

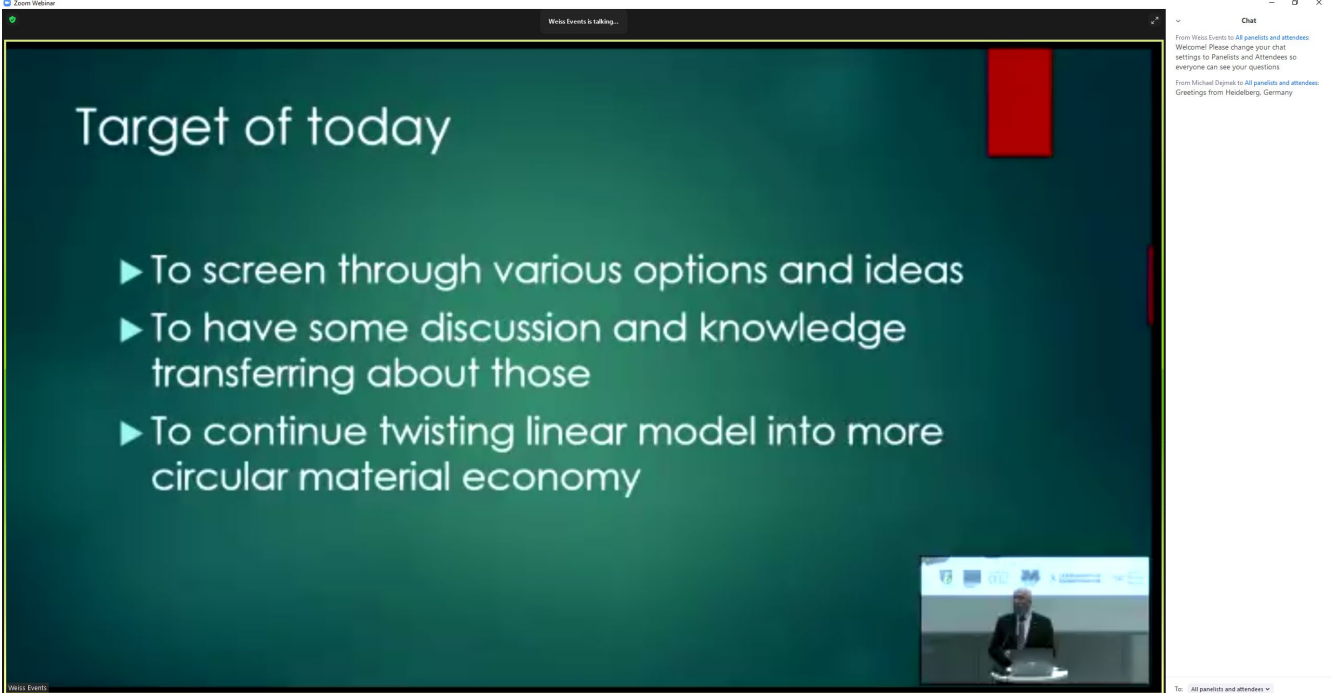
Plastics-webinar

16.12.2020 09.00–14.30

9.00 Opening of the seminar, Vesa Kärhä, Finnish Plastics Industries Federation

Looking for carbon neutral and circular economy. Renewable materials and feedstocks are coming to market.

Number of participants: 160



The image shows a Zoom webinar interface. The main content is a slide with a dark green background and white text. The slide title is "Target of today". Below the title are three bullet points, each preceded by a right-pointing triangle. The bullet points are: "To screen through various options and ideas", "To have some discussion and knowledge transferring about those", and "To continue twisting linear model into more circular material economy". In the bottom right corner of the slide, there is a small video thumbnail showing a man in a suit speaking at a podium. To the right of the slide is a chat window with a white background and a dark border. The chat window has a title bar that says "Chat" and contains three messages: "From Weiss Events to All panelists and attendees: Welcome! Please change your chat settings. To Panelists and Attendees so everyone can see your questions.", "From Michael Dignak to All panelists and attendees: Greetings from Heidelberg, Germany", and "To: All panelists and attendees".

9.15 EU policy framework for bio-based plastics and biodegradable or compostable plastics,

Silvia Forni, Directorate-General for Environment, European Commission

Strategy Adapted in 2018

Four pillars in EU strategy in circular economy.

New circular economy action plan.



Chat

From Weiss Events to [All panelists and attendees](#):
Welcome! Please change your chat settings to Panelists and Attendees so everyone can see your questions

From Michael Dejmek to [All panelists and attendees](#):
Greetings from Heidelberg, Germany

From Piia Nurmi to [All panelists and attendees](#):
Greetings from Turku, from <https://bioplasticseurope.eu/> project
While waiting you can subscribe to our newsletter
<https://bioplasticseurope.eu/newsletter> :)

Use bio-based compostable or biodegradable. Bioplastic is too general and covers too many things.

Zoom Webinar

Chat

From Wits Events to All panelists and attendees: Welcome! Please change your chat settings to Panelists and Attendees so everyone can see your questions.

From Michael Dymek to All panelists and attendees: Greetings from Heidelberg, Germany

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From Kristi Cure, LL... to All panelists and attendees: I don't see the presentation. How about others?

From Minna Annila to All panelists and attendees: Should we see slides?

From Johanna Slet to All panelists and attendees: I can't see the slides.

To: All panelists and attendees
Your text can be seen by panelists and other attendees

9:22 14/12/2019

ea sac
Science Advisory Council

Packaging plastics in the circular economy

Recommendations (press release 10 March 2020)

"At present, the scientists see a very limited potential for biodegradable plastic"

"There are only a limited number of products which can meet biodegradation tests in the marine environment and even those still maintain their integrity for months, during which time the risks of entanglement and ingestion remain."

"Bio" does not equate to reduced environmental impact"

"Today consumers are often misled, including by the current diversity of labelling schemes."

EA SAC policy report 20
March 2020
ISBN: 978-2-8847-4123-4
This report is for internal use only

European Commission

Report made by scientists, not EU on packaging

Zoom Webinar

Chat

From Wits Events to All panelists and attendees: Welcome! Please change your chat settings to Panelists and Attendees so everyone can see your questions.

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From Maya-Lisa Ep... to All panelists and attendees: I can't see the slides.

From Pia Nurmi to All panelists and attendees: I can see now

To: All panelists and attendees
Your text can be seen by panelists and other attendees

9:22 14/12/2019

Framework for bio-based, biodegradable and compostable plastics

Sourcing, labelling and use of bio-based plastics

- ⇒ Ongoing JRC Study on feedstock (LCA)
- ⇒ Ongoing study on sustainable sourcing (sustainability criteria) and content

Use of biodegradable plastics:

- "no license to litter"
- ⇒ Opinion by Chief Scientific Advisers
- ⇒ Ongoing study on agricultural plastics

Use of compostable plastics

- ⇒ Study on compostable plastic products and packaging (criteria)

European Commission

Framework expected end of this year

4. Study: Biodegradability in the open environment

• Study with the Chief Scientific Advisors and European academy networks to look at technical and behavioural aspects:

- How can 'biodegradation' of plastics and 'open environment' be defined?
- What applications can be recommended?
- What should be communicated in order to avoid consumer confusion?

Results end 2020



Disposal scenarios: potential for biodegradable materials – DRAFT

Disposal scenarios	Positive potential outcome	Neutral potential outcome	Negative potential outcome
Release into a natural environment – appropriately designed	X		
Release into a natural environment – inappropriately designed, e.g. litter		X	X
Transfer to an appropriate managed system, e.g. industrial composter	X		
Transfer to an inappropriate managed system, e.g. recycling for conventional polymers			X
Transfer to a managed system for residual waste		X	



Industry waiting for definition of plastics. Currently waiting for guidance from the EC.

Request for single use products instead of single use plastics.->EC view based on study

9.45 Green Lahti – European Green Capital 2021, Milla Bruneau

This event is part of European green capital project

AN ANNUAL COMPETITION ORGANISED BY THE EUROPEAN COMMISSION:

Applicants for the European Green Capital Award 2021 were assessed on their performance in 12 key environmental indicators:

1. Climate change: Mitigation
2. Climate change: Adaptation
3. Sustainable urban mobility
4. Sustainable land use
5. Nature and biodiversity
6. Air quality
7. Noise
8. Waste
9. Water
10. Green growth and eco-innovation
11. Energy performance
12. Governance

Lahti's application: greenlahti.fi/facts

GREEN LAHTI

LAHTI



GREEN LAHTI

LAHTI



GREEN CAPITAL YEAR 2021 THEMES

The 2021 themes are represented by four images:

- CARBON-NEUTRAL LIFE:** A person working on solar panels.
- CITIZEN PARTICIPATION:** A person sitting on a bench outdoors.
- CIRCULAR ECONOMY:** A recycling symbol with a green leaf.
- NATURE AND WATER:** A landscape with a body of water and a green plant.

GREEN LAHTI

LAHTI



Sustainable Lahti foundation established this year by Lahti and surrounding municipalities. Funds local projects

GREEN LAHTI

Change is an endurance sport. It takes time and resolve to see it through.

Change is scary. It's easy to cling to the past and seek security in the current ways of doing things.

It takes guts to ask for more. A new approach, higher goals and a brighter future. Each crisis is a test that shows our capacity to endure change. Forward looking leaders are the first to identify and take on future challenges.

No one knows this better than a city that has faced tough challenges by making everlasting decisions that promote a more sustainable tomorrow and lead the way for sustainable living with an enduring attitude.

Lahti – Enduring change

LAHTI

Milla Brunéau

10.30 Boosting bioplastic innovations, Sauli Eerola, Muovipoli Oy

Industry and innovations

Science-based innovations, STI-mode (Science, technology, innovation) 4 %

- Radical technological innovations
- Science and related expertise
- Technology diffusion for the firms and clusters
- Codified knowledge

Context of knowledge application

Innovation ecosystems Companies Universities Public bodies

Practice-based innovations, DUI-mode (Doing, using, interacting) 96 %

- Incremental innovations
- Practice-, market- and demand-based
- Organisational and network learning
- Scanning and absorbing technology and market signals
- Future-oriented, tacit knowledge

Emda, based on Harneskorp, Herman & Urdal

Policy instruments and tools aiming at promoting knowledge transfer and utilisation

	Low-tech industries	High-tech industries	KIBS (knowledge intensive business service)
Competition criterion	Price / quality	Innovation	Customer orientation, innovation
R&D intensity	Low	High	High or low
Patenting	Low	High	Low / copyright
Type of innovation	Process innovation	Product innovation	New concepts and ICT-based services
Scale of innovation	Incremental	Fundamental	Incremental and fundamental
Type of knowledge	Tact / practical	Codified / theoretical	Codified and tact
Type of learning	Learning by using	Searching and exploring	Interactive learning
Cooperation	Customer-producer relationships	University-producer relationships	KIBS-client relationships
Skills and competencies	Practical knowledge	Theoretical knowledge and cognitive skills	Theoretical and practical knowledge

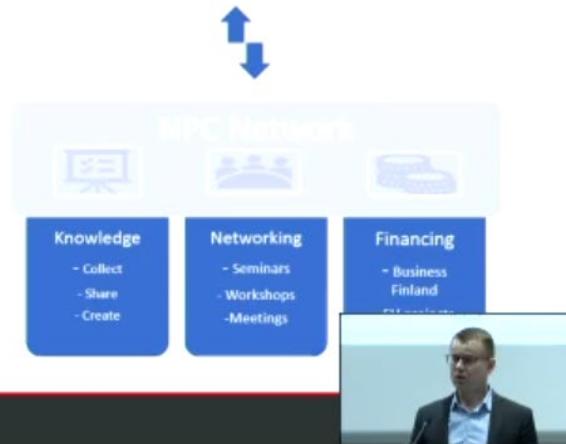
16.12.2020

A Plastics Roadmap for Finland

A need for New Plastics Finland knowledge network and the coordination party, aiming for:

- to enhance the material competence of companies
- strengthen the value chains of plastic recycling and research
- disseminate knowledge on solutions to replace traditional fossil-based plastics
- develop standardisation and unite the network with key international forums in the field.
- <https://muovitekartta.fi/n-brief/>
- NPC was established in 2019 as part of Muovipoli Oy, to support rise of market-based biomaterial innovations in cooperation with companies, research organisations and the network

The markets



muovipoli

16.12.2020

Recently published a plastics guide with Finnish plastics industry federation.

10.50 Carbon neutral plastics in packaging industry, Tuija Suur-Hamari, Wipak Oy

Flexible packaging company, working in food and health packaging

Innovate for Circularity

Fiscal instruments should make it possible for industry to create circular economies and business models.



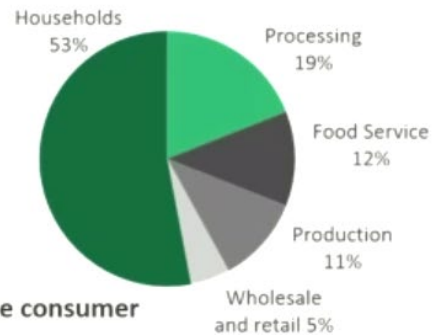
- Flexibles package 40% of goods packaged in plastics in Europe at only 10% of the plastic waste
- Circularity can be achieved with mechanical and chemical recycling
- Fiscal stimulus has to be a catalyst for this kind of innovation, not a hindrance

WIPAK
GREEN IS THE NEW BLACK

Food Waste - Awareness

Prevention is at the top of the hierarchy pyramid in relation with resource efficiency

- Food waste statistics in EU show:
- A total of 88 million tons of food waste per year;
- Equivalent of **20% of all produced food in EU**;
- 173 kilograms of food waste per person
- With almost **two third of the waste occurring at the consumer stage** (households 53% and food service 12%)



Source: Flexible Packaging Europe, Sept. 2016

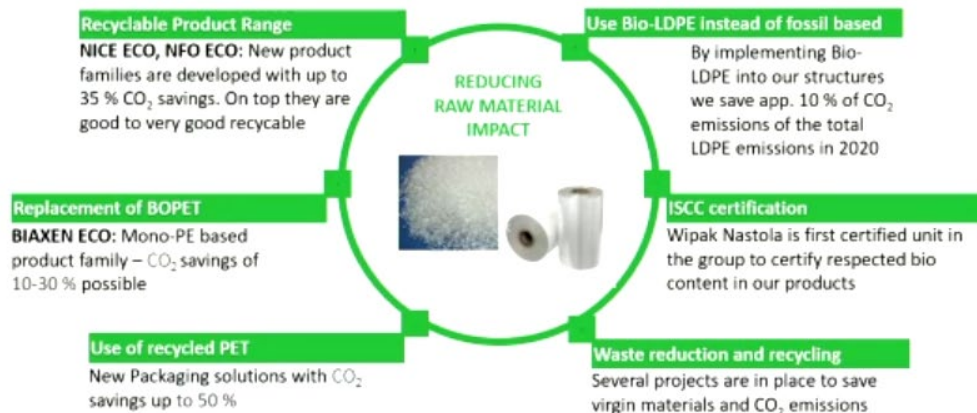
WIPAK
GREEN IS THE NEW BLACK



Their aim: prevent food waste whilst being carbon neutral (Corporate Carbon Footprint Carbon Zero-Z focus on raw materials). Now working with replacement raw materials, e.g. using recycled and bio-based materials. Cost of changed is passed to end consumer. Will still need market acceptance for the new products. Have an app oto show customers the benefits of changing to more sustainable solutions

Reducing Raw material impact is key

Current achievements



WIPAK
GREEN IS THE NEW BLACK

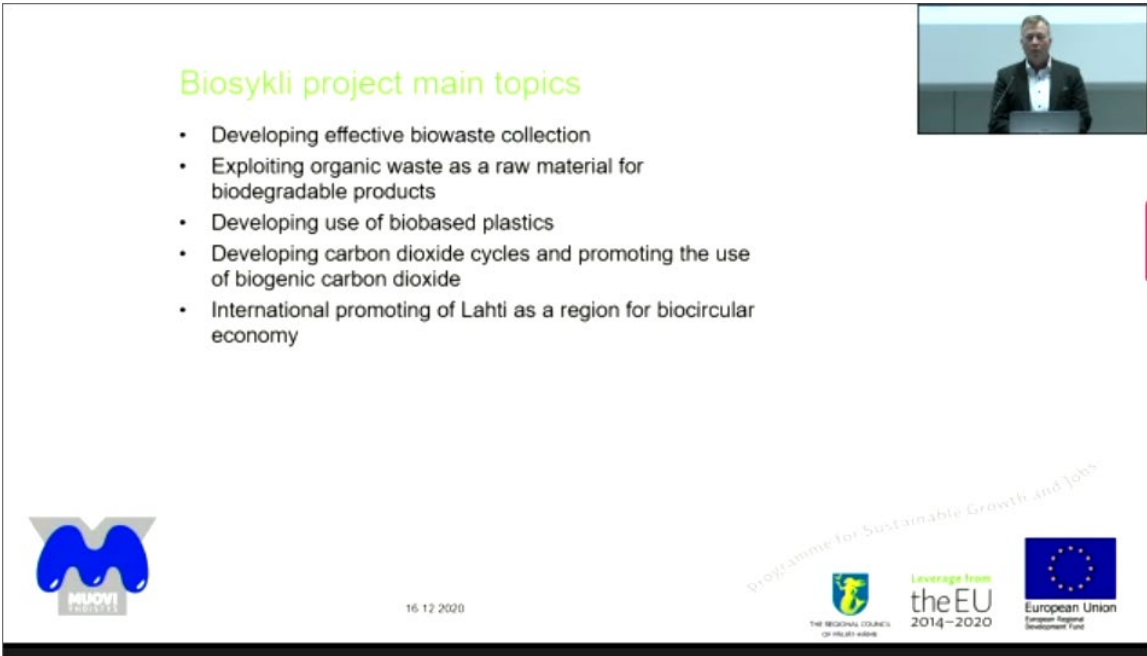
11.10 Case Wiitta, Wille Viittanen, Wiitta Oy

Company focusing on injection moulding. Looking at the problems (including limits) and benefits of different materials.

In Finland the future is based on wood.

Not all products are suitable to use biodegradable material, e.g. pipes

11.45 Biosykli – Circular Bioeconomy in Lahti Region, Vesa Taitto, The Finnish Plastics Association



Biosykli project main topics

- Developing effective biowaste collection
- Exploiting organic waste as a raw material for biodegradable products
- Developing use of biobased plastics
- Developing carbon dioxide cycles and promoting the use of biogenic carbon dioxide
- International promoting of Lahti as a region for biocircular economy

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MUVI Finland

THE REGIONAL COUNCIL OF UUSIMAA

Leverage from the EU 2014-2020

European Union European Regional Development Fund

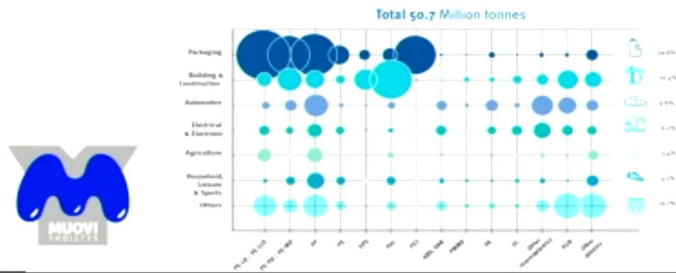
Biosykli project interviews in Finland



- Manufacturers of plastic products (mainly extrusion and injection molding) supplying to many industries
- Machine manufacturers / suppliers
- Raw material manufacturers / distributors
- Interviews representing plastic demand by segment and resin type in Europe

JAMK University of Applied Sciences
 Market Research Group
 PLM&C and Logistics
 Market & Strategic Studies

PLASTICS DEMAND BY SEGMENT AND POLYMER TYPE IN 2019
Data for EUROAREA



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Interview findings:

Biosykli interviews - general findings



- In general, a holistic approach is needed when considering plastics and environment reducing CO2 footprint. We (and EU) have to ask the right questions, for example:
 - How to avoid plastic in packaging? More relevant questions: How to minimize food waste? How to maximize safety? What kind of structures are ideal for recycling? How to increase shelf life? How to minimize environmental impact (many criteria)? How to minimize littering?
 - How to decrease plastic use in buildings? More relevant questions: How to build energy efficient buildings? How to minimize water usage? How to design long lasting buildings? How to design structures for easy recycling?
- Companies have clearly more focus on sustainability / environment than e.g. 5 years ago; environmental management systems, projects, LCA, recyclability etc.
- Energy and material efficiency depend on materials also; not possible to suboptimize
- Many companies have very general targets related to the use of recycled and/or biobased materials. To have exact numerical targets is an exception.
- Still a lot of confusion related to terminology, marketing claims, measurability



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We need more common standards

Key findings – there are quite a lot of limitations

- Communication / information related to new EU regulations is confusing, e.g. SUP directive isn't any good news for recycling (plastics are ideal for recycling)
- Legislation; you cannot use recycled plastics in many applications
- Technical constraints (mechanical recycling):
 - Using recycled materials is always a compromise. In many technically demanding applications, there isn't any room for compromises.
 - Variation between different batches of recycled materials
 - Learning curve needed in production (more work)
 - Limited colour options, smell in some cases,
- PET is the only available, approved recycled raw material for food packaging.
- Virgin material prices are close. In some cases recycled could be even more expensive.
- Sometimes (compounds) recycled content is not informed i.e. you don't know how much recycled content there is



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What is preventing the use of biobased plastics?

- Volumes globally growing, but fossil based volumes are growing much more. The absolute growth figures are very modest.
- Prices are very high:
 - Drop-in biobased plastics (PP, PE) are about double vs. fossil based
 - Biodegradable plastics prices are sky-high
- Companies and their customers are ready to pay a higher price to some extent, but now the gap is too much for most companies.
- There are also availability risks as there are not many suppliers.
- Volumes are so low that there isn't recycling in practise (except drop-in plastics)
- Confusion, especially consumers but also companies, in terminology
- Companies are not all very convinced about environmental benefits
 - E.g. green washing, biobased definition, more energy consumption + waste (in some cases), lack of recycling,
- Mass balance: you get the same product, but pay double
- In most cases, this is not a technical challenge for companies



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the EU
2014-2020



Environmental benefit is contradictory

Conclusions

- Finnish companies see circular economy as an opportunity
- Increasing recycled plastics is mainly prevented by technical and legislative issues.
- Chemical recycling is needed to have circular economy running in plastics. Also there need to be more closed loops to guarantee high quality of raw materials.
- Biobased plastics prices are too high, but it is still a business opportunity.
- Limited applications with biodegradable plastics, but at the same time there is lack of this material
- There is a need for common guidelines for measuring environmental impact to avoid green washing. A more holistic approach is needed to protect our environment.
- Research in Biosykli- project are addressing concerns about environmental benefits in an excellent way:
 - University of Helsinki. PHA from sludge. There is a huge lack of this material in the market and getting it this way would be very sustainable.
 - LUT University. Power-to-plastics. Plastics could be a carbon sink in durable goods.



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12.00 PHA production from sludge, Merja Kontro, University of Helsinki

Polyhydroksyalkanoate (PHA) production from sludge

Sub-project of Biosykli – Circular Bioeconomy in Lahti Region

Merja Kontro
University of Helsinki
Faculty of Biological and Environmental Sciences,
Ecosystems and Environment Research
Programme



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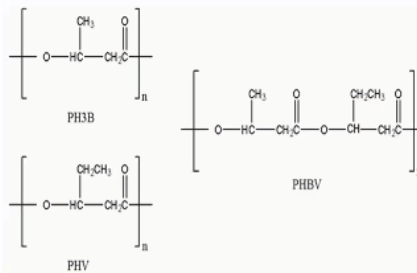


Leverage from
the EU
2014-2020



Polyhydroxyalkanoates (PHA)

- Polyhydroxyalkanoates are most commonly polyesters of hydroxybutyrate (HB) and/or hydroxyvalerate (HV)
- PHAs are bacterial storage lipids
- PHAs are currently produced commercially mainly by pure cultures
- The trend is to move to producing PHAs from waste material using bacterial mixed cultures



2

Merja Kontro

16.12.2020

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the EU
2014-2020



European Union
European Regional
Development Fund



Merja Kontro

Tend to be produced from sugars. Nor there is a move to produce it from other materials. In their case, they are studying sludge. Look not only at production method as also whether it is economically viable

12.20 Power to plastics, Ville Uusitalo, LUT University

The slide has a green background with several faint white stars. The main title is "POWER-TO-PLASTICS". Below it is the question: "Is it possible to produce plastics with negative global warming impacts by using electricity and CO₂?"
The presenter's name and affiliation are listed: Ville Uusitalo, Assistant professor | LUT University, LUT School of Energy Systems – Sustainability Science, ville.uusitalo@lut.fi.
Logos for LUT University, the Regional Council of Åland, the EU (2014-2020), and the European Union are at the bottom.



Ville Uusitalo

Looking at a new way of making plastics, based on electricity. Using excess electricity produced through renewable methods. Use electrolysis.

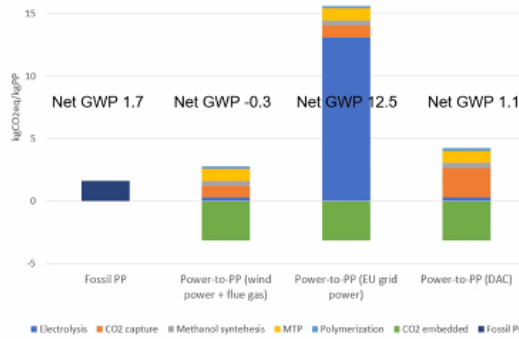
Carbon capture

MATERIALS, METHODS AND ASSUMPTIONS

- A Life cycle assessment model was created using the GaBi software to assess global warming potential (GWP) of power-to-polypropylene (PP)
- Initial data is based on literature and GaBi databases
- Functional unit is 1 kg polypropylene
- Basic assumptions:
 - Electricity for electrolysis is produced by wind power
 - PEM electrolyzer is utilized to produce hydrogen
 - CO₂ is captured from flue gas flow using amine technology
 - Methanol conversion is modelled based on previous simulations
 - Propylene is produced by MTP process



GWP OF POWER-TO-PP



(Kuusela, K., Uusitalo, V., Ahola, J., Levänen, J. 2020. Not yet published, in a review process)



CONCLUSIONS

- It could be possible to produce polypropylene with negative global warming impacts if:
 - Electrolysis is based on renewable electricity
 - Waste CO₂ is captured from flue gas
- This could provide a carbon sink if plastic is used in long lasting solutions
- From LCA methodological perspective it is not clear how CO₂ from flue gas flow should be considered e.g. between power plant and plastic producer
- There can be additional possibilities to reduce GWP of power-to-plastics e.g. by heat integrations
- There are still open questions related to future feasibility and technical implementation of required processes and to their integration especially methanol conversion
- Power-to-plastics does not solve end-of-life challenges related to plastics
- Power-to-plastics provides an interesting option to reduce climate impacts of plastic industry

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Leverage from
the EU



Ville Uusitalo

Chat

From Britta Haahti to [All panelists and attendees](#):
So, it is possible to produce a plastics substitute (or bioplastics) from sludge?!!
Sounds fantastic!

From Vesa Taitto, ... to [All panelists and attendees](#):
To Erkki. Please see the presentations from University of Helsinki and LUT University. Both could be real global solutions in the long run.

From Britta Haahti to [All panelists and attendees](#):
Is this a innovative new way of producing this end product, already used by industry, or are we talking about a totally new product?
Thank you Merja for your answer!

From Sauli Eerola to [All panelists and attendees](#):
Yes!

From Jenni Syvänn... to [All panelists and attendees](#):
Questions to Ville?

From Vesa Kärhä to [All panelists and attendees](#):
What kind of PHB capacity/production do you expect from the 1000l batch.
Was is Q&A section. Anybody, numbers?

From Jenni Syvänn... to [All panelists and attendees](#):
Merja Kontro 12:22 PM
In high organics bioreactor, about half of organics is transformed to PHAs (about 40-50%), some less in high inorganics bioreactor; in case of sludge-based material.

From Werner Merz... to [All panelists and attendees](#):
What is the efficiency rate for this process?

From Vesa Taitto, ... to [All panelists and attendees](#):
Potential is unlimited because only in the area of Lahti, you could get (theoretically) thousands of tons annually

From Vesa Kärhä to [All panelists and attendees](#):
Plastics as CCS route ! Great.

From Merja Kontro to [All panelists and attendees](#):
It is most likely that we need several/all different alternatives, one cannot solve all problems. All different carbon sources should be utilized, and the economics of different carbon sources utilization also vary. The need for recycled carbon is huge if we are aiming to replace all fossil fuel based plastics with biobased/recycled carbon sources. Then carbon is also needed for other purposes than plastics. In course of time we will get to know which approach is the best one and in which situation. In case of wastewater sludge, there is 2/3 organic material, and currently it is difficult to utilize, cannot be used in agriculture.

To: [All panelists and attendees](#) ▾

13.15 Neste's approach to renewable and circular carbon solutions, Maiju Helin, Neste Oyj

Neste's approach to renewable and circular carbon solutions

Maiju Helin, Neste Renewable Polymers and Chemicals

December 16

PLASTICS IN CARBON-NEUTRAL BIOCIRCULAR ECONOMY -webinar

NESTE

Maiju Helin

The slide features a blue and white abstract background with wavy lines and a circular graphic element. The text is white and positioned on the left side. The NESTE logo is in the bottom right corner. A small video inset of Maiju Helin is on the right.

Neste developing more sustainable solutions for the polymers and chemicals industries with a focus on two areas

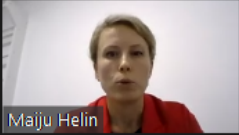
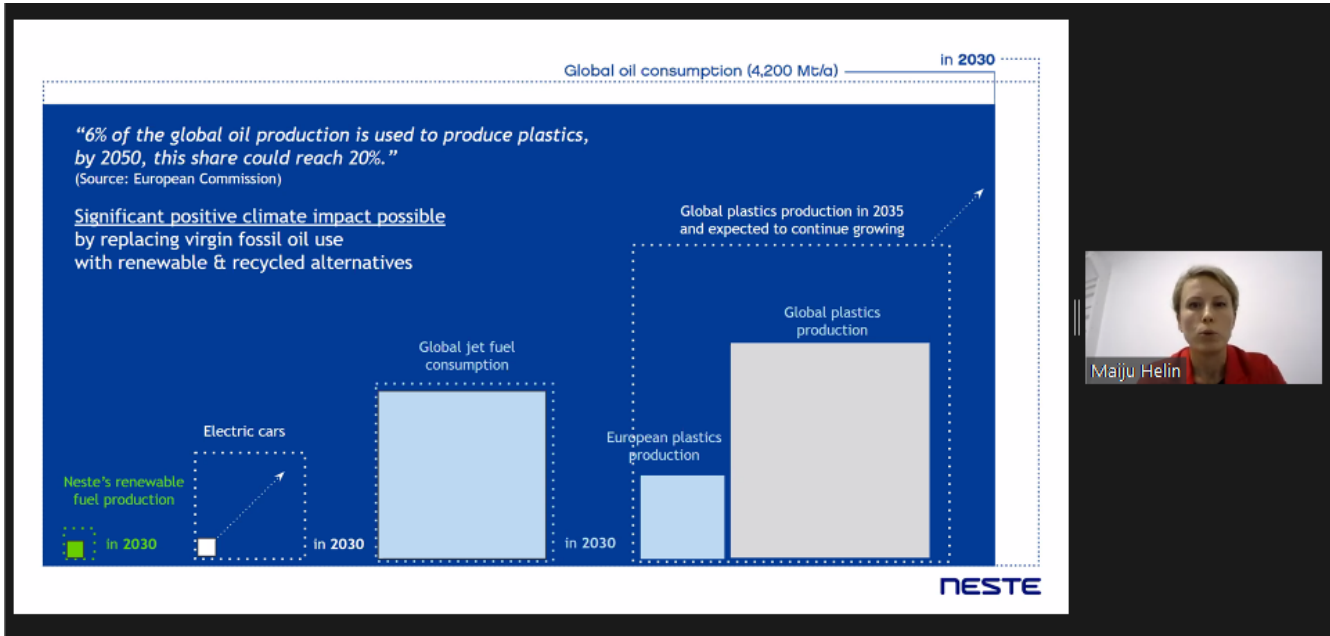
Circularity
Chemically recycling waste plastic to new high-quality plastics and chemicals.

Renewable
Renewable feedstock to replace virgin fossil feedstock in the production of a variety of plastics

NESTE

Maiju Helin

The slide features a blue background with a close-up image of water droplets on a textured surface. The text is white and positioned in the upper half. Two white rounded rectangular boxes contain the 'Circularity' and 'Renewable' sections. The NESTE logo is in the bottom right corner. A small video inset of Maiju Helin is on the right.



Green: Neste

Others: global

Renewable raw material mix

- Neste's renewable raw material portfolio consists of waste and residue oils and fats as well as vegetable oils
- Waste and residues account for 80% of Neste's renewable raw material use annually
- All renewable raw materials Neste uses are sustainably produced* and traceable to the place of origin
- Independent of raw materials used, our renewable feedstock for polymers and chemicals have consistent high quality

*Meeting or exceeding e.g. EU RED requirements

NESTE



In Europe, some **29 million tons** of post-consumer plastic waste is generated annually.

1/3 collected for recycling
1/10 actually recycled

EU's Strategy for Plastics in a Circular Economy: **increase recycling of plastic and reuse of plastic packaging by 2030.**

In the EU Waste package, **recycling target for plastic packaging: 50% by 2025, 55% by 2030**

NESTE

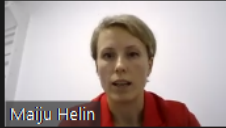


Creating a higher value alternative for incineration and complementing mechanical recycling

Re-use	Used for same purpose	To be counted towards recycling targets
Material recycling (mechanical)	Mechanically sorted and re-granulated for use in new products	
Chemical recycling	Used as feedstock in the chemical industry to make plastics and petroleum products	
Energy recovery	Converted to electricity and/or heat by incineration	
Reject	No use, landfilled	

Improved collection and sorting creates increasing amount of plastic material of too low quality for mechanical recycling, but too high for incineration

NESTE



New layer of recycling. Focus is on chemical recycling.

Phasing out palm oil.

13.45 Biobased plastics in circular economy, Anna Fråne, IVL Swedish Environmental Research Institute & Marjo Ketonen, Arctic Biomaterials Oy

ABM Technical compounds application areas

Sustainable & clean alternative for fossil plastics



ABM – World's strongest biodegradable composite materials
abmcomposite.com

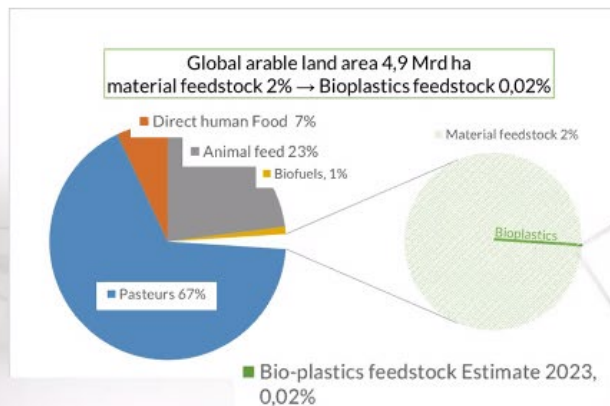
ABM COMPOSITE
Arctic Biomaterials



Marjo Ketonen

They produce raw materials as a sustainable products

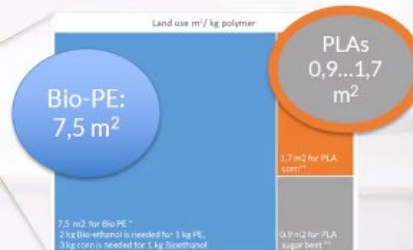
ABM COMPOSITE Arctic Biomaterials Supply chain awareness



Data source: European Bioplastics, Nova institute (2018), Institute for bioplastics and biocomposites (2016)

"Maximize bio-based carbon content with resource efficiency"

Land use for PE & PLA
[m²/kg] / produced polymer



*Ashby, Michael F. 2015 Materials and Sustainable Development, chapter 8, spreading Biopolymers
** Lovett, De Bie and Salde et al. 2016



Marjo Ketonen

e.g. corn requires more land than PLA production

marjo.ketonen@abmcomposite.com

Sales:
marko.manu@abmcomposite.com

abmcomposite.com

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Instagram: https://www.instagram.com/bioplastics_eu/
LinkedIn: <https://www.linkedin.com/groups/1046234/> (European Bioplastics Research & Networking)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101016777

ABM - World's strongest biodegradable composite materials

Thank you for listening. Contact us for more discussion and for inquiries.

Bio based products are more expensive and it is important that customers can use them in economic terms, not working with cellulose based, working with fiber glass

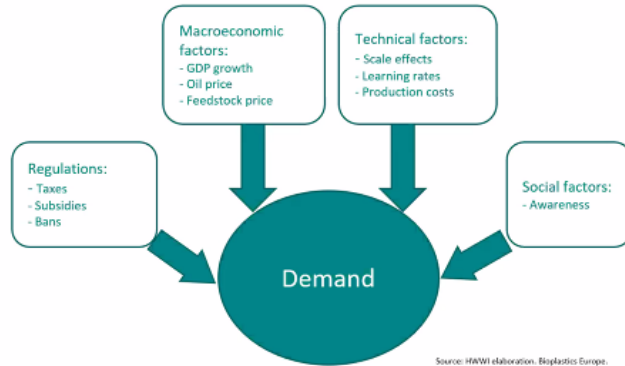
Biobased plastics in a circular economy

Anna Frâne, IVL Swedish Environmental Research Institute

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Focus on plastic waste

Factors affecting the demand for bio-based plastics



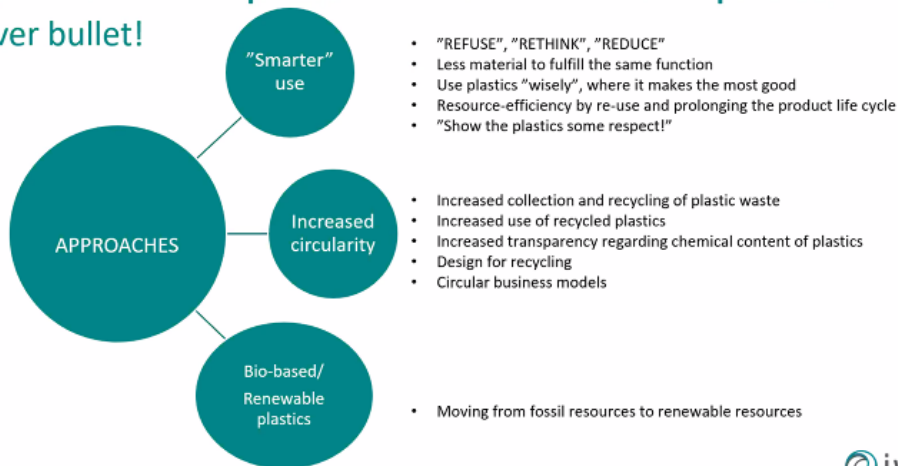
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Approaches to optimise the benefits of plastics

No silver bullet!



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You must always think about the end of life options



BIO-PLASTICS EUROPE

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Anna Frane

The main objective:

To develop sustainable strategies and solutions for bio-based plastic products, as well as the to develop approaches focused on circular innovation for the whole bioplastics system. These may be deployed to support policy-making, innovation and technology transfer.

WP1: Ethics	
WP2: Project Management	
WP3: Identification and tests of innovative product design	WP4: Plastic waste collection, recycling, and filtering
WP5: Pre-normative research and field tests	
WP6: Bio-based plastic safety components	
WP7: Replication, policy-making, capacity-building and upscaling	WP8: Environmental and economic assessments of product life cycles and business models
WP9: Information, communication and dissemination of the results	



Anna Frane

Thank you for listening!

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14.15 Closing remarks