



FROM EKOL TO **ECO**♻️-oh!

HOW INSPIRATION LEADS TO INNOVATION

ECO♻️-oh!
let's recycle for life

WHAT WE DO

**RECYCLING OF MIXED HOUSEHOLD PLASTICS
IN THE MOST ECO-EFFICIENT WAY, INTO VALUABLE
RAW MATERIALS TO MANUFACTURE 100% RECYCLABLE PRODUCTS**

EVOLUTION

In 1989: we recycled all household plastics



In 2016: all mixed household plastics smaller than a 10 liter bucket

WHAT WE DO

In 2016: all mixed household plastics smaller than a 10 liter bucket



COLLECTING SYSTEMS
Recycle park - collect at home



PRODUCT MANUFACTURING



Ecolat® / Ecoplanc®



Vegetable garden



u-bench

VISION

UP TO NOW RECYCLING WAS A FREE CHOICE

MIXED HOUSEHOLD PLASTICS (EXCL.PMD)

141.000 TON

90% INCINERATION – **10% RECYCLED** BY ECO-OH!

**WITH THE NEW 2025 EU STANDARD OF 55%,
RECYCLING OF MIXED PLASTICS WILL BECOME A NECESSITY**



FACTS IN PERSPECTIVE

For many years, 3 intercomunal local authorities organize a very succesful collecting of household plastics

2015 Belgium	tons	kg/res.	tons collected	kg/res.	%recycled
Bleu-pmd	88.761	7,92	65.931	5,89	74,3
Pink-mixed plastics	141.260	12,6	15.413*	1,37	10,9
Total	230.021	20,5	81.344	7,26	35,4

* by 1.600.000 residents

Case	residents	tons recycled	kg/res.	hh.pack.*	kg/res.	%recycled
Pink Limburg.net	800.000	9.925	12,41	7,69	13,58	66,1
Pink Ivarem 2015	236.720	1.493	6,31	5,55	11,44	55,8
Pink Ivarem 2016**	236.720	1.820	7,69	6,77	12,66	61,7

* in kg household packaging

** estimation 2016

ECO-EFFICIENT RECYCLING = 97% RECYCLING OF PLASTICS, 0% INCENERATION
COMBINING P-FRACTION PMD & MIXED PLASTICS THE 2025 EU STANDARD OF 55% IS REACHED BY ALMOST ALL OUR PARTNERS, EN THIS WITHIN 3 YEARS TIME.

OUR NEW MISSION

INSPIRING ALL OUR STAKEHOLDERS
TO PARTICIPATE IN
A REAL CIRCULAR ECONOMY
IN THE RECYCLING OF HOUSEHOLD PLASTICS

FROM STRICTLY BUSINESS TO EMOTIONAL INVOLVEMENT

WE BELIEVE IN WIN-WIN PARTNERSHIPS



OUR AMBITON

RECYCLE **100%** OF COLLECTED HOUSEHOLD PLASTICS
INTO **97%** VALUABLE RAW MATERIALS,
IN THE MOST COMPETITIVE, **ECO-EFFICIENT** WAY

&

BEING **AN INNOVATION LAB**
TO CREATE
'A MAKING INDUSTRY'



OUR CHALLENGE

FIND A SUSTAINABLE POSITION IN THE VALUE CHAIN,
OPTIMIZING THE RECYCLING OF ALL PLASTIC FRACTIONS.



PET/HDPE

Positive stream



FILMS/BAGS

65%

Positive stream

PP/PE

10%

Positive stream

PET/PS/MULTI LAYER

25%

Negative stream

Average gate fee: 160€* (* from 0 tot 400€)

RECYCLING A 'MIX OF PLASTICS' IS A NECESSITY TO ACHIEVE +97% OF RECYCLING RATE

OUR INNOVATION CHALLENGE

UPGRADE THE QUALITY, PROCESSIBILITY AND FUNCTIONAL USEFULNESS OF OUR RAW MATERIALS



flakes



agglomeraat/regranulate



sink fraction

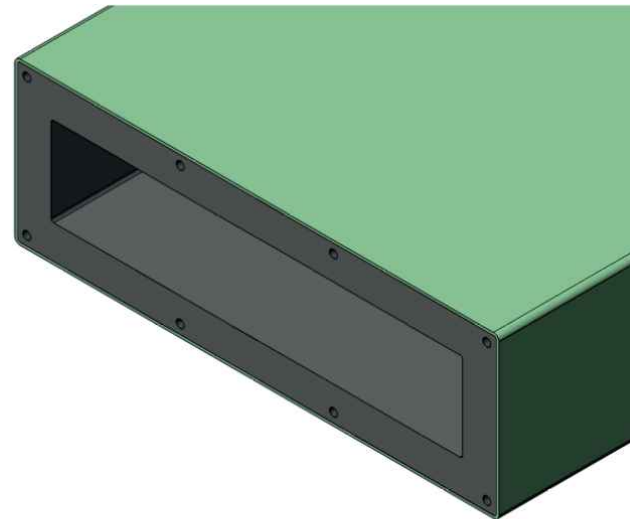
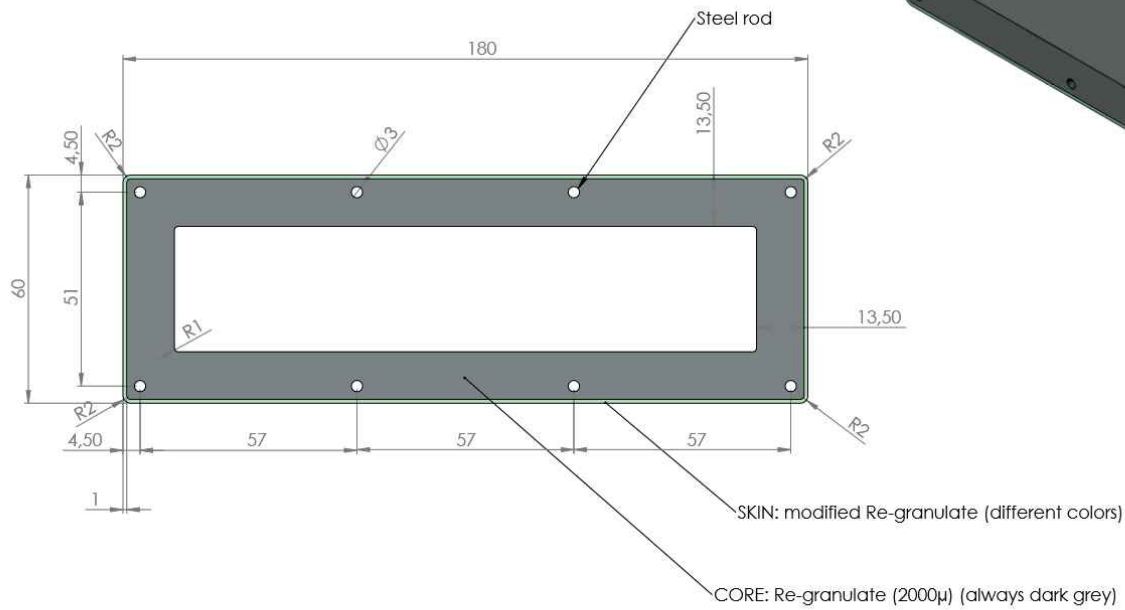


grinded HDPE

ADAPTING EXISTING PRODUCTION TECHNOLOGIES IN ORDER TO PROCESS OUR RAW MATERIALS

Intrusion	→	Injection
Extrusion	→	co-extrusion + reinforcing with steel wire
Matting	→	thermoforming
Boards	→	processable with wood processing machinery

CO-EXTRUSION OF PROFILES REINFORCED WITH STEEL WIRE - PATENT PENDING -



**MATTING: CONDENSING PLASTIC FLAKES
AND FIBRES AS A SEMI-FINISHED PRODUCT
FOR THE THERMOFORMING INDUSTRY.**
- PATENT PENDING -



mats can vary in terms
of fibre content,
colour, size, thickness,
density and more...



**POSSIBLE APPLICATION FIELDS
AND APPLICATIONS ARE ENDLESS...**

RECYCLING BECOMES DESIGN

**BESIDES QUALITY, PRODUCT DESIGN WILL SHOW THE
UPCYCLING POTENTIAL OF OUR RAW MATERIALS.**



RECYCLING BECOMES ART

DESIGN BRINGS INSPIRATION, INVITING US TO BE CREATIVE AND FIND SOLUTIONS TO BE USED IN SERIAL PRODUCTION AFTERWARDS.

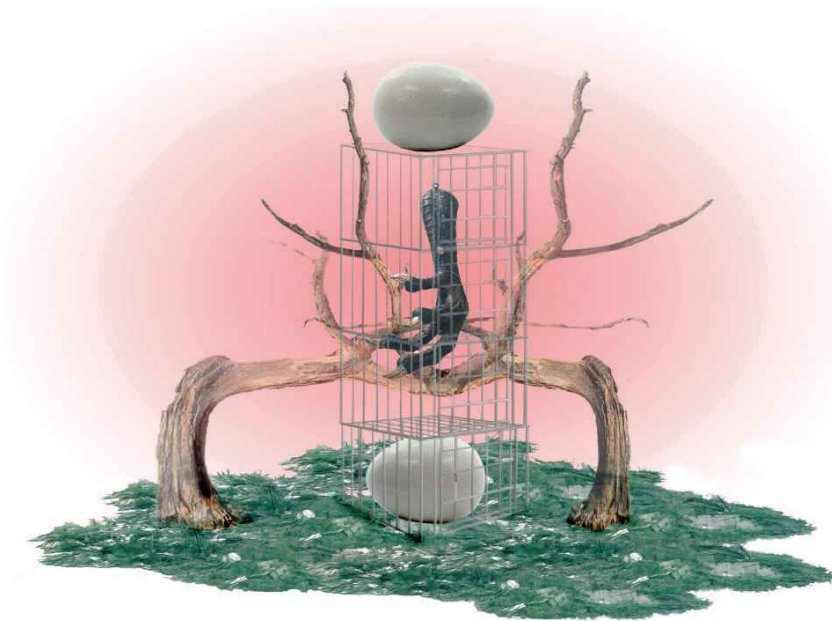


VISIT ECO-OH! IN THE COLLATERAL EVENT IN 'SALONE DEL MOBILE' IN MILAN 2017

ART BRINGS A MESSAGE

A CIRCULAR ECONOMY IS THE ONLY OPTION FOR OUR ECO-SYSTEM

Everyday we have the choice, to sort or not, to buy biological or not, to...



RECYCLING BECOMES ART, VISIT ECO-OH! AT GLASSTRESS 2017 - BIENNALE VENICE.

TOGETHER WE'RE STRONGER

WE BELIEVE IN PARTNERSHIP.
SO IF YOU ARE INTERESTED IN OUR KNOWLEDGE
OR LIKE TO SHARE YOURS,
FEEL VERY WELCOME!





Maximizing heat efficiency through joint long term cooperation set up

Chris De Hollander,
CEO Stora Enso Langerbrugge

Stora Enso



- Stora Enso is a leading provider of renewable solutions in packaging, biomaterials, wooden constructions and paper on global markets
- Some 26 000 employees in 35 countries
- Sales in 2015: EUR 10.0 billion
- Shares listed on Nasdaq in Helsinki and Stockholm



Everything that's made with fossil-based materials today can be made from a tree tomorrow



Stora Enso Langerbrugge

Sustainable paper production, 2 paper machines



- Production:
 - 400.000 tonnes recycled newsprint paper
 - 155.000 tonnes recycled magazine paper



- Raw material:
 - 100% PfR, Paper for Recycling



Stora Enso Langerbrugge

Sustainable energy production, 2 biomass fuelled qualitative CHP's



Challenge: How to maximize our heat efficiency?



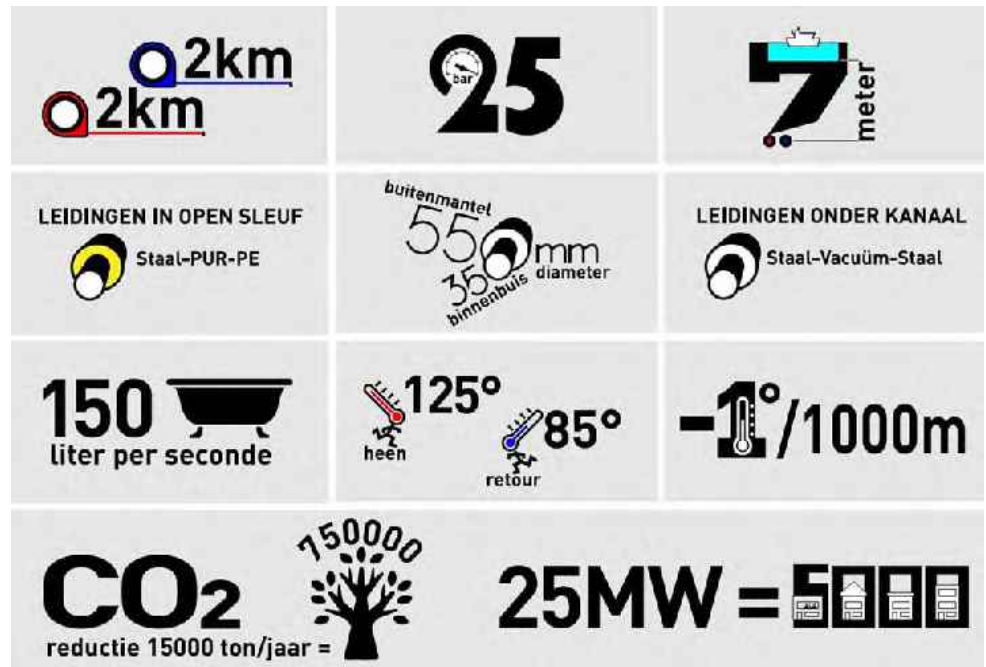
By optimizing the exchange
of side streams

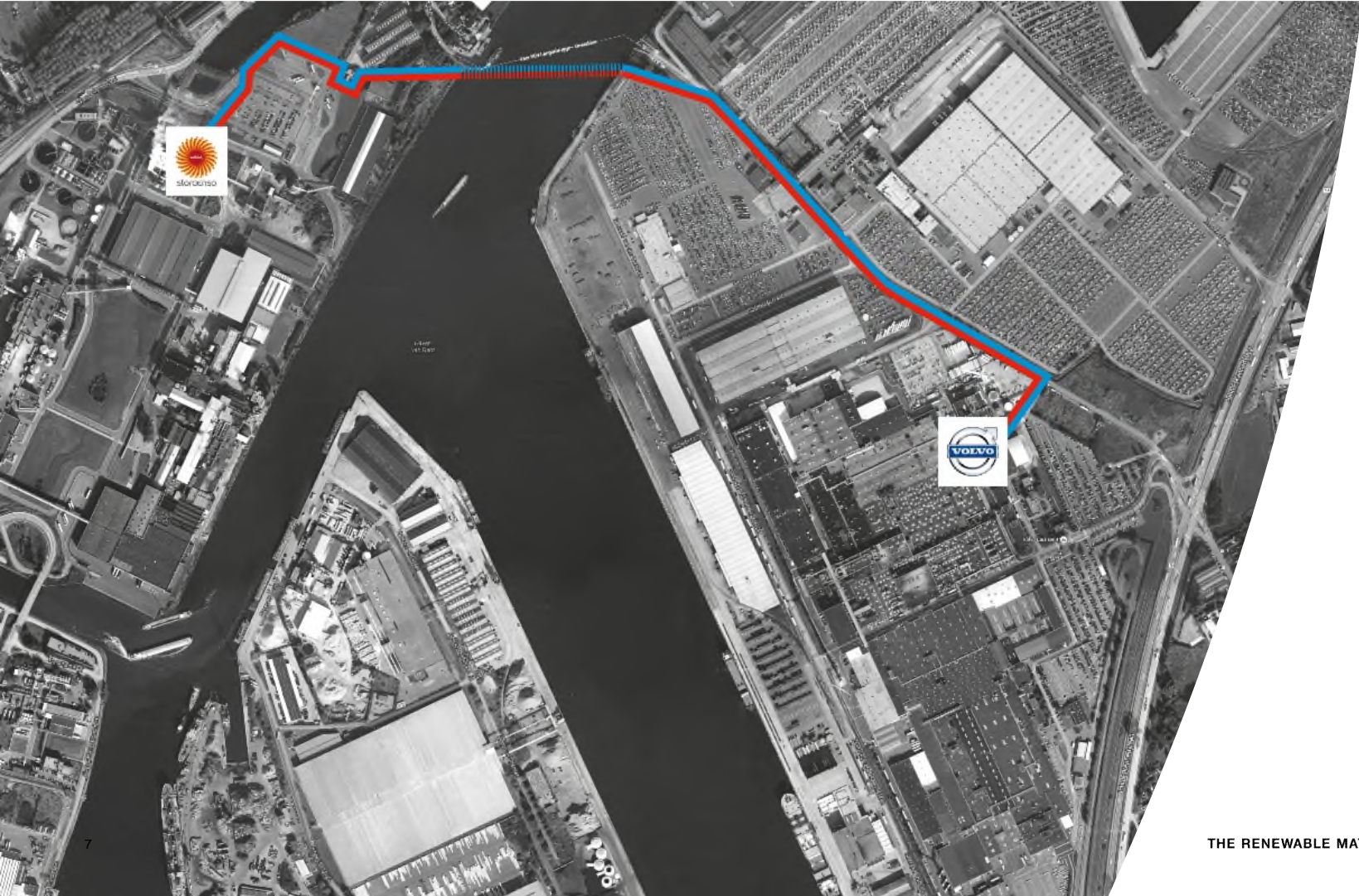


through implementing a highly
efficient underground district heating



based on a
long term cooperation set up
with Volvo Car Gent





storacenso



THE RENEWABLE MATERIALS COMPANY

What does this strategic ecological project mean for Stora Enso ?



- Embodies Stora Enso's Intention:
 - *“Do good for the people and the planet”*
- The delivery of external green heat:
 - Increases the energy efficiency
 - Benefits the environment
 - Leads to higher use of the paper mill's assets



Stora Enso Langerbrugge's heat exchanger

What does this strategic ecological project mean for Volvo Car Gent ?



- Decrease of fossil fuels
- Reduction of 15 000 tons CO₂
= -40% CO₂ for the Volvo factory
- More sustainable products and production processes



What does this strategic ecological project mean for the community ?



Response to

- the environmental policy of the Flemish Government
- Our ISO 50001 energy care system
- The EU Energy Efficiency Directive
- The EU Commission Report concerning heating & cooling, as recently approved in the European Parliament

“Ensure the optimal usage of the scarce resources available”

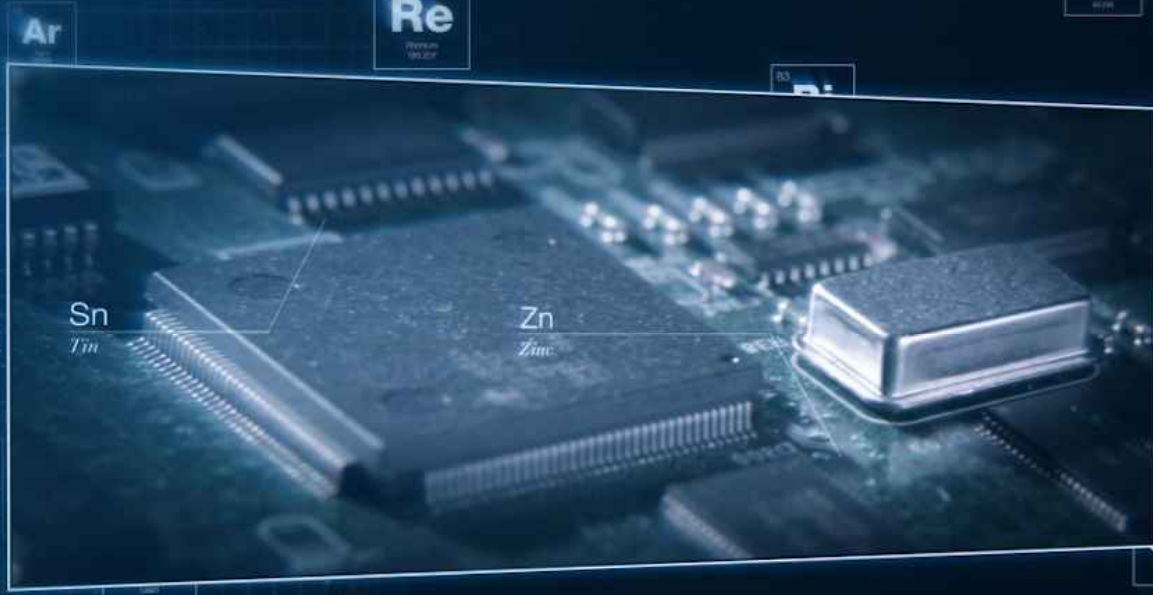


Thank you!



storaenso

THE RENEWABLE MATERIALS COMPANY



Recycling & Innovation

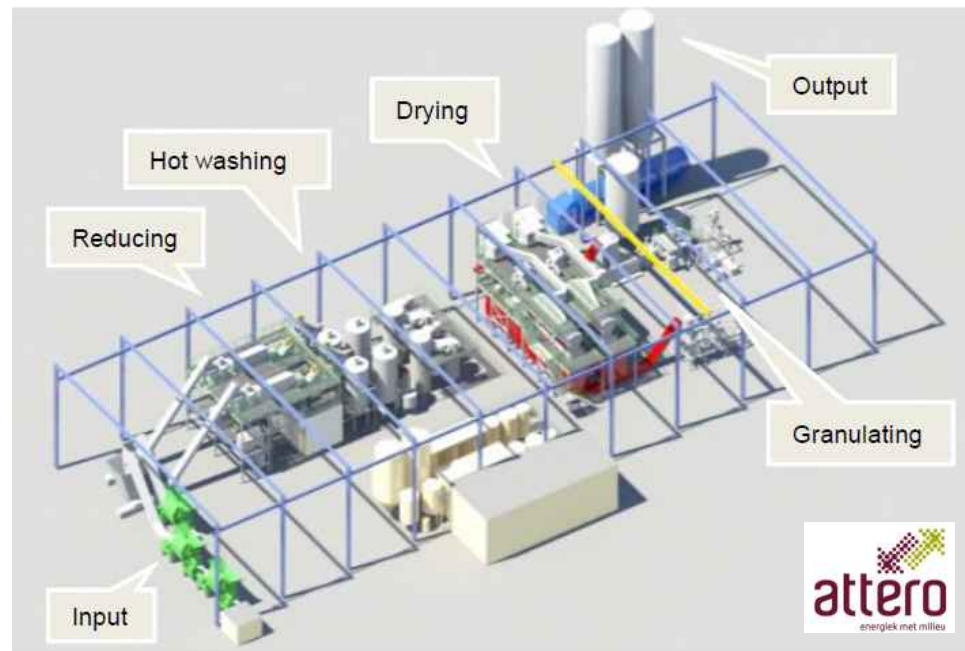
Brussel 22-11-2016 - Florens Slob



AVR. 



PST Factory – Improving recycling performance



Attero Wijster 2017: Realization flaking, hot-washing and granulating 2d plastic film from sorting packaging plastics.

- Different initiatives in testing phase
- Focus on smart treatment & recovery of raw materials (plastics and / or cellulose)

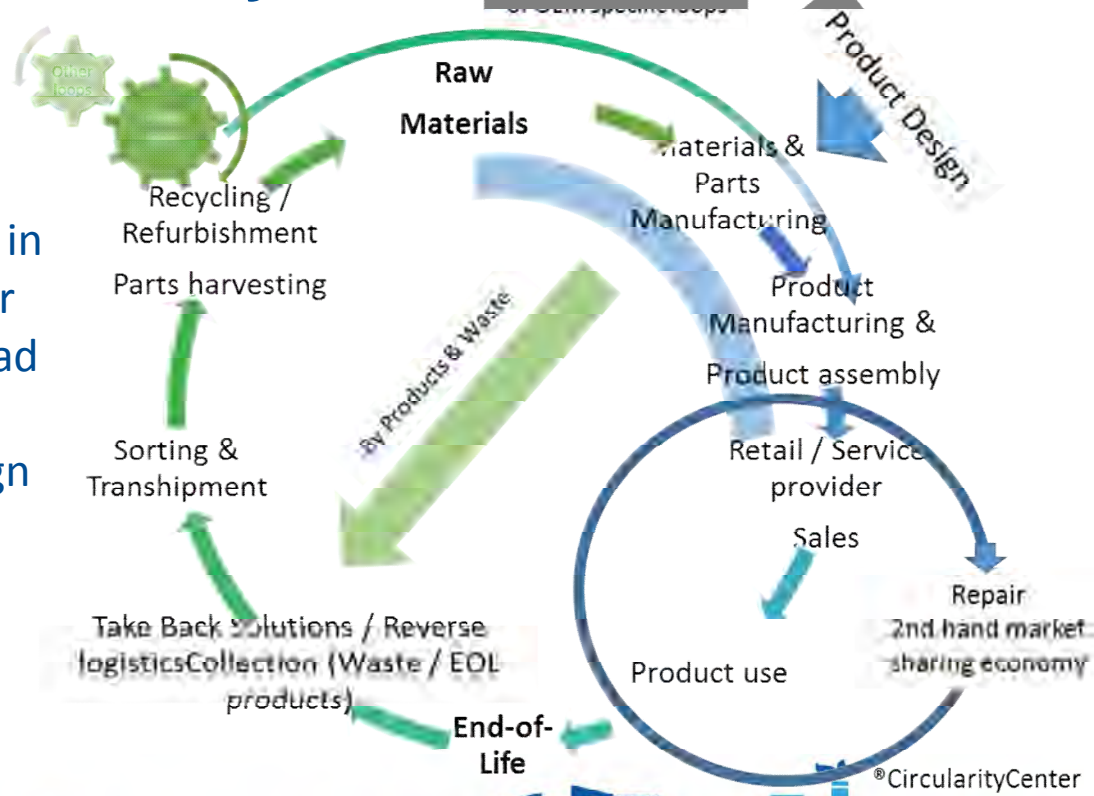


- A waste stream with focus from the waste & recycling sector
- Valuable materials inside and outside (textiles)



Matras Recycling Europe

- Recycling , a crucial part of the circular economy!
- Optimization of waste flows step 1 in the transformation towards circular
- Focus on quality of recycling in stead of quantity
- Change to circular starts with design and innovation
- Our quest is how to speed up and scale up



- Prices for raw materials do not resemble the actual scarcity
- Legislation & regulation today has evolved from experience we have on “waste” (started with hygiene)
- Current (good) recycling performance is build upon this (EU) and local regulation (but focus on quantity)
- **Focus on quality of the products / raw materials made from waste (system approach)**
- Transformation towards a low carbon & circular economy can be supported by EU & local government

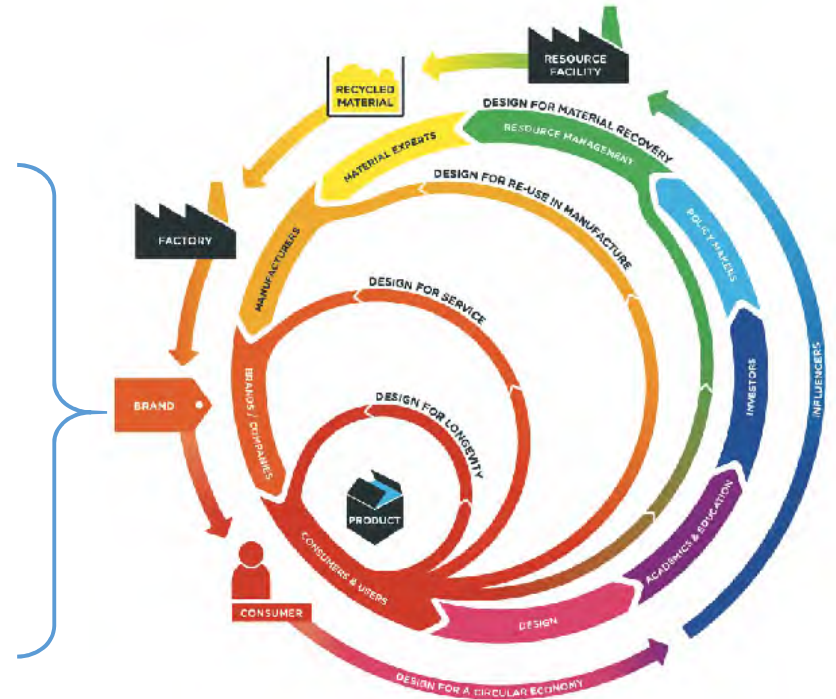


- A Prevention
- B Re-use
- C Recycling
 - C Molecular recycling
- D Energy
- E Incineration
- F Landfill

Extraction of carbon to create virgin chemicals

Extension molecular recycling

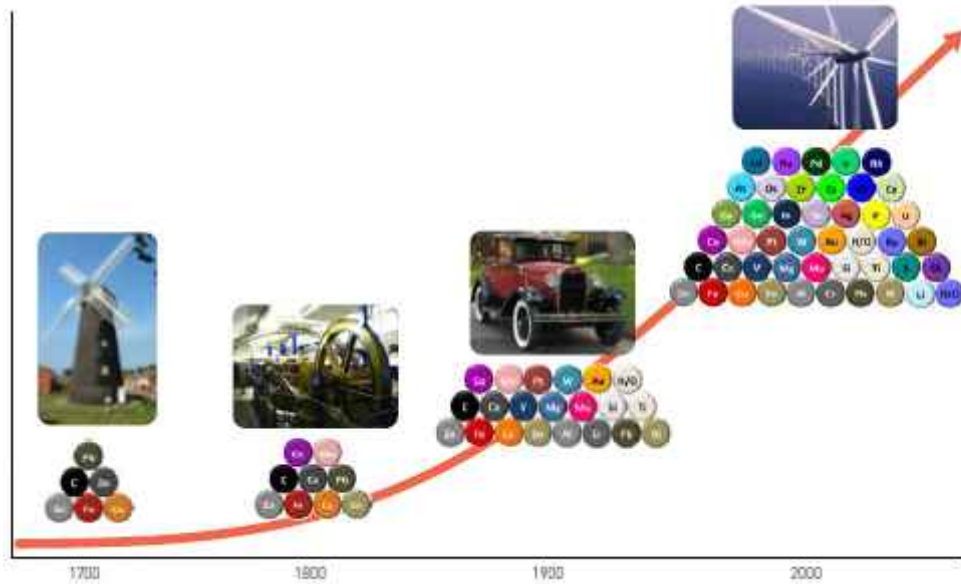
Don't "Waste" your raw materials
 Use the full potential of your "Waste"
 Use the "stuff" you run into today

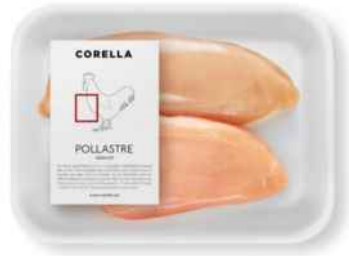


Design for (future) Circular Solutions
 (recycling as the last resort) —

- Keeping the same level of recycling will be a challenge
- Products become more and more complex
- Sustainability is not equal to using less material...
- It's about keeping the stuff in the cycle
- It starts with design and a systemic approach

Metal/Element Use Intensity in Products







Technology provider / Engineering



Supplier of utilities / gasses / technology assesment



Technology assesment / buyer methanol



Operator of plant / supplier of steam / heat



Feedstock supply and strategy



Infrastructure utilities / liaison to public partners





European Innovation Partnership on Raw Materials and cooperation with the sector

EuroDay 2016

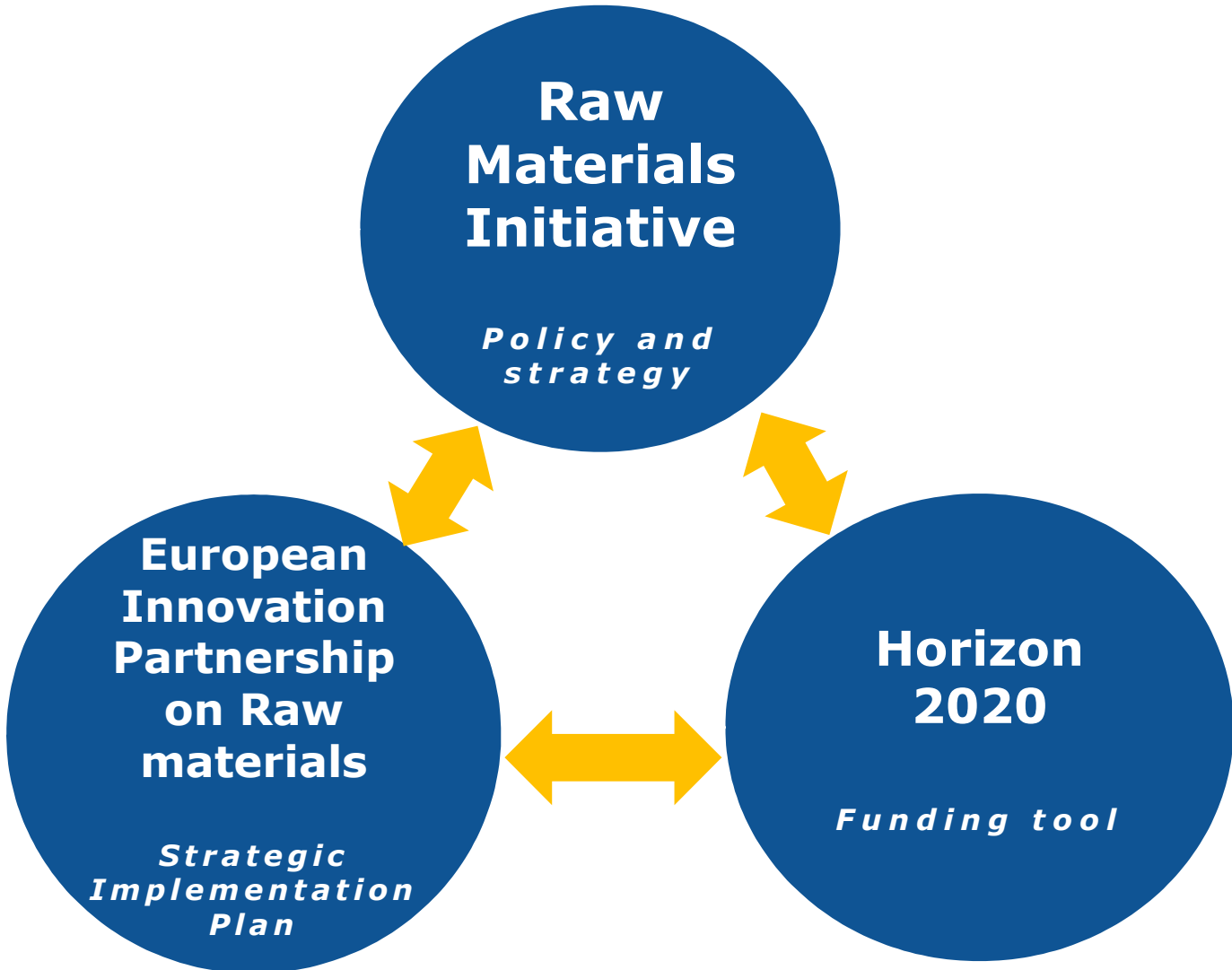
Brussels, 22 November 2016

European Commission

Directorate-General for Internal Market, Industry, Entrepreneurship
and SME's

Magnus Gislev

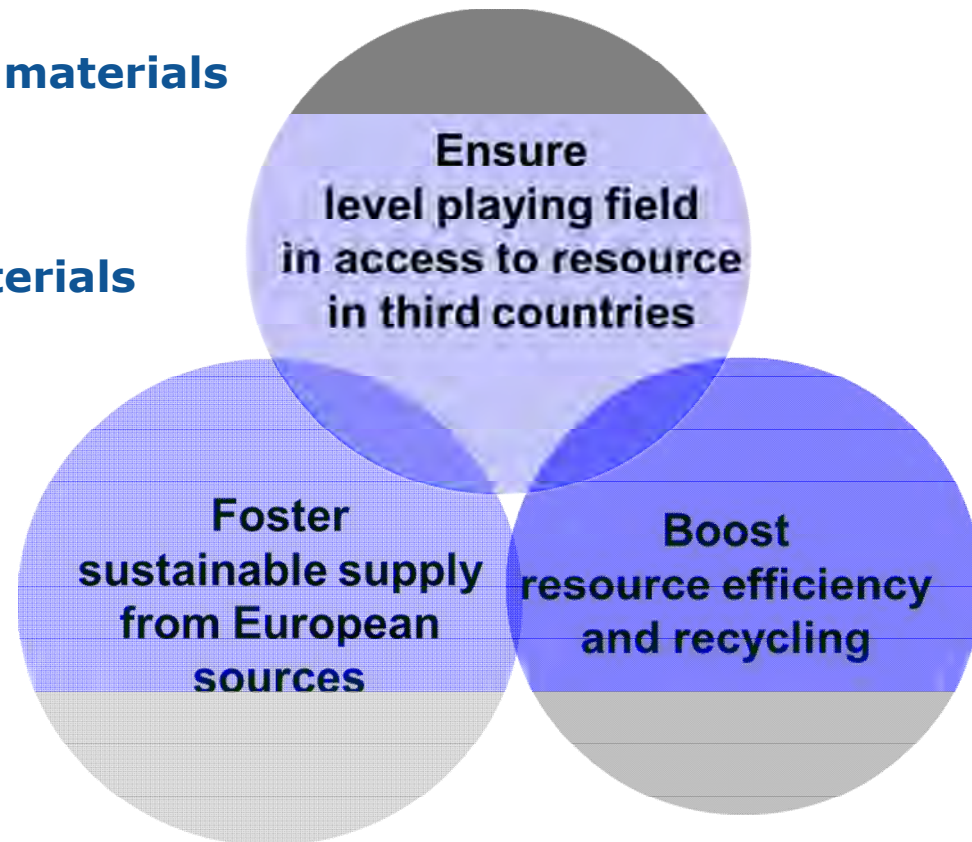
Resource Efficiency and Raw Materials





EU "Raw Materials Initiative" (2008/2011)

- **Aim: securing sustainable supplies of raw materials**
- **Non-energy, non-agricultural raw materials**
- **Integrated strategy (3 pillars)**
- **Introduced list of Critical Raw Materials in 2010, updated in 2014**



Overall objective:

Contribute to the 2020 objectives of the EU Industrial Policy, the Innovation Union and the Resource Efficiency 'flagships'

EIP targets:

- *Up to 10 innovative pilot actions*
 - *Substitutes for at least 3 applications of critical raw materials*
 - *Regulatory framework for primary and secondary raw materials*
 - *EU raw materials knowledge base with raw material flows and trends*
 - *International cooperation strategy*
- *Strategic Implementation Plan (SIP) adopted in 2013*



I. Technology Pillar

- I.A Raw materials research and innovation coordination
- I.B Technologies for primary and secondary raw materials' production
- I.C Substitution of raw materials

II. Non-Technology Policy Pillar

- II.A Improving Europe's raw materials framework conditions
- II.B Improving Europe's waste management framework conditions and excellence
- II.C Knowledge, skills and raw materials flows

III. International Cooperation Pillar

- III.1 Technology
 - III.2 Global Raw Materials Governance and Dialogues
 - III.3 Health, Safety and Environment
 - III.4 Skills, Education and Knowledge
 - III.5 Investment activities
- 

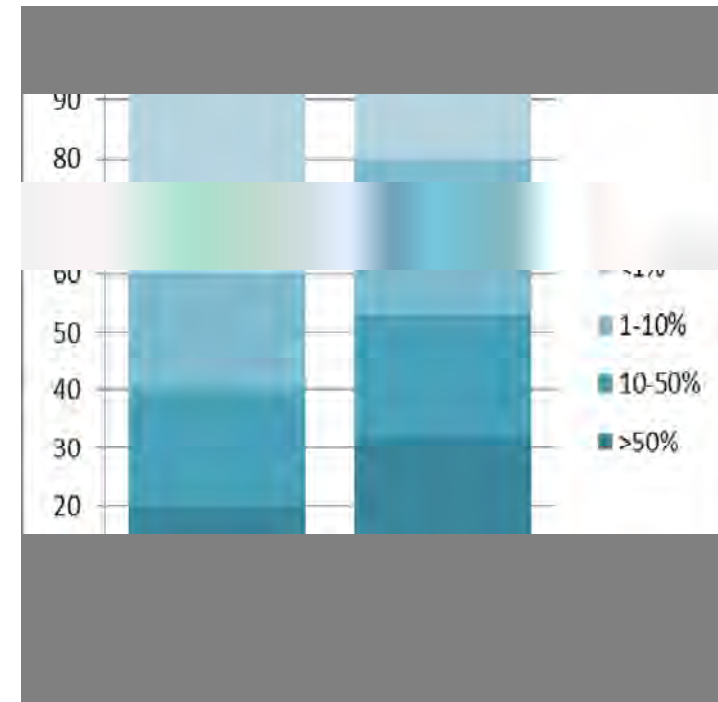
The EIP plays a central role in the EU's raw materials policy framework

- It reinforces the **Raw Materials Initiative** by:
 - translating the strategic policy framework into **concrete actions**
 - **mobilising the European stakeholder community**
- Helping securing&directing **R&I funding**:
EUR 600 million under Horizon 2020 (Societal Challenge 5)



The EIP has made significant progress towards the implementation of its actions

- **123 Raw Materials**
Commitments: 980 partners, indicative budget ± EUR 2 billion
- **European Commission:**
 - Horizon 2020 (2014-2016):
39 Projects on Raw Materials under SC5. EC Contribution > EUR 200 million
 - Circular Economy Package
 - Studies, dialogues etc.
 - RM Scoreboard, RM Information System
- **Launch EIT Raw Materials**



Indicative budget secured by the Commitments

The EIP is well on track to achieving its targets

Target	Outlook
1: Up to 10 innovative pilot actions	😊😊😊
2: Substitutes for at least 3 applications of critical and scarce raw materials	😊😊😊
3: Framework conditions for primary raw materials	😊😊
4: Framework conditions for material efficiency and waste management	😊😊😊
5: European raw materials knowledge base	😊😊😊
6: Launch of a Knowledge and Innovation Community	😊😊😊😊
7: Pro-active international co-operation strategy	😊😊😊



Findings per Priority Area

Example II.B: Waste management framework conditions

Priority Area II.B: Improving Europe's waste management framework conditions and excellence	Level of implementation
II.4. Product design for optimised use of (critical) raw materials and increased quality of recycling	☺☺☺
II.5. Optimised waste flows for increased recycling	☺☺☺
II.6. Prevention of illegal waste shipments	☺☺
II.7. Optimised material recovery	☺☺

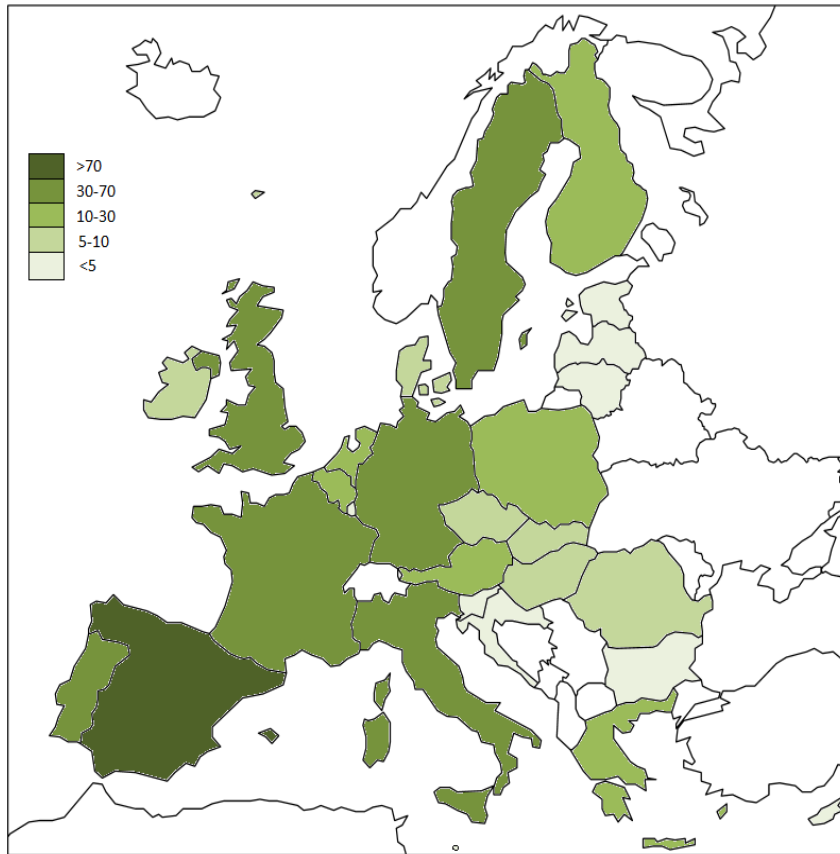
Indicative assessment based on:

- Raw Materials Commitments
- Horizon 2020
- Activities undertaken by the European Commission
- Activities undertaken by other players

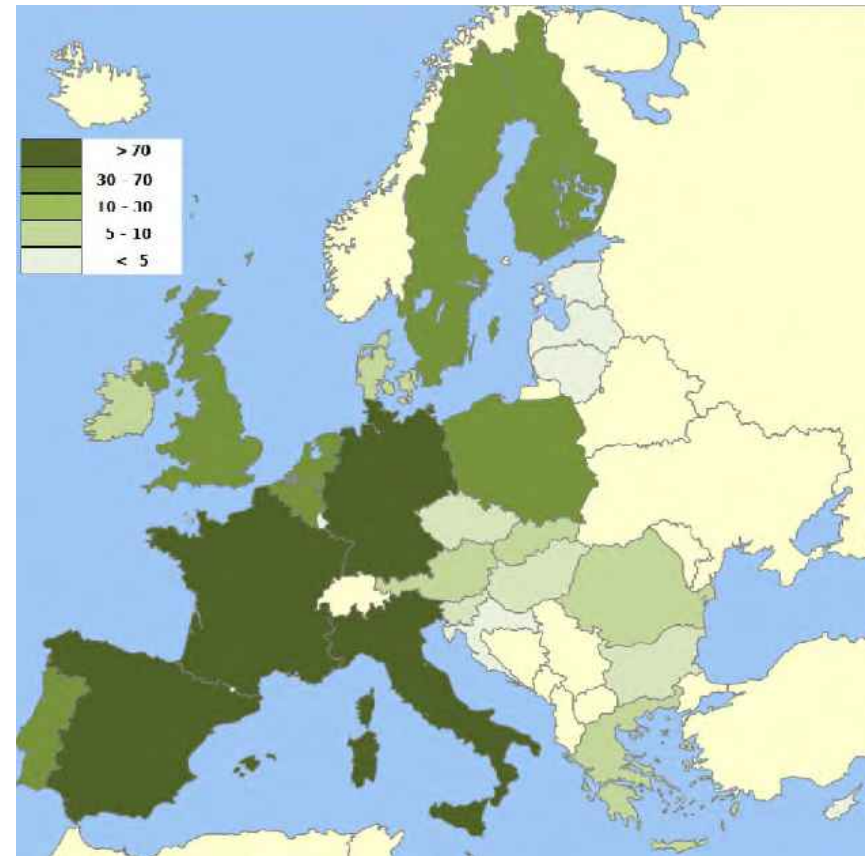
Commitments: state-of-play

Key performance indicator	2013 Call for Commitments	2015 update on Commitments from 2013	Call for Commitments 2015	Total
Number of commitments	80	- 4	+ 47	123
Number of unique partners	699	+ 56	+ 223	978
Total indicative budget	€1744 million	- €58.4 million	+ €294 million	€1979 million
Budget secured	€268 million	+ €123 million	n.a.	€391 million
Share of indicative budget secured	15%	23%	n.a.	20%
Outputs	200	+ 343	n.a.	543

Number of Commitment partners per Member State

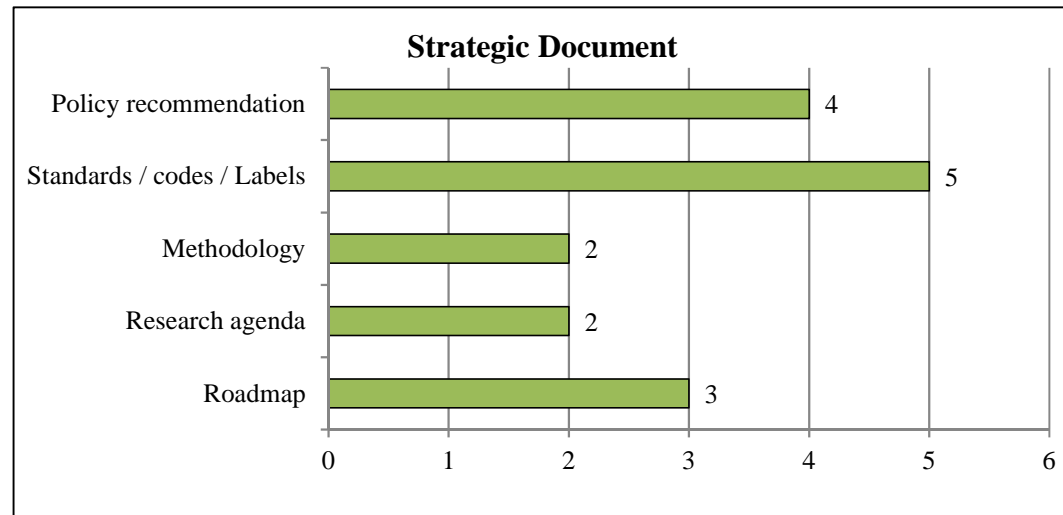
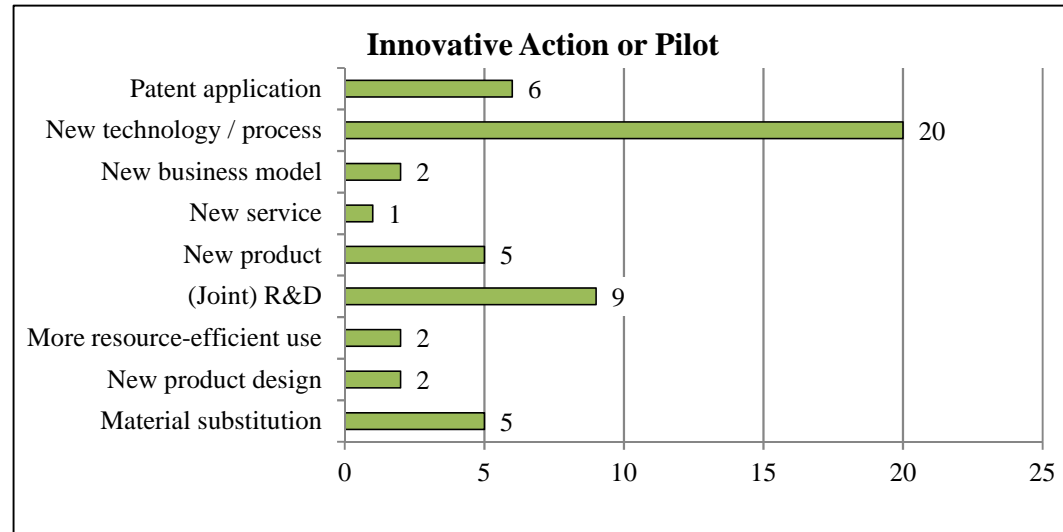


2013



2016

Outputs



Additional insights from the Commitments

- Most Commitments are **newly created projects**
- Commitments generally acknowledge **the added value of being a recognised Raw Materials Commitment**
- The low success rate of EU funding grants is the most quoted **obstacle to public funding**

Conclusion

- **Raw Material Commitments:** 980 partners undertaking action
- Raw Material Commitments are progressively **securing their budgets**
- Differences in **Member State participation**
- Most commitments have started their **activities** and some are already delivering **tangible outputs**

Next steps

- The implementation of the EIP's action is **well on track**.
- **The EIP has demonstrated** its power to mobilise stakeholders.
- The EIP has an important role to play to continue **bringing stakeholders together, to reduce fragmentation and foster synergies**.



Horizon 2020 Work Programme 2018-2020

- More than **250 million** available.
- Actions covering the entire EU raw materials **value chain**, following the logic of **SIP** and supporting the **targets** and objectives of the **EIP on Raw Materials**.
- Specific attention to circular economy and critical raw materials
- Involving all relevant **actors** at EU level as well as international partners.

Looking towards the future: Strategic orientations for the EIP beyond 2020

- A **long-term vision for the EU economy** must have a solid strategy on **raw materials supply**.
- **The EIP can play an active role** in shaping the EU's future raw materials policy framework:
 - 1)The EIP can continue to **advise the European Commission** on the raw materials sector
 - 2)The EIP can carry out a **mapping** on the implementation of the individual actions included in the Strategic Implementation Plan as well as any new areas of interest



EU raw materials:

http://ec.europa.eu/growth/sectors/raw-materials/index_en.htm

EIP on Raw Materials:

<https://ec.europa.eu/growth/tools-databases/eip-raw-materials/en>

Horizon 2020 - Raw materials webpage:

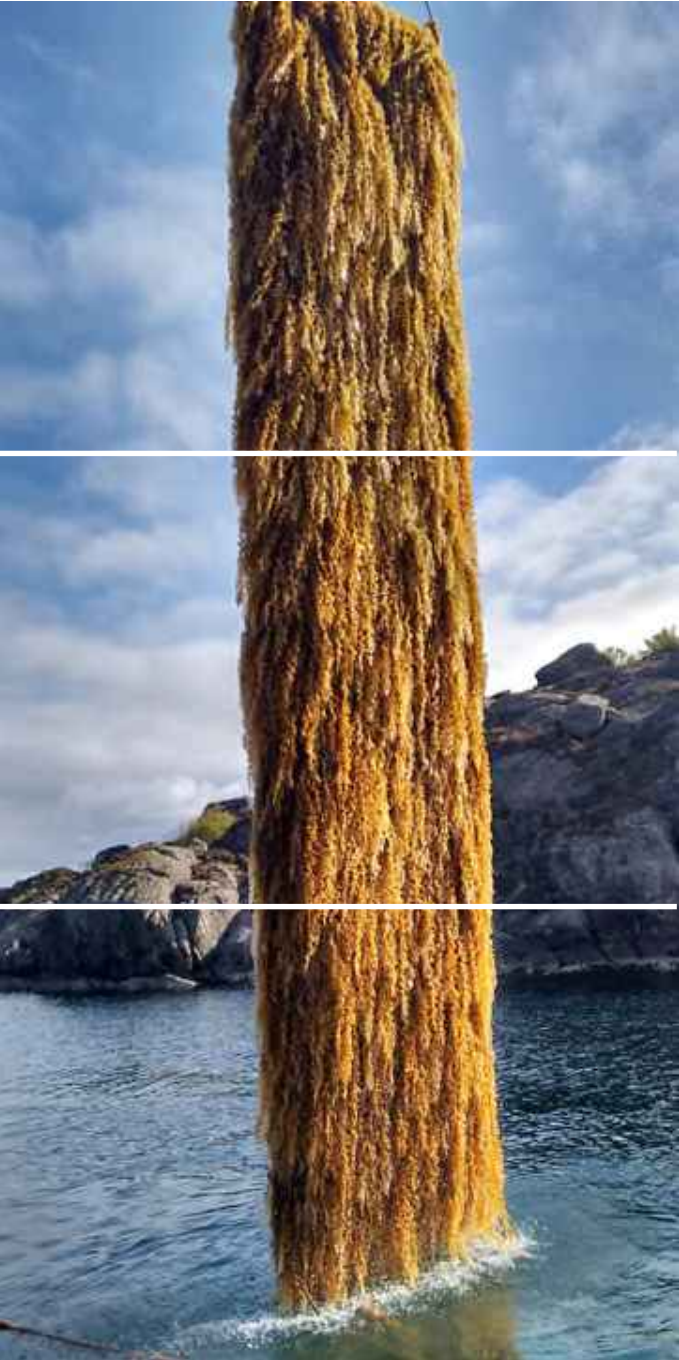
<http://ec.europa.eu/programmes/horizon2020/en/area/raw-materials>



- **29 November** **"6th EU-US-Japan Trilateral Conference on Critical Raw Materials"** (on invitation only)
- **30 November (morning)** **"Education and training as a vehicle to improve competitiveness and business creation"**, a half day event co-organized with the **EIT Raw Materials**
- **30 November (afternoon)** **"Horizon 2020 Brokerage event"**
- **1 December** **"4th annual High Level Conference of the EIP on Raw Materials"**

Plus other "satellite events" organised by external stakeholders

http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=8915&lang=en&tpa_id=1040



***From an European project
to a sound business***

**Ir. Patrice Vandendaele
Managing Director
AT~SEA Technologies NV**





Outline

- Introduction
- The AT~SEA EU project
- Spin-off of the AT~SEA Project : AT~SEA Technologies
- AT~SEA Technologies business model
- Our experience with EU projects
- Conclusions



More food/feed and energy for strongly growing global population

Renewable and sustainable energy

Sustainable/biobased materials

Agriculture -> **seagriculture**





Seaweed - Feedstock of the future

- Industrial hydrocolloids (alginates, carrageenan's)
- Human consumption
- Animal feed (ingredients and supplements)
- Chemicals (biorefinery)
- Cosmetics
- IMTA (Integrated Multi-Trophic Aquaculture)
- Fertilisers
- Biofuels





Today's agriculture

- ❖ Large scale agriculture
- ❖ Industrial, fully mechanized food production
- ❖ 2D and 3D



Today's seagrass



- ❖ Large scale **wild** seaweed harvesting
- ❖ Industrial, fully mechanized
- ❖ Heavy impact on the sea life



Today's seagriculture

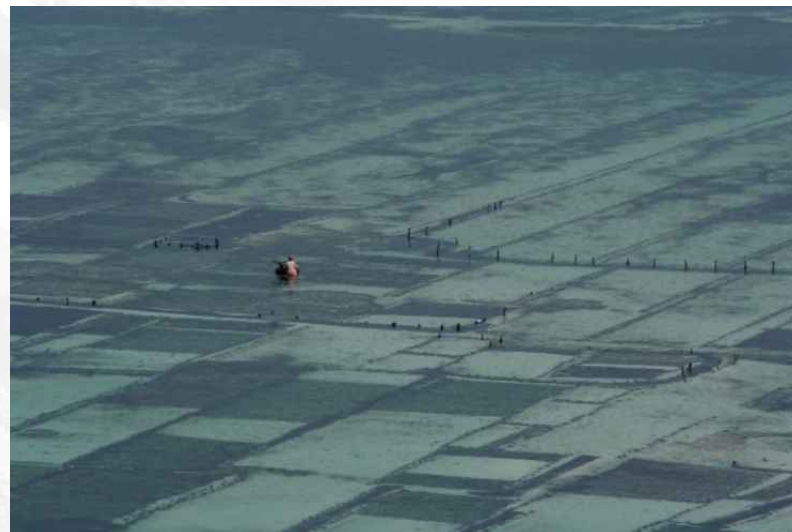
- ❖ Large scale seaweed cultivation
- ❖ Manual and 1D



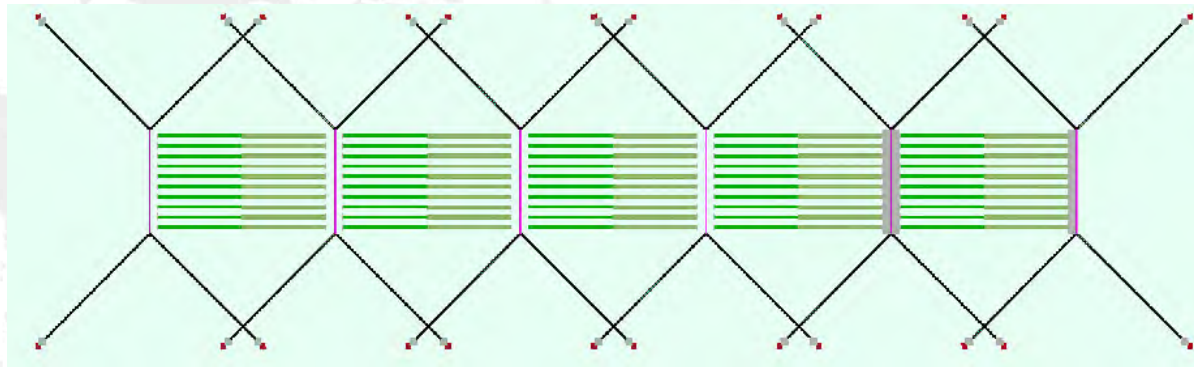
Our objective

If we want to develop a **profitable and sustainable seaweed business in Europe** we have to:

- Mechanise all processes (seeding, monitoring, harvesting, etc.) => cost-efficient
- Cultivate 2D (or 3D)
- Cultivate in a smart and sustainable way => integrated
- Serve existing and new markets



Our concept



1 ha seaweed field

Development of substrates based on advanced textiles to facilitate open sea cultivation of aquatic biomass (seaweed), having a high-potential as source for our future supply of food (additives), feed, biochemicals/biomaterials and biofuels/energy



Advanced textiles for open sea biomass cultivation (AT~SEA)



Our project

Work program:

FP7-NMP-2011-SME-5

FP7 project number :

280860

Duration:

36 months + 3 months extension
April 2012- July 2015

Budget :

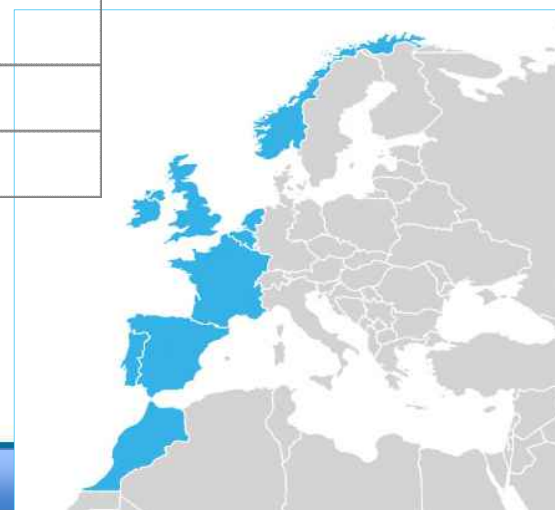
Total investment: 4.7 million
EU grant: 3.4 million





Our team

Participant no	Participant legal name	Country	Organisation type (expertise)
1 (Coordinator)	Sioen Industries	BE	LE ((non)woven & coated textiles)
2	Devan Micropolis	PT	SME (textile modification)
3	Hortimare	NL	SME (seaweed biology)
4	Oceanfuel	IRL	SME (aquatic biomass production)
5	Eurofilet	MA	SME (offshore textile confectioning)
6	ECN	NL	RTD (aquatic biomass engineering)
7	Centexbel	BE	RTD (textiles, testing)
8	SAMS	UK	RTD (offshore research & testing)
9	Marintek	NO	RTD (mooring analyses)
10	Bexco	BE	SME (offshore ropes/connections)
11	Tecnored	ES	SME (offshore nets)





SEVENTH FRAMEWORK PROGRAMME
FP7-NMP-2011-SME-5
Project nr:280860



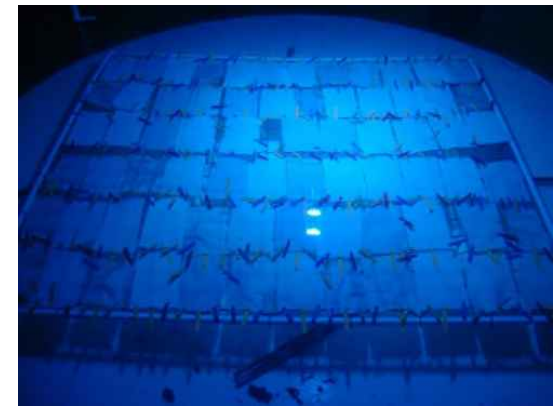
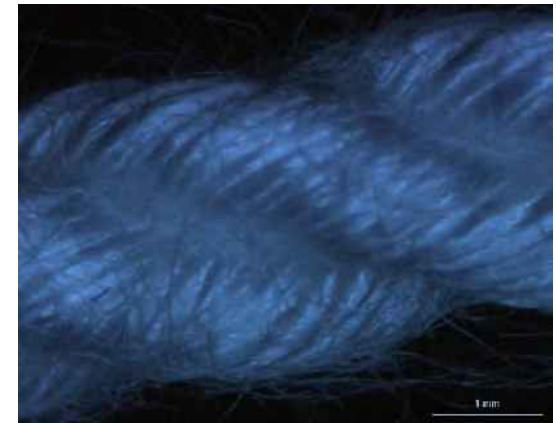
Selection of results



Advanced textile substrates

- ❑ Development of advanced textile substrates:
 - Materials/chemistries
 - Textile structure
 - Textile finishing/coating

- ❑ Testing and evaluation:
 - Lab level
 - Tank level
 - At sea



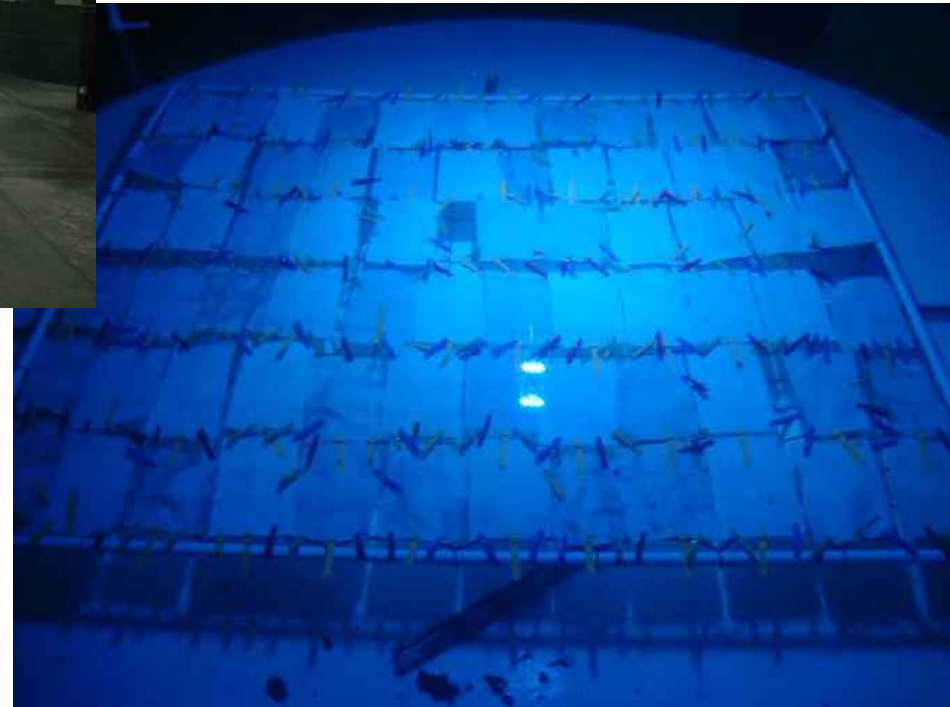


Lab scale



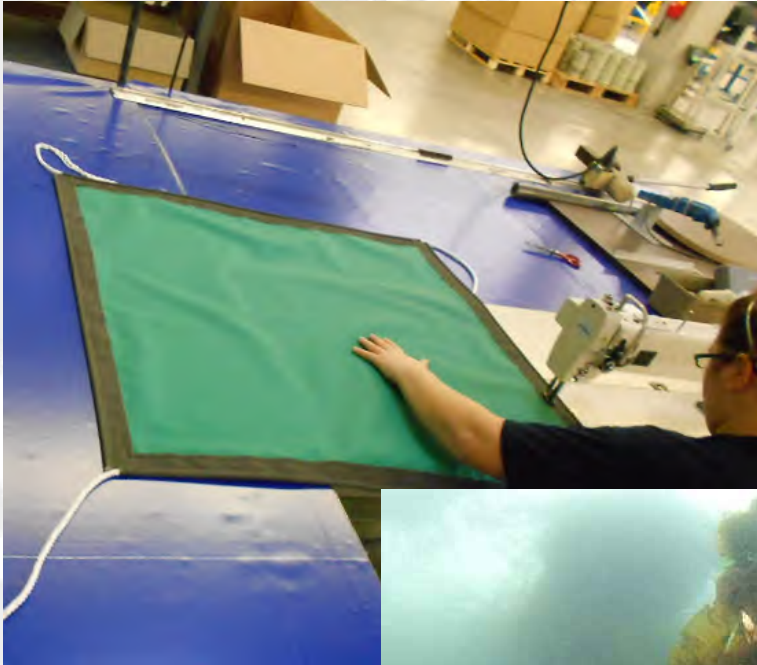


Tank scale



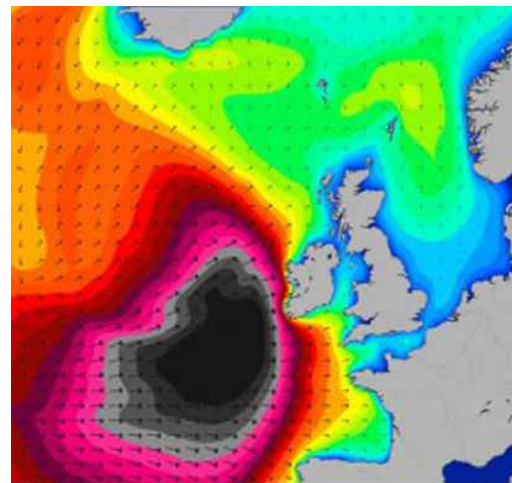


At sea



- Ireland
- Norway
- Scotland





- Influence of depth
- Horizontal vs vertical sheets
- Parallel vs perpendicular to current

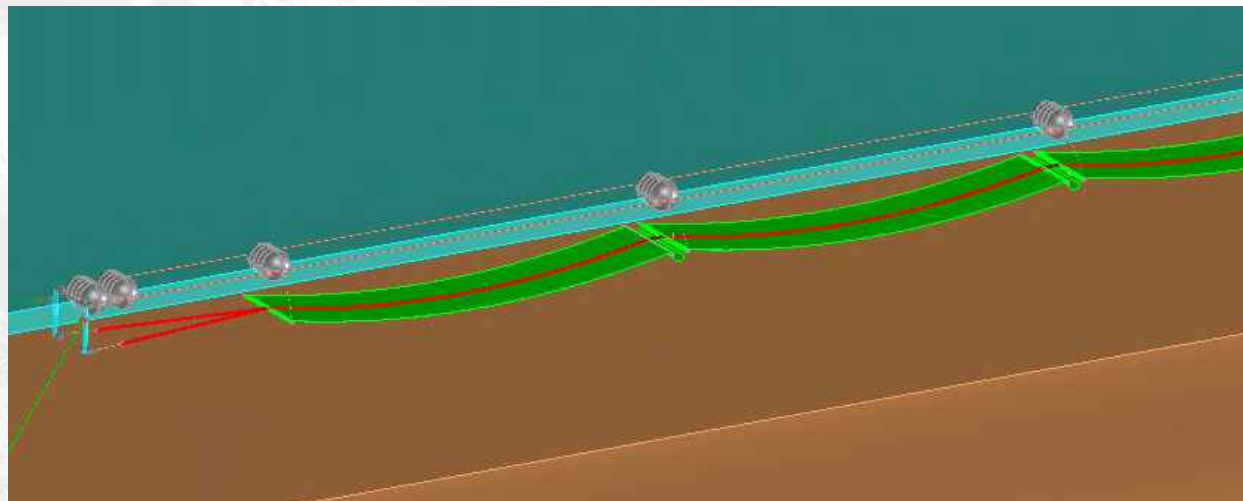
EU project video:

<https://www.youtube.com/watch?v=e5zSRVNzelo?rel=0>



Demonstration phase

- Deployment in October 2014 in IRE, SCO and NOR
- 10 pcs of 2 x 10 m substrates deployed per site
Saccharina L
- Growth monitoring, harvesting, ...



Demonstration phase - IRELAND



May 25, 2015



Demonstration phase - IRELAND



Demonstration phase - NORWAY



May 20, 2015



Conclusions (1)

- The AT~SEA consortium has developed, patented (PCT) and demonstrated advanced **2D textile substrates*** that yield 3-5 times more biomass than state of the art 1D rope based systems
- Success of AT~SEA lies in the **multidisciplinary** of the project and the product
 - project: chemists, materials scientists, textile engineers, biologists, marine engineers, etc.
 - product: much more than just a piece of textile => **system**



Conclusions(2)

- Award winning technology:
 - Essenscia Innovation Award 2013
 - TechTextil Innovation Award 2015
 - Nomination for Scottish Aquaculture Award 2015



What was next?

- ❑ AT~SEA project ended on July 31, 2015
- ❑ Several follow up projects have been submitted and 2 project accepted
- ❑ Founding of JV **AT~SEA Technologies** August 2015-August 2016
 - 6 out of 11 partners participate in this JV



1 ha seaweed farm in Norway



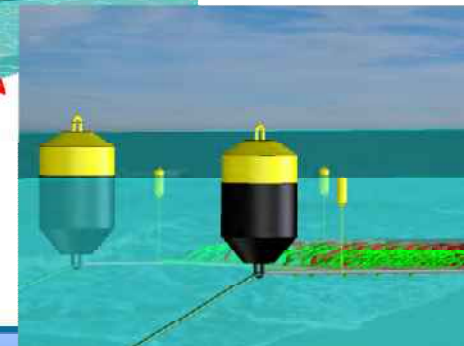
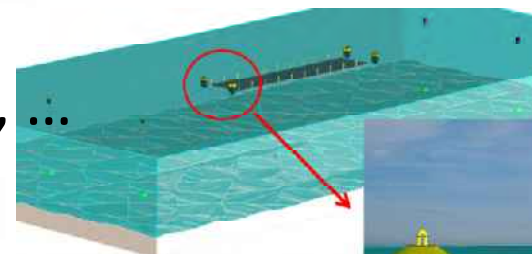
Today ?

- The investors of ATSEA Technologies NV
 - Devan Chemicals (B)
 - Filetnova (Ma)
 - Sioen Industries (B)
 - TecnoCorda (Sp)
 - J2M (B)
- Two scientific partners
 - Centexbel (B)
 - SAMS (UK)



AT~SEA Technologies Business Model

- To propose turnkey seaweeds farms
 - Selection of the site
 - Design and deployment of the mooring system
 - Fully equipped farms using patented and award winning 2D textile cultivation substrates
 - Equipment (seeding & harvesting)
 - Juveniles
 - Monitoring, servicing, harvesting, ...
- One-stop shopping



Strengths of AT~SEA Technologies

- Unique business model (One stop shopping + services)
- Better yield/m²
- The structure is designed in function of mechanisation
- Good balanced consortium
- Applicable on several types of seaweeds



AlgaeTex product portfolio

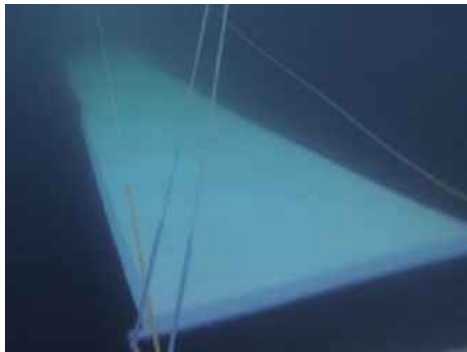
- ❑ Advanced textiles for seaweed cultivation
- ❑ Patented by SIOEN Industries
- ❑ Available as:



AlgaeRibbon



AlgaeNet



AlgaeSheet



AlgaeRope

Our overall experience(1)

- Combination of fundamental research with industrial project
- Access to multidisciplinary teams and experts
- Networking (new relationship with potential customers, suppliers and research centres)
- Access to new market (marine applications...)
- Faster development





Be careful

- Be consistent and prepared
- In line with the company strategy
- Good match between Science and Business (added value, return on investment, social impact)
- Good balance between the partners (avoid concurrent!)
- The partners must cover several steps of the supply chain
- SMEs must lead the project
- Be proactive, avoid “sleeping” partners





Tips

- Be open minded for fundamental research
- Be active, better PRO-ACTIVE
- Be patient
- If you do it only for the funds don't do it, you are wasting your time.
- Keep focused on what is important for your company, be selective in the tasks you accepted.



- Very positive, rewarding experience
- Building of a large network
- Lead to new products and commercial opportunities
- Building of huge technical and scientific experience.
- Wider market potential





More info ...



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