastics
 - Microplastics in the LCA of new materials
 - Model contracts



Circular Factory

Pitch & Plug
event 2022



21 april 2022

De Hydrogen Business Challenge
Programma 2022

De Hydrogen Business Challenge biedt ondersteuning bij het versterken van businessplannen van ondernemers die werken aan innovaties voor de supply chain.



The Fastlane Program

Fastlane is a tailored program for impact-driven Food- & Ag pioneers to prepare companies for their next funding round. Early-stage companies receive hands-on support from a multidisciplinary team of experts to work on company specific challenges.

Team Biobased & Circular Economy

