# INNOTALK

## KLAR TIL DEN NÆSTE PLASTREVOLUTION?

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# PROGRAM

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Flemming Besenbacher

Karmenu Vella

Habib El-Habr

Clarisse Magnin-Mallez

Tommy Ahlers

Emily Penn

Maria Gjerding

Erhvervspanelet

Det miljøpolitiske Panel

Flemming Besenbacher

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Direktør

United Nations Environment Programme

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Senior Partner

McKinsey & Company Paris

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New Plastics Economy

# A RESEARCH, INNOVATION, AND BUSINESS OPPORTUNITY FOR DENMARK

InnoTalk January 17th, 2019

McKinsey&Company

Innovation Fund Denmark

# McKinsey and the Innovation Fund Denmark have analyzed the opportunities of the plastics challenge

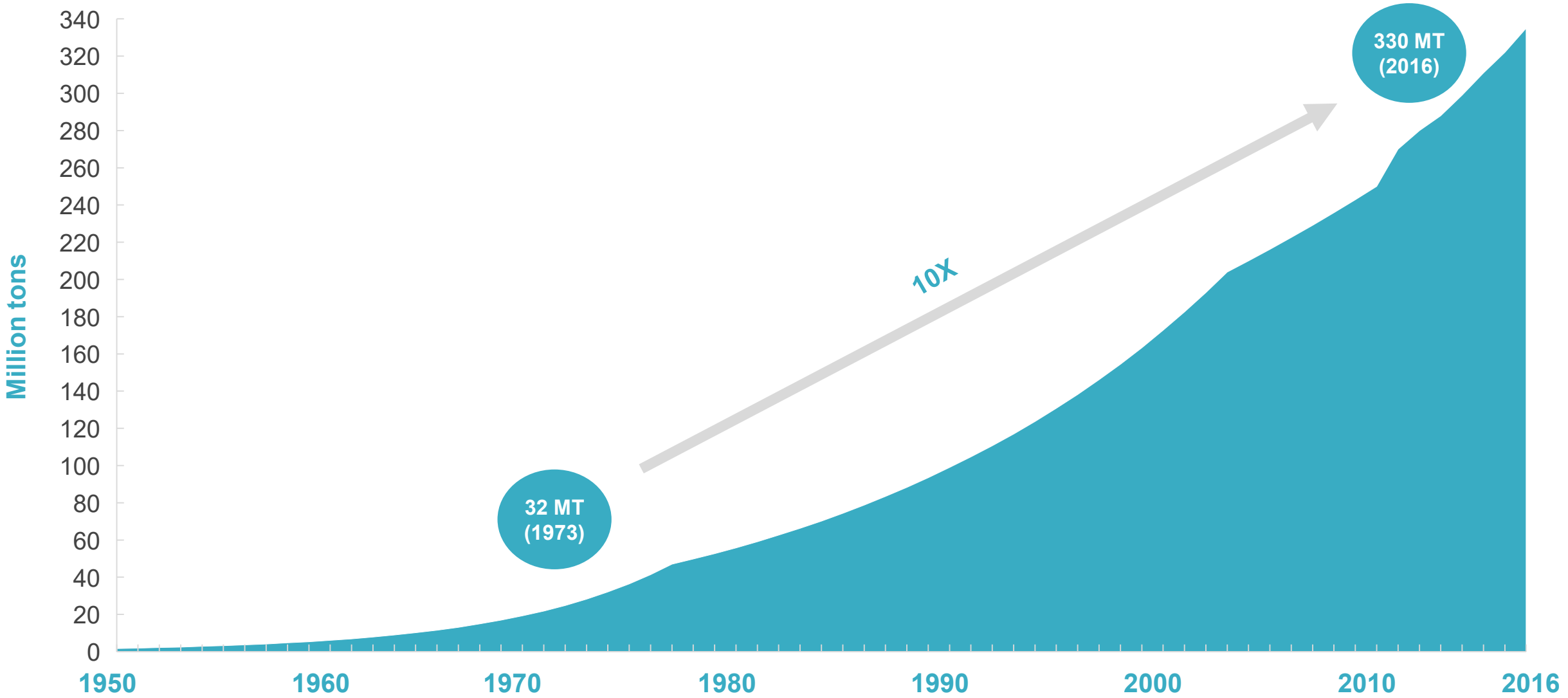
Ørsted
DANISH TECHNOLOGICAL INSTITUTE
Letbæk Plast
WWF
salling group
DAKOFA
DTU Technical University of Denmark
VESTFORBRÆNDING
RUC Roskilde University Denmark
Faerch plast
novozymes
Nationalmuseet National Museum of Denmark
OCEAN PLASTIC FORUM
Dansk Affaldsforening Affald er ressourcer
amager ressource center
Plastindustrien.
B&W vølund
Danmarks Naturfredningsforening
FLSmidth
AARHUS UNIVERSITY
DHI
plastic change
Ministry of Environment and Food of Denmark
Dansk Design Center
KL
AALBORG UNIVERSITET
Energi-, Forsynings- og Klimaministeriet
Arla
ARI Affalds- & Ressourceindustrien
HALDOR TOPSØE

## Interviews with Danish stakeholders



# In the past 40 years, global plastics production has increased ten-fold

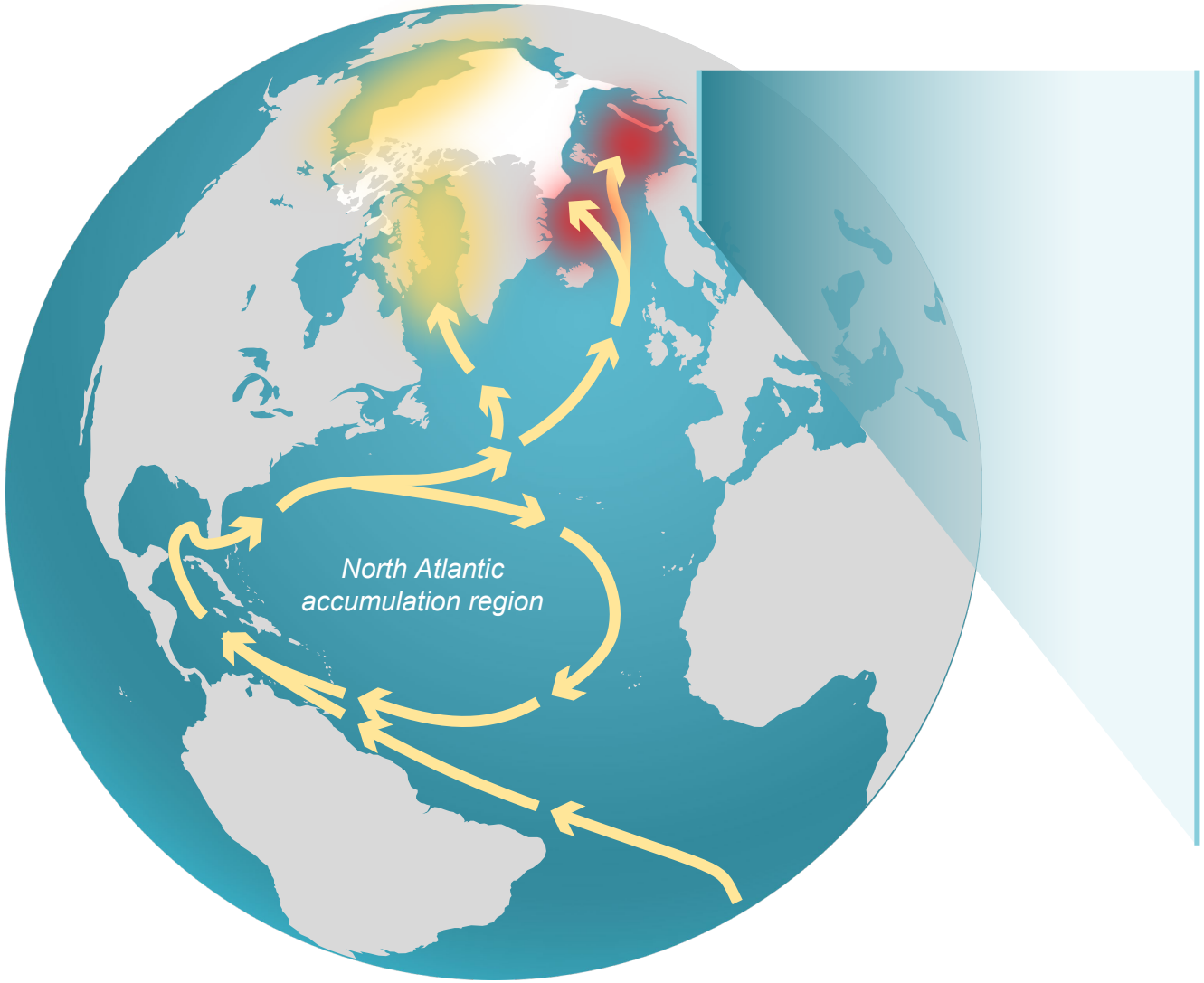
## Growth in global plastics production 1950-2016, percent



# ~8 million tons of plastic leak into the ocean annually, mainly because of waste mismanagement, littering behavior, and poor design

| Plastic pollution sources | Description |
|---|---|
| **Mismanagement**  | ▪ Plastics that have **successfully been collected** still end up as pollution due to **unmanaged landfills or mismanaged waste handling** |
| **Marine-based waste**  | ▪ **Dumping of waste at sea,** e.g., fishing boats dumping damaged fishing nets or waste from oil rigs<br>▪ Plastics with **a design to leak into the ocean,** e.g., dolly ropes |
| **Littering and dumping**  | ▪ **Uncollected waste** from littering/dumping by both citizens and organizations, e.g., due to insufficient infrastructure or lack of education |
| **Intentional waste**  | ▪ Plastic with a **use pattern or design that is unsuitable for collection systems,** causing high likelihood of leakage into the environment, e.g., toy gun cartridges, particles from tires, and small detached packaging items |

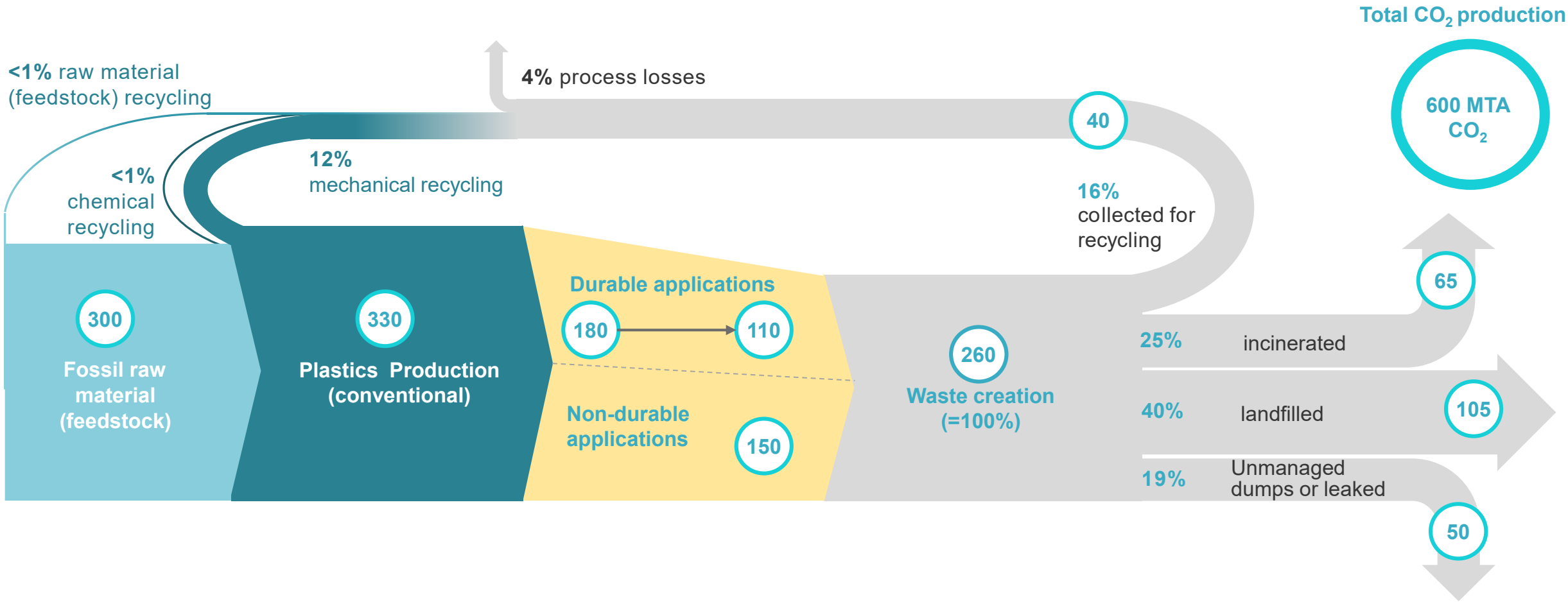
# The Arctic Ocean is a global sink for the world's microplastics as plastic waste decompose and is transported below the surface




- A significant fraction of plastics in the Arctic come from far away, as **Nordic ocean currents provide long-range transport for plastics waste**
- Surface ice-free waters in the Arctic Polar Circle were slightly polluted with plastic debris, despite extremely low population density
- The uniqueness of the Arctic ecosystem makes the **potential ecological implications of exposure to plastic debris a special concern**

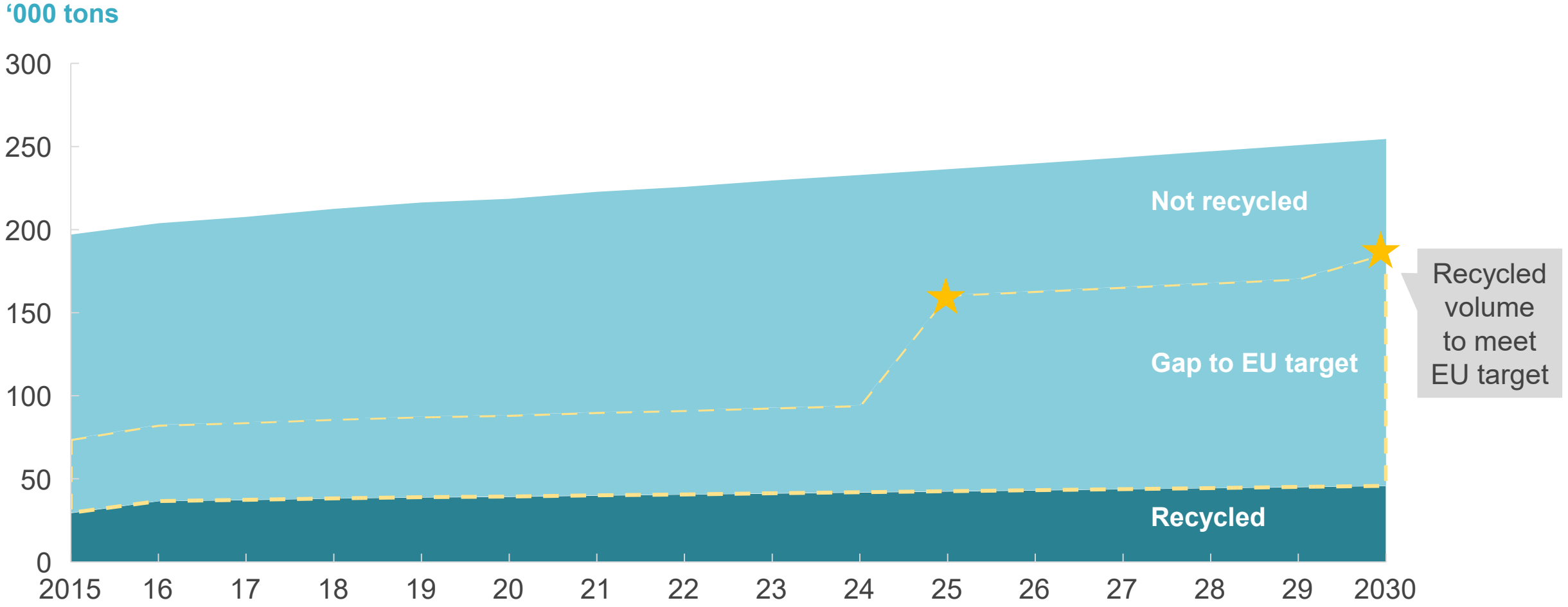
# Today, we create 260 million tons of plastics – the vast majority is not recycled. This will double in less than 20 years

## Global plastics flows 2016, million tons annually (MTA)



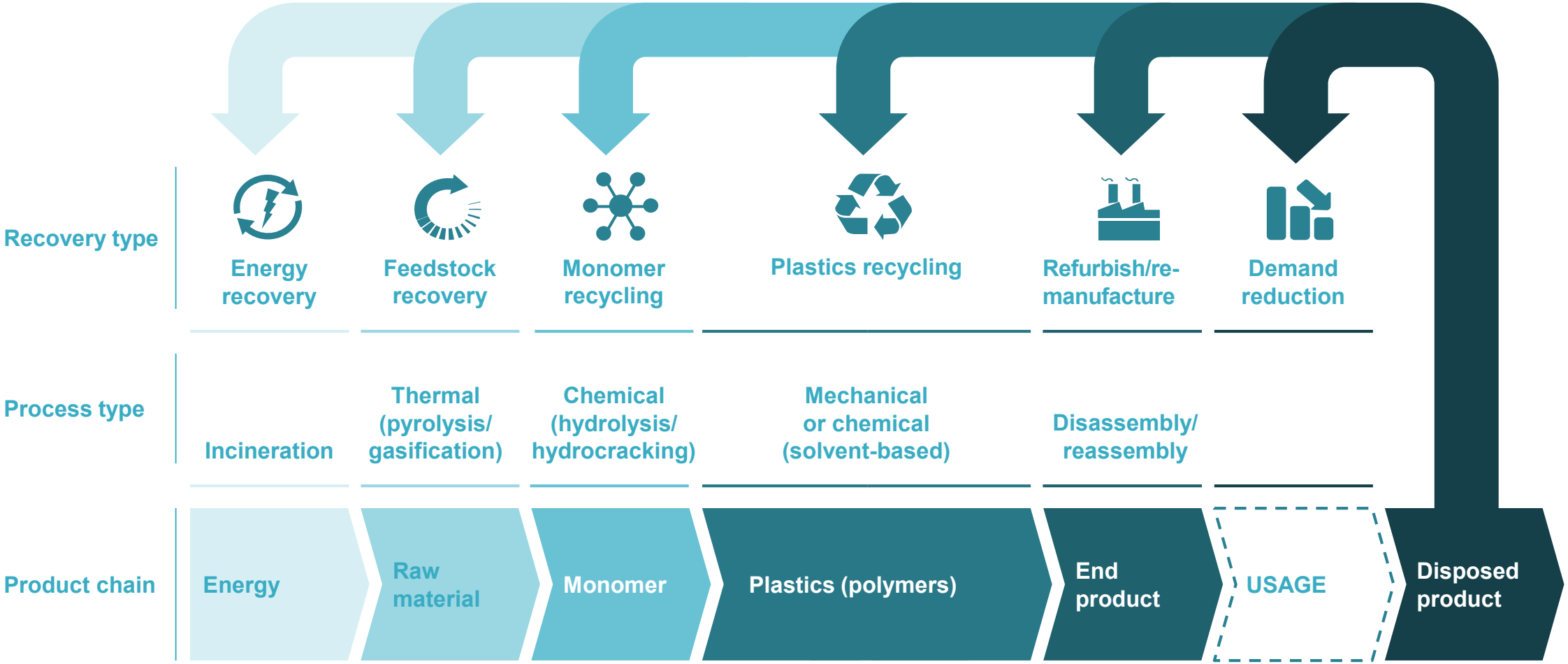
# Meeting the EU 2030 target of 55% recycling requires Denmark to triple its current recycling rate of plastics packaging

## Recycling rate and volumes for plastics packaging, thousand tons



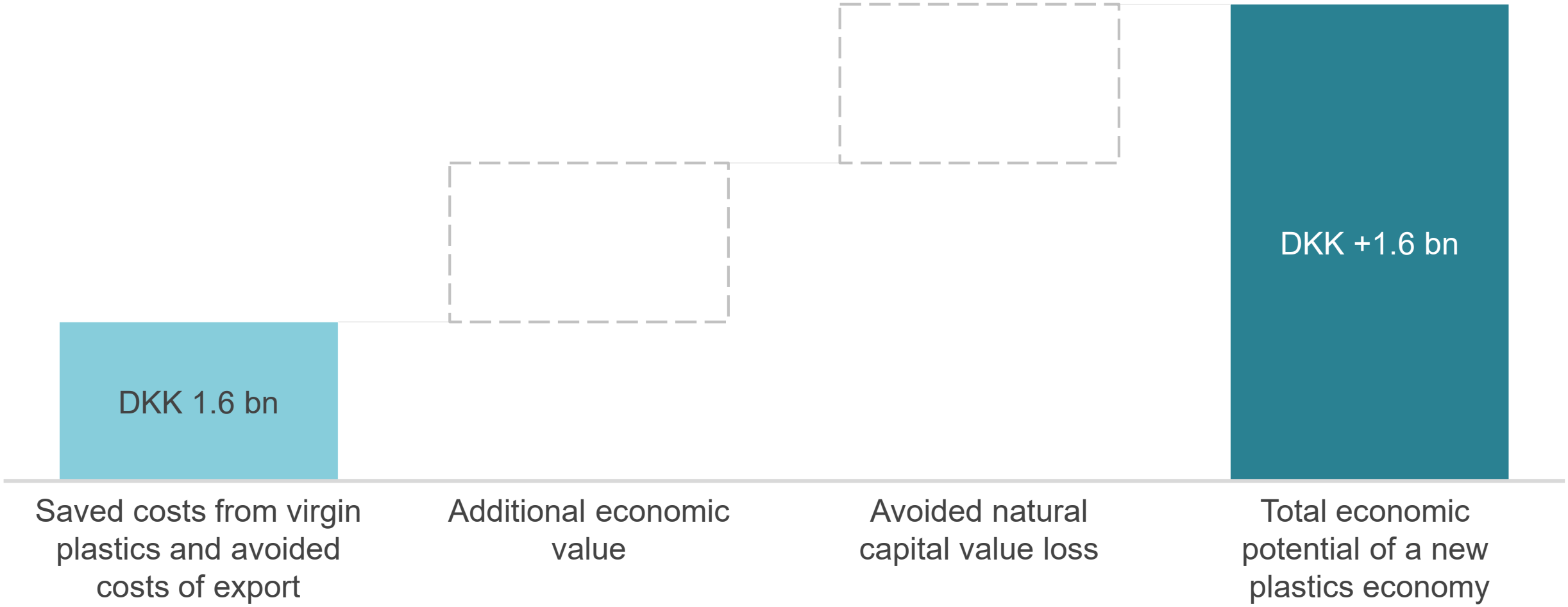
# We are today recovering the value of plastics at its lowest value point

## Overview of recovery technologies throughout the plastics value chain



# The economic upside is substantial, with at least DKK ~1.5 billion annual savings from reduced use of virgin plastics

## Estimated annual value of a circular plastics economy, DKK billion



# Denmark should become a frontrunner in the New Plastics Economy through research and innovation

## Elements of a vision for Denmark

| | | |
|---|---|---|
| 1 |  | 100% recycling of plastics with a view to capture the full value of our waste streams - for both household and industrial plastics – enabled by a functioning market for reused and recycled plastics |
| 2 |  | Minimize or phase out plastics that are difficult to recycle and/or collect |
| 3 |  | Find alternatives for plastics where intended use result in direct pollution (e.g., textiles and artificial turf) |
| 4 |  | Eliminate need for new fossil based plastics by reducing consumption, a high level of recycling and development of new sustainable bio-based plastics |
| 5 |  | Drive policies to stop plastics pollution of the oceans through the EU and global forums, as Denmark cannot solve the plastics challenge alone |

# Denmark should set aspirational targets short, medium, and long term to guide efforts needed today and in the future

## Short term

Prioritize research and development on plastics



**Bring academia, industry and regulators together to define a research and innovation agenda** to close key knowledge gaps

Identify necessary **technologies, regulatory changes, and societal tools**

## Medium term

Meet EU targets and drive innovation



**Align collection criteria** across municipalities and **reduce waste creation,** specifically in plastics that are difficult to recycle

Innovation in necessary **recycling technologies, and supporting technologies for sorting and collection** (e.g., traceability, use of AI, and robotics) as well as innovations for **reuse and repair**, **and new business models**

## Long term

Establish a viable market for renewable plastics and [illegible]stainable plastics



Define and implement **a viable market for recycled plastics** via a combination of demand and supply measures

Lead **development of niche applications of bio-based plastics** for high-value products based on existing industry in Denmark

# Potential research areas for Denmark in the circular plastics economy

## Research areas (examples)

### Smart use of plastics



- Product design enabling increased reuse
- New circular business models for plastics
- Alternative materials for food packaging

### Long term health and biosystem effects of plastics



- Definition and measurement technologies for micro- and nanoplastics
- Biosystem and human health effects of microplastics exposure incl. critical thresholds and most critical exposure pathways
- Technologies to avoid or reduce micro- and nanoplastics in nature

### Recycling of plastics



- Assessment of potential of mechanical recycling of consumer and industrial plastics
- Technologies for improved sorting and collection incl. AI, robotics, advanced sensors as well as potential implementation roadmap
- Technologies to detect, measure, and remove substances of concern from plastics
- Technologies for recycling of complex plastic waste, e.g., chemical recycling

### New sources of plastics



- Technology and cost roadmaps for sustainable bio-based plastics
- “Power to X” and other options for fossil free plastics incl. cost and environmental comparisons

# McKinsey has been a trail blazer on the Plastics topic globally for more than 4 years

2015 2016 2017 2018



Stemming the tide – Land-based strategies for a plastic-free ocean **(2015)**




The New Plastics Economy - Rethinking The Future of Plastics **(2016)**



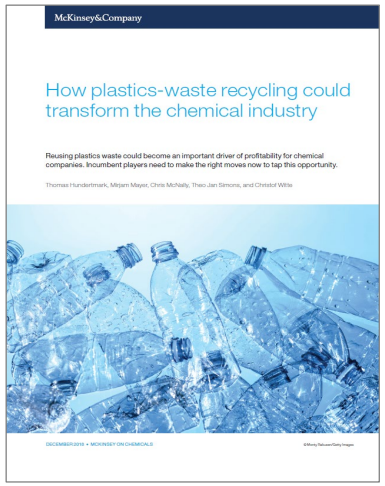
Managing waste in emerging markets **(2016)**




No time to waste: What plastics recycling could offer **(2018)**




How plastics waste recycling could transform the chemical industry **(2018)**





# THANK YOU

McKinsey&Company

Innovation Fund Denmark

# TOMMY AHLERS

Uddannelses- og Forskningsminister

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Miljøpolitisk debat

Flemming Besenbacher

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# EMILY PENN

*Aktivist*

*Plastic Ocean: eXXpedition*

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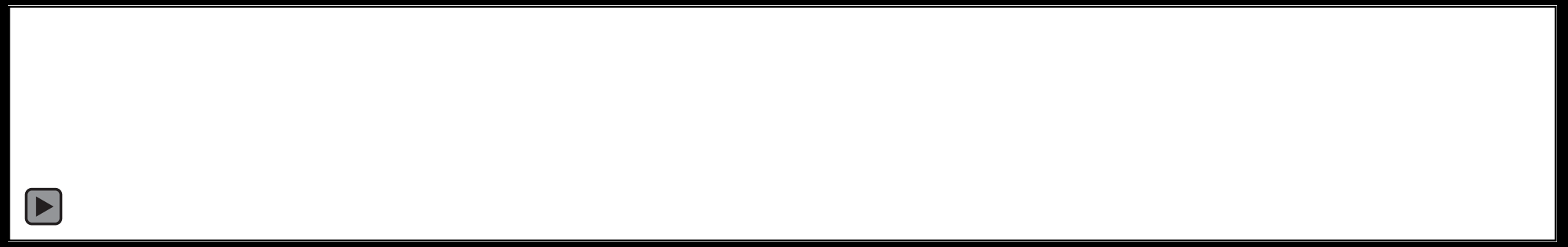





ALUMINUM FOIL 37.5 HEAVY DUTY
PLASTIC WRAP
Ribbed Penne
Baby Oil
Breakfast Crackers
Cream Crackers
Custard Creams
Ginger Kisses
Weet-Bix
Rolled Oats
Healthy Grain Rice
Island Queen
MACKEREL
WELLASTRATE
CORNED BEEF
SALISBURY
Stella
Palmolive
Medicare
Protex
Peanuts
1.00
4.00
3.00





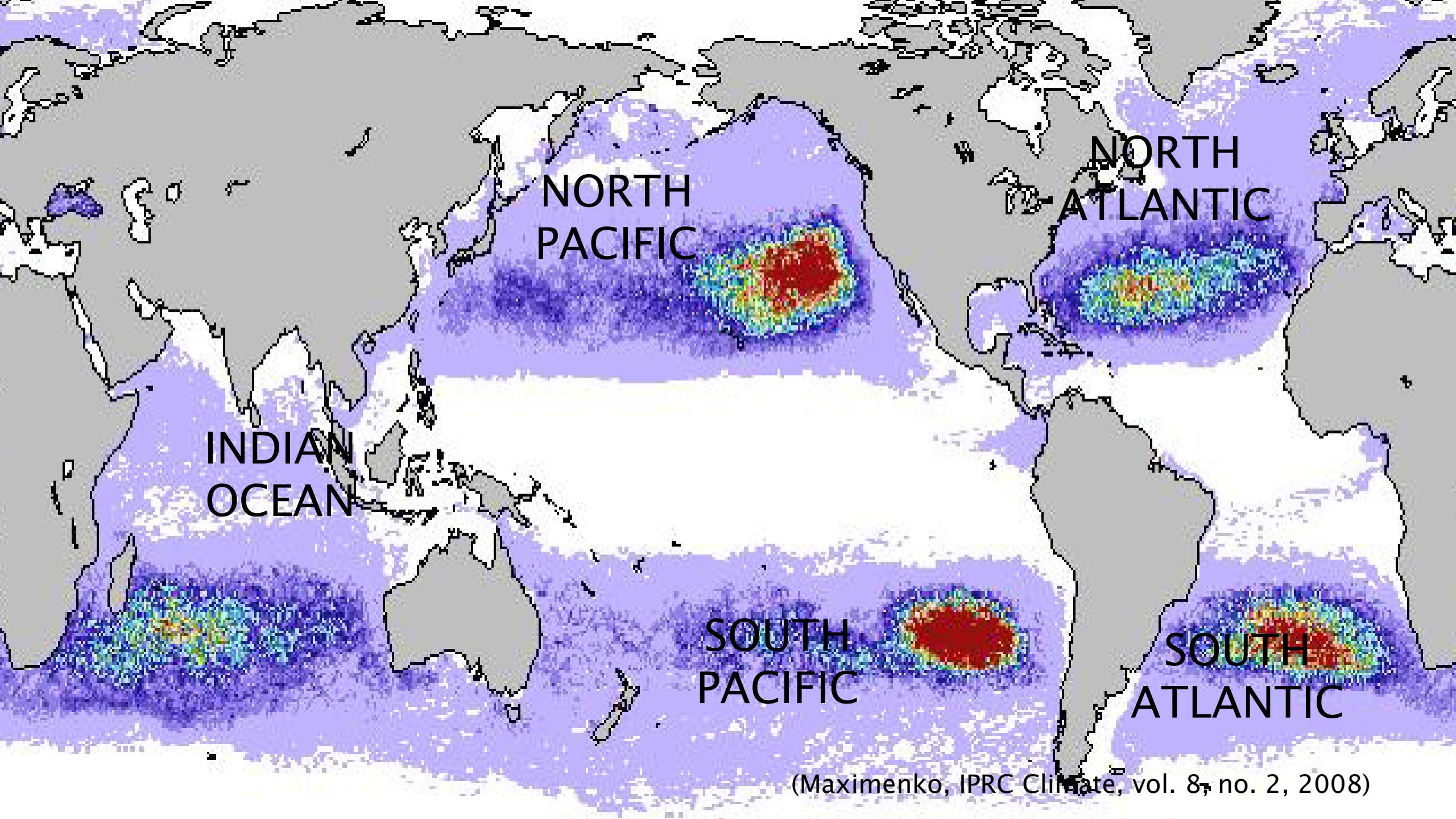


number of plastic bags produced

worldwide

**this year**


1
2
3
4
5
6
7
PETE
HDPE
V
LDPE
PP
PS
Other

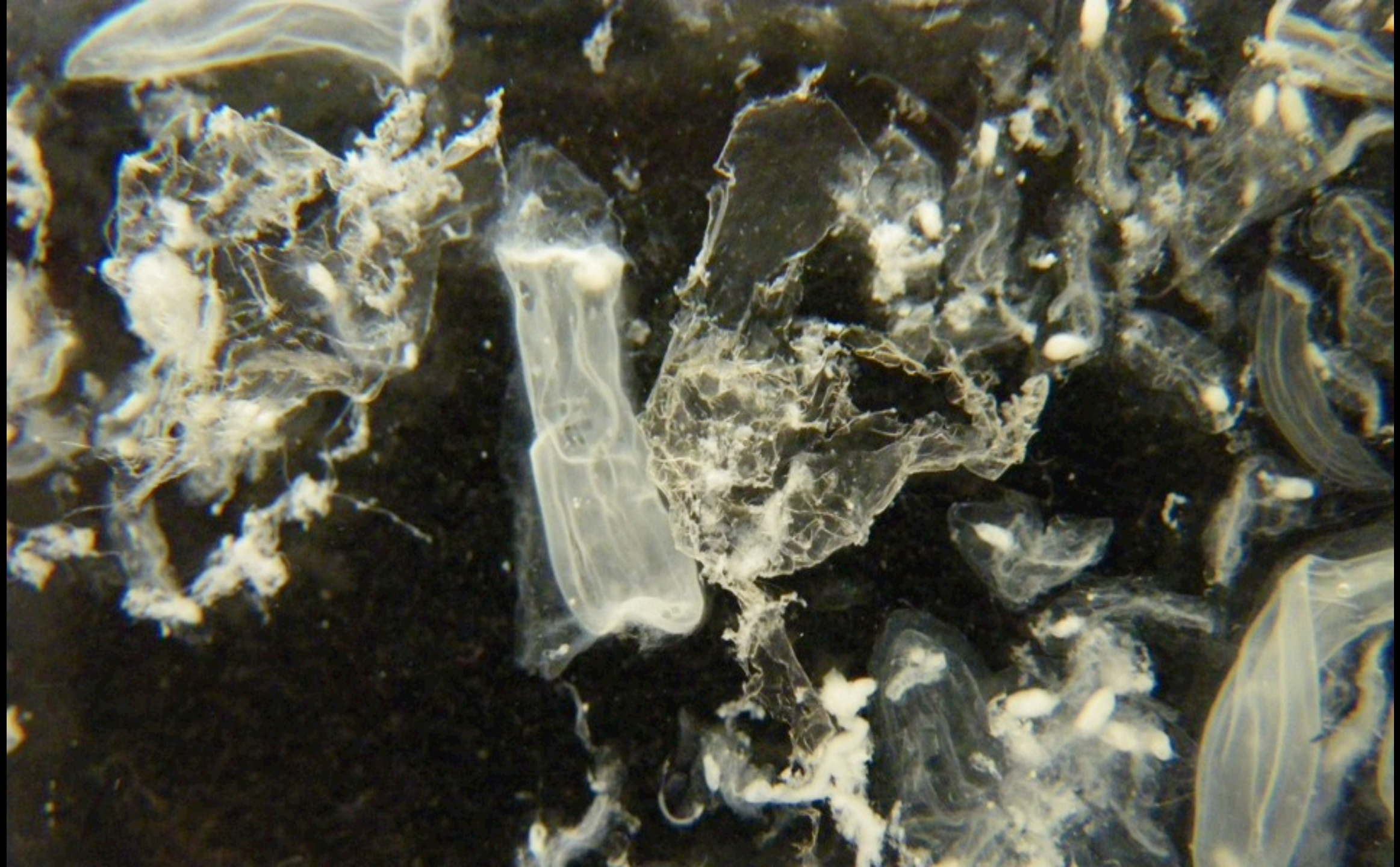


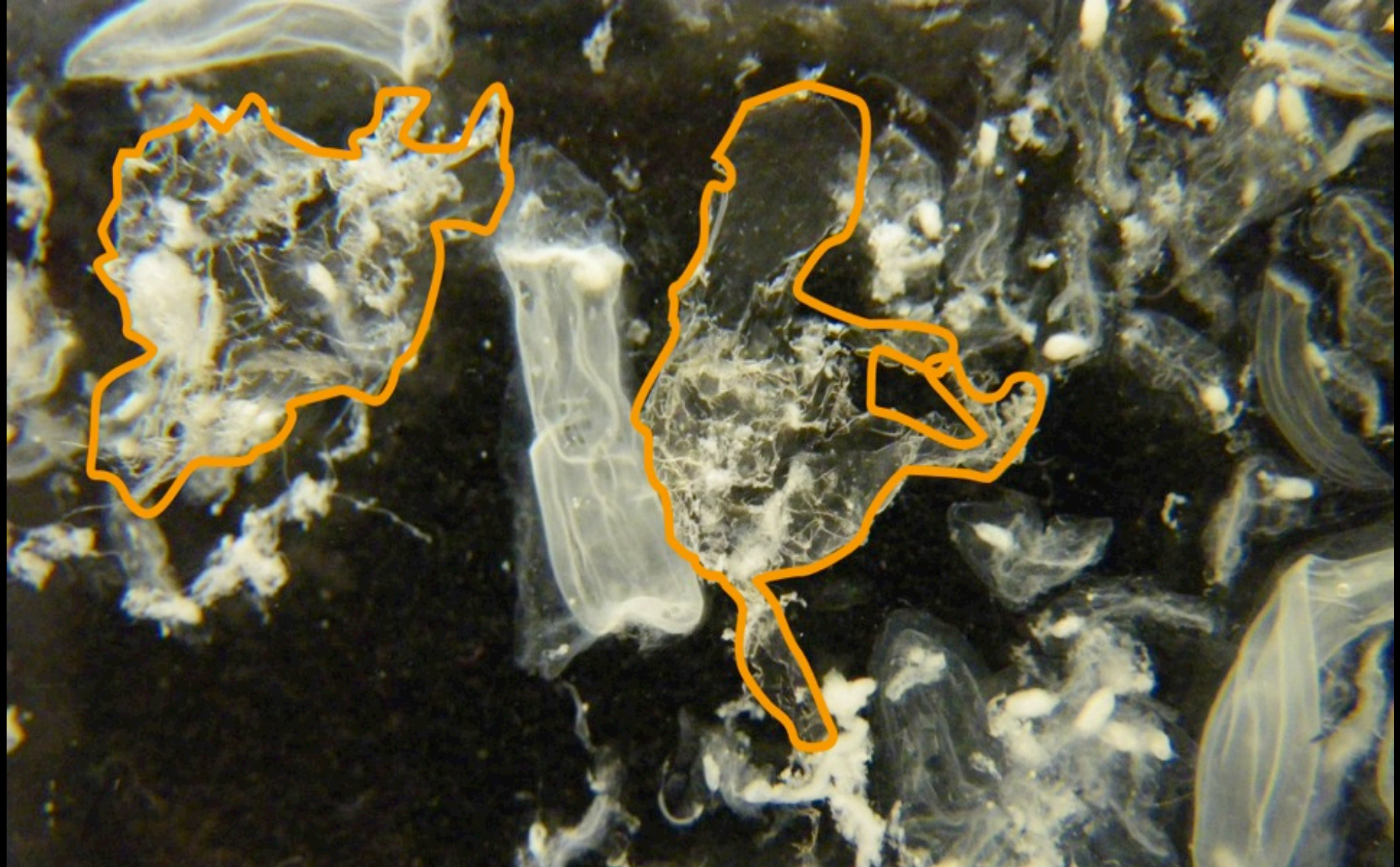

(Maximenko, IPRC Climate, vol. 8, no. 2, 2008)

Sea Dragon. 72ft expedition sailing vessel



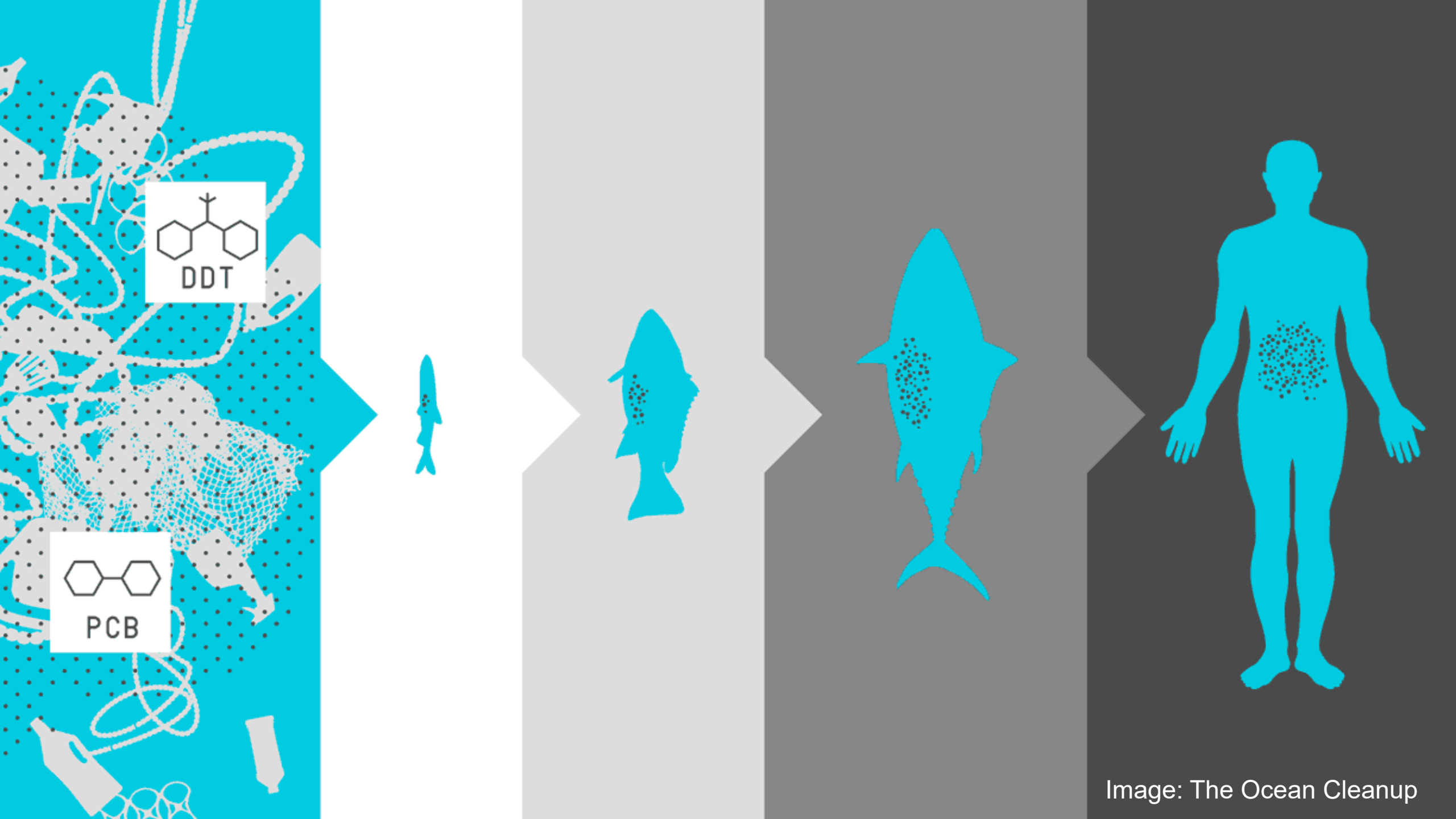






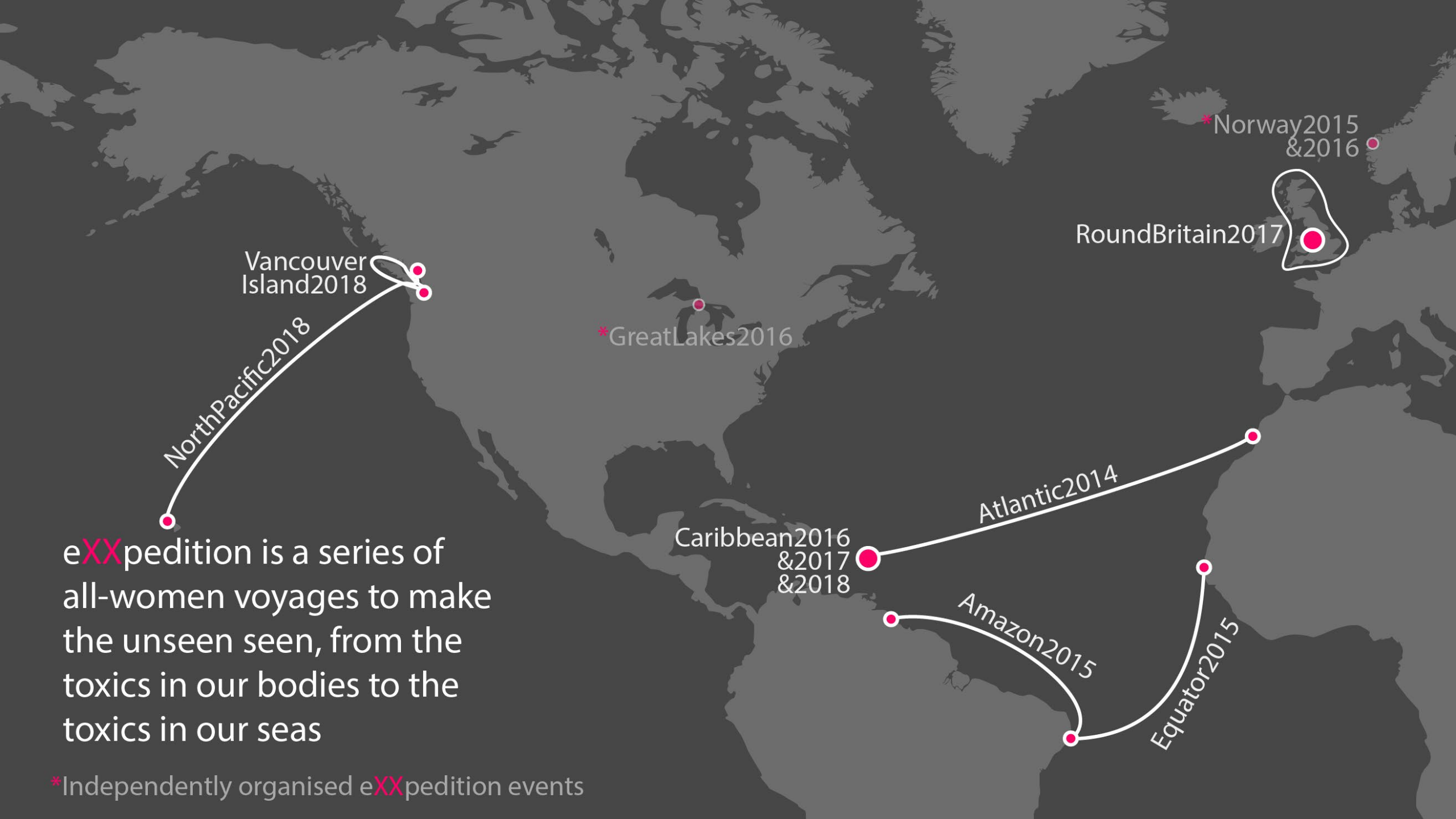


17 fragments of plastic (Photo: 5 Gyres)


DDT
PCB
Image: The Ocean Cleanup


THE DOCTORS
LABORATORY


eXXpedition
/atlantic2014




eXXpedition is a series of all-women voyages to make the unseen seen, from the toxics in our bodies to the toxics in our seas

*Independently organised eXXpedition events


37
eXXpedition
MAKING THE UNSEEN SEEN
5GYRES
clean seas
turn the tide on plastic
SPERRY
Since 1935
Copernicus
Marine Service
TOMRA
SafePlanet
boot
SHERWOOD SCUBA
PELICAN ROPE
The Most Trusted Name in Rope
spinlock
aquapac
NORTH SAILS


PANG EA
EXPLO TIONS






eXXpedition
PANGAEA
EXPLORATION
exploration - education - conservation

# STOP PLASTIC AT THE SOURCE






+




+




**AVOID**

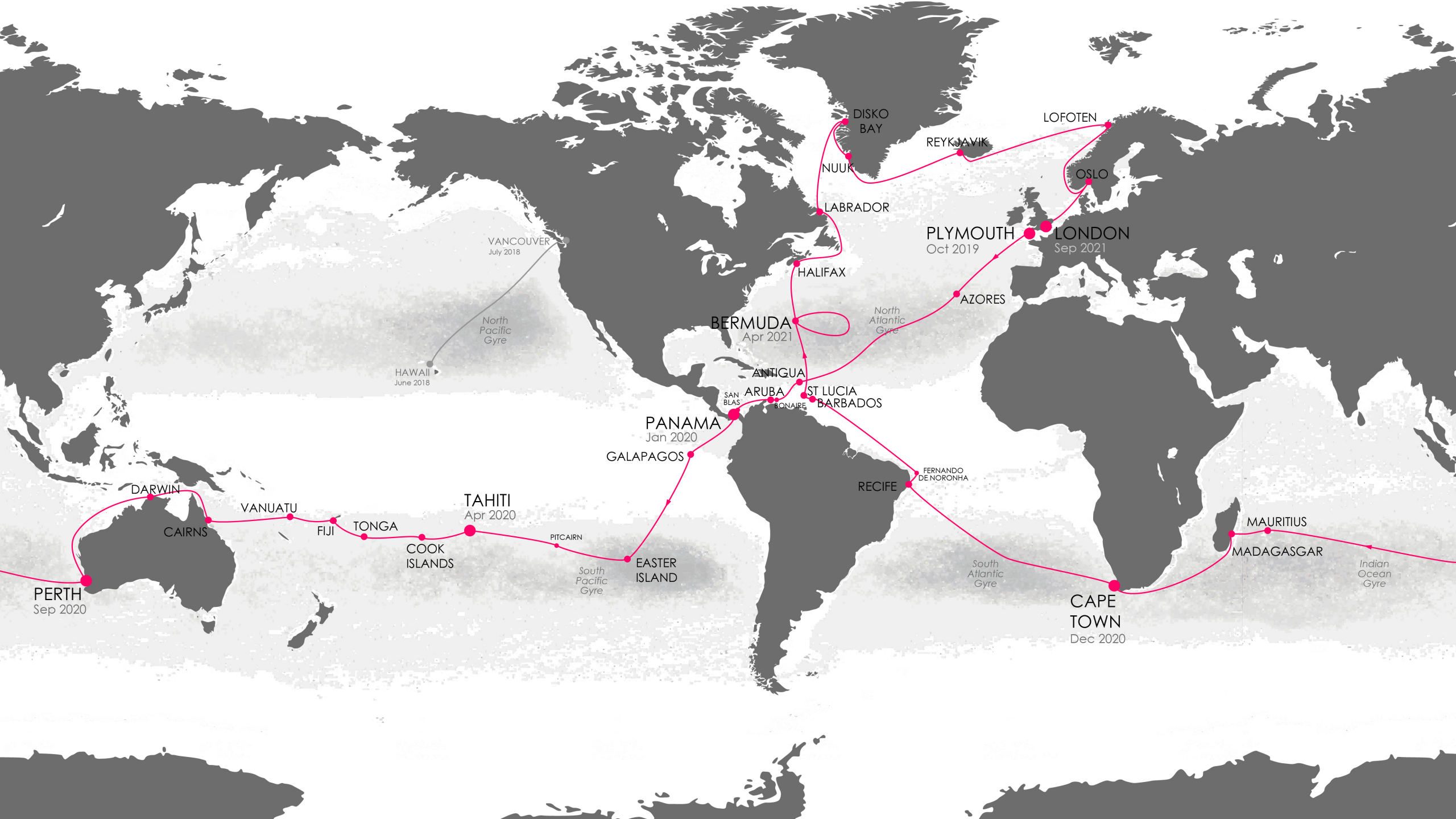
A

**INTERCEPT**

I

**REDESIGN**

R


DISKO BAY
NUUK
REYKJAVIK
LOFOTEN
OSLO
LABRADOR
PLYMOUTH
Oct 2019
LONDON
Sep 2021
HALIFAX
AZORES
VANCOUVER
July 2018
North Pacific Gyre
BERMUDA
Apr 2021
North Atlantic Gyre
HAWAII
June 2018
ANTIGUA
ARUBA
ST LUCIA
BARBADOS
SAN BLAS
BONAIRE
PANAMA
Jan 2020
GALAPAGOS
FERNANDO DE NORONHA
RECIFE
DARWIN
VANUATU
TAHITI
Apr 2020
CAIRNS
FIJI
TONGA
COOK ISLANDS
PITCAIRN
EASTER ISLAND
South Pacific Gyre
South Atlantic Gyre
MAURITIUS
MADAGASGAR
Indian Ocean Gyre
PERTH
Sep 2020
CAPE TOWN
Dec 2020

# MARIA GJERDING

Præsident for

Danmarks Naturfredningsforening

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# ERHVERVSPERSPEKTIVER PÅ EN NY PLASTØKONOMI

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# JESPER EMIL JENSEN

Regional CEO

Færch

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# FOOD PACKAGING – THE JOURNEY TOWARDS CIRCULARITY




Jesper Emil Jensen, CEO continental Europe

# Agenda

- Key points
  - Plastic is not just Plastic
  - The technology and setup for full circularity is there
  - What needs to be done?






# Agenda

I About

II PET recycling – our story

III Closing the loop – the setup

IV The future – what do we need to do onwards in DK?





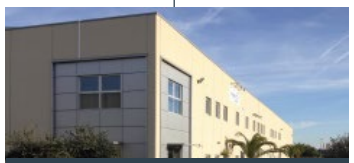
**Durham, UK**
Established 2012



**Poole, UK**
Established ‘70/ ‘00



**Sutton, UK**
Established ‘98/ ’02/ ’16



**Buñol, ES**
Established 2006



**Lorient, FR**
Established 2001



**Annecy, FR**
Established 1974



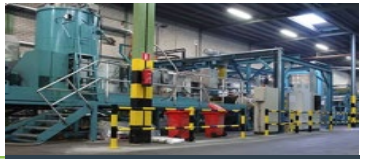
**Holstebro, DK**
Established 1969



**Liberec, CZ**
Established 2008



**4PET, Druiven, NL**
Established 1998



**4PET, Arnhem, NL**
Established 1998



**4PET, Raamsdonskveer, NL**
Established 1998

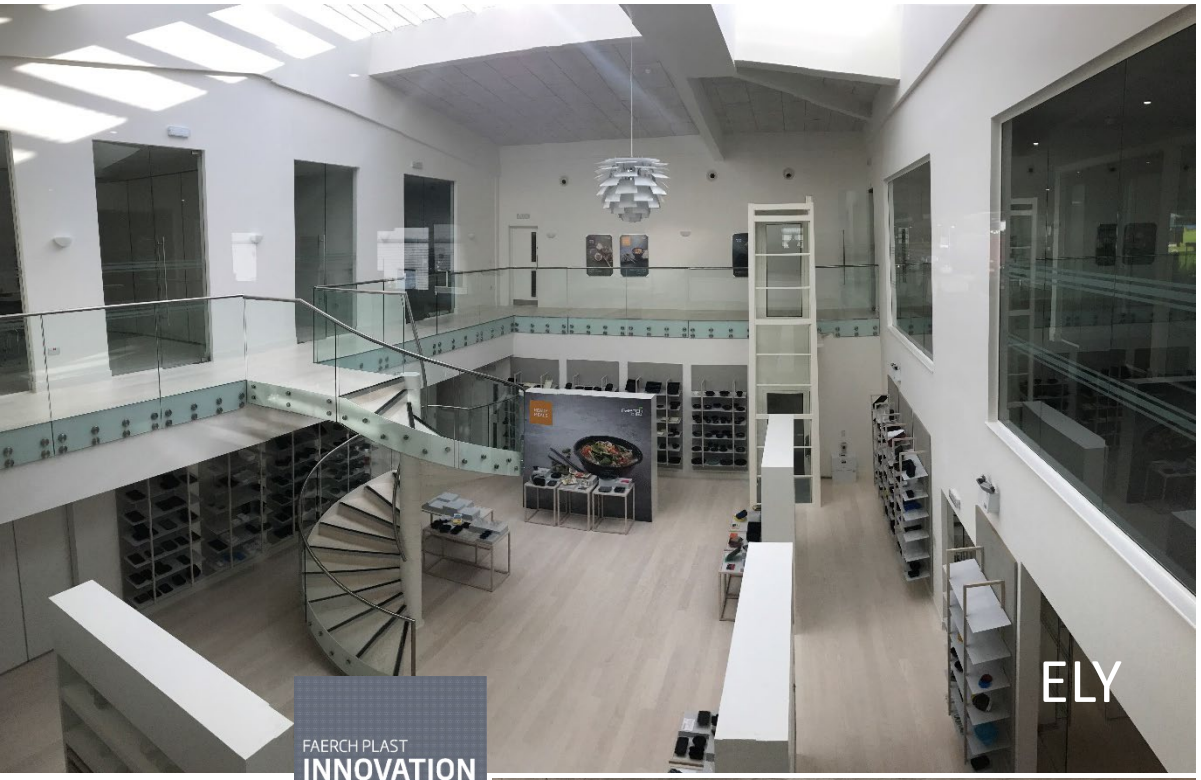


**4PET, Druten, NL**
Established 1998

**Facts**

- 12 fabrikker
  - 9 emballage
  - 2 halvfabrikata
  - 1 recycling
- 1700 medarbejdere

# FAERCH PLAST - 4 INNOVATION HUBS = 300+ new designs year

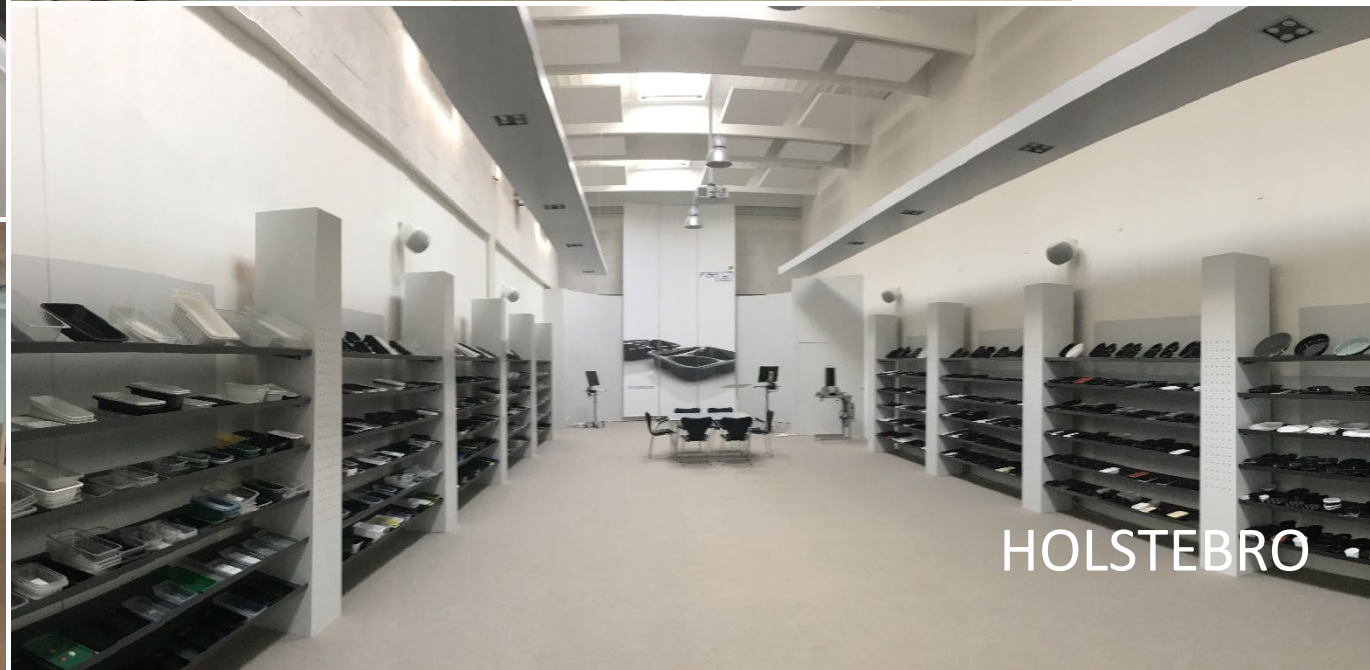



FAERCH PLAST
INNOVATION
HUB®









# Agenda

I About

II PET recycling – our story (How & Why)

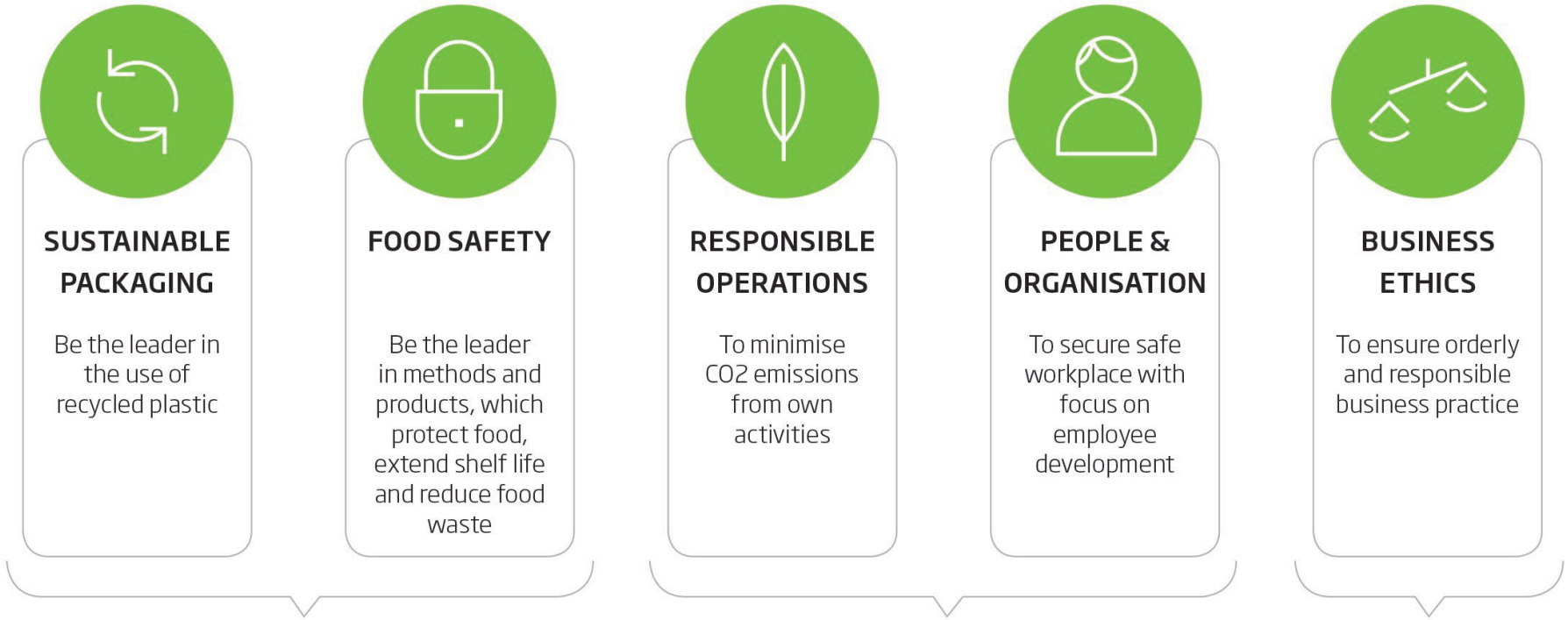
III Closing the loop – the setup

IV The future – what do we need to do onwards?



Faerch

# SUSTAINABILITY FRAMEWORK & AMBITION LEVELS



# SUSTAINABILITY IN 3 WAVES










- Reduce Campaign – use less
- BioPlast - Intro
- **rPET introduced (OMDB - phase)**

- **Define sustainability (Cradle to Cradle)**
- **rPET investing & strategic descision (DeCon)**
- BioPlastic PhaseOut
- Sorting Black plastic
  - Development of ID pigm.

- Recycled trays in rPET stream
- **Closing the loop via 4PET**

# PET – the only ‘Plastic’ material that can be recycled in to new food packaging






# Agenda

I About

II PET recycling – our story (How & Why)

III Closing the loop – the setup

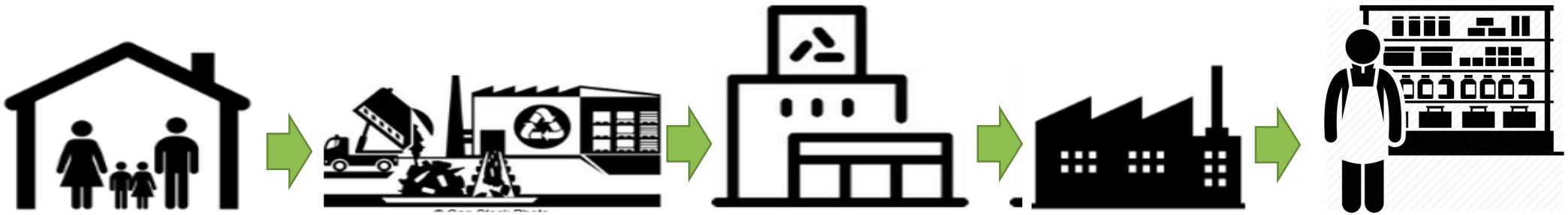
IV The future – what do we need to do onwards?



Faerch

# The setup – closing the Loop – the Dutch model

Household | Material ‘seperator’(MRF) | Plastic recycler (sorter, grind, wash)(PRF) | Færch | Retail














# WHY?: Two fundamental arguments for recycling

**Use a ressource already created = significant energy and CO2 reduction**

**When we recycle it – it dosen't end up in the Nature via littering or landfill**



**APET**
Virgin raw material
EU average electricity mix

**~ 38.7 g of $CO_2$ eq**
emission per tray *)

**APET (90% rPET**)**

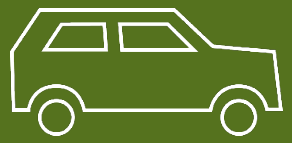
100% renewable electricity

**~ 19 g of $CO_2$ eq**
emission per tray *)

*) 12g APET tray
**) Calculation based on an average family car at carbonfootprint.com
***) rPET share used is based on 2016



CO2 savings per tray
~ 17,3 gram $CO_2$ eq



~ 110 meter by car***
17,3 gram $CO_2$ eq



~ 5 minutes of running
17,3 gram $CO_2$ eq

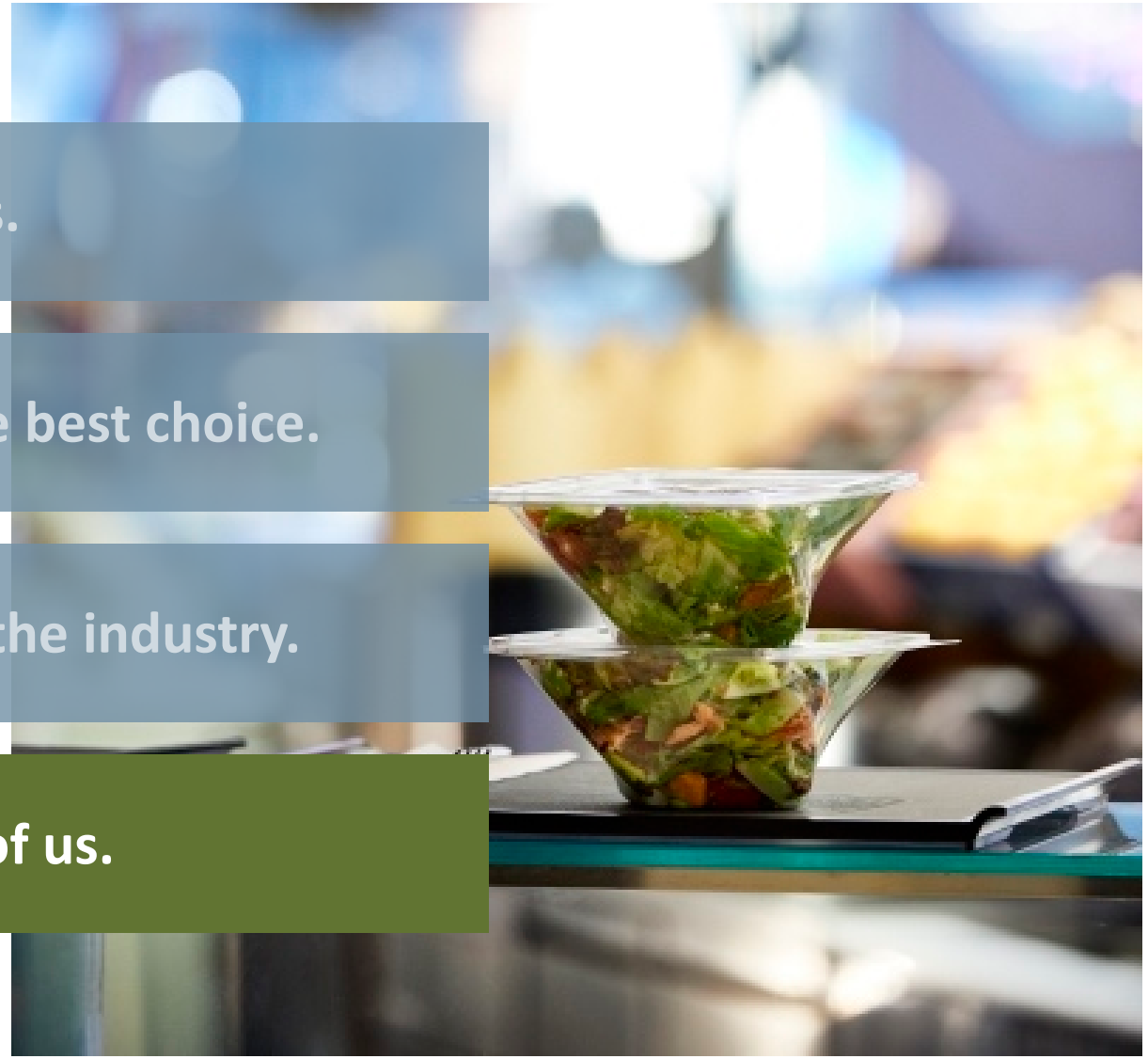
# Agenda

I Food packaging matters.

II PET allows true circularity and is the best choice.

III Faerch has always been leading in the industry.

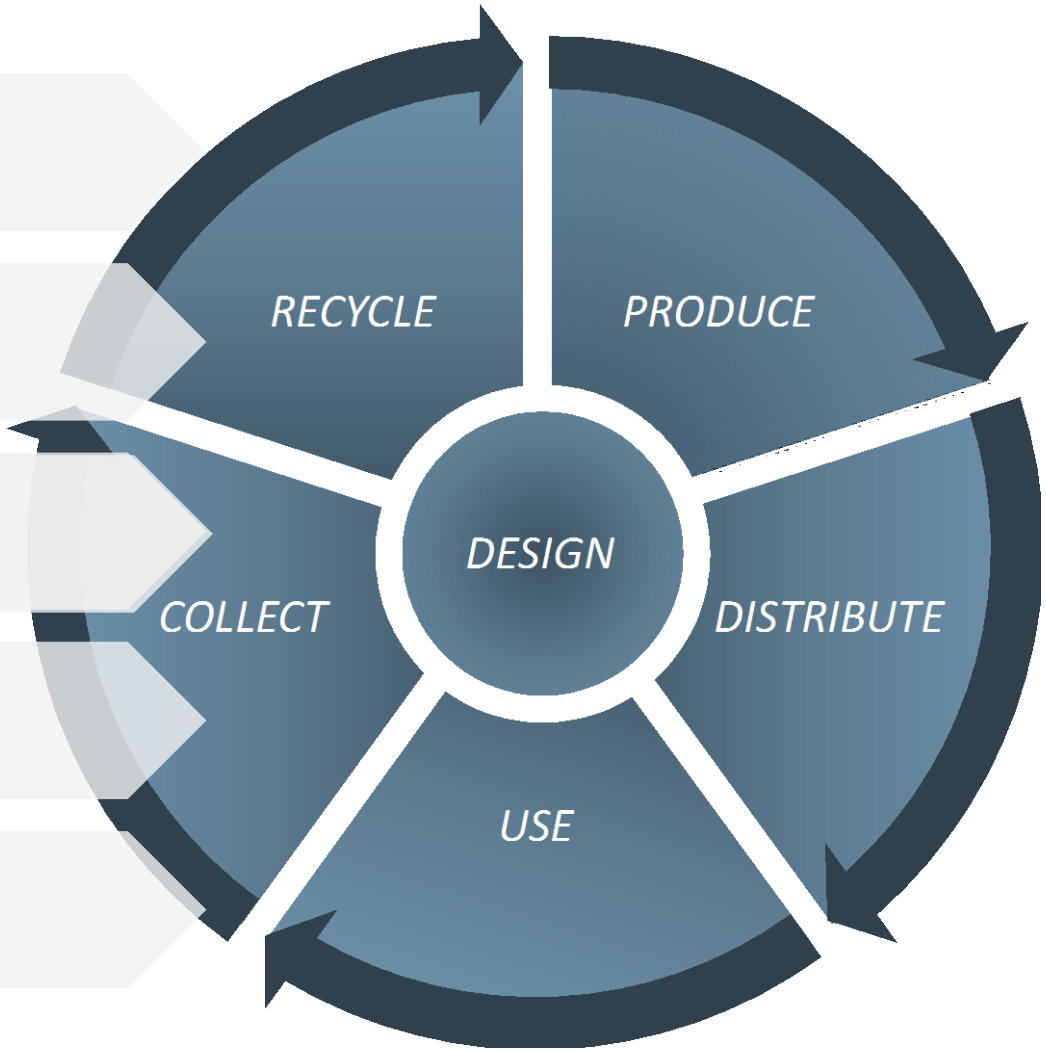
IV **Action is required from all of us.**



# To transform the food packaging industry into true circularity, action is required from all of us.

***ACTION NEED***

1. Product choice
2. Infrastructure
3. Investing in MRF site and PRF site
4. Collaboration
5. Education & Behaviour




Faerch


01
THE OCEAN CLEANUP
CAROLINE
WOZNIACKI

# MILJØPOLITISK DEBAT

**ERLING BONNESEN**
Miljøordfører for Venstre, MF

**CHRISTIAN RABJERG**
Miljøordfører for Socialdemokratiet, MF

**IDA AUKEN**
Miljøordfører og tidl. Miljøminister for Radikale Venstre, MF

**CHRISTINA BUSK**
Miljøpolitisk chef for Plastindustrien

**BRIAN BECH NIELSEN**
Rektor for Aarhus Universitet

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# FRANZ CUCULIZA

Administrerende direktør

Aage Vestergaard Larsen

#INNOTALK

Innovationsfonden

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COPENHAGEN


Aage Vestergaard Larsen A/S
Mere end 45 års erfaring med genanvendelse af plast
Forside
Salg
Indkøb
Nyheder/presse
Om os
Miljø
Kontakt
Forretningsudvikling
Fra affald til Guld
Mere end 45 års erfaring indenfor genanvendelse af plast
Plastindustri - Anden industri
Detail – Andet erhverv
Indsamlere – Miljøvirksomheder
Genbrugspladser – Forsyningsvirksomheder
Bygge og anlæg

# Innotalk–danske forsknings, innovations og erhvervsmuligheder

- Kort om Aage Vestergaard Larsen A/S
- Hvad har vi af viden og guidelines
- Hvor er udfordringerne
- Hvor er løsningerne





# Aage Vestergaard Larsen A/S

Innotalk 170119/fc

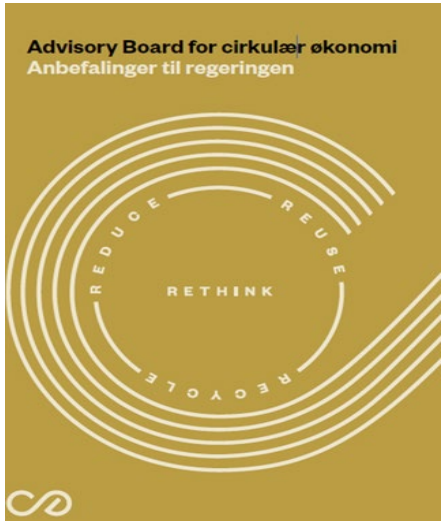
- af plast som kernekompetence siden 1972
- 55 ansatte
- Håndterede i 2018 > 15.000 t plastaffald/spild
  - 97% kom tilbage til plastindustrien
- Høj kvalitet er vores berettigelse i markedet!
  - Kan så være et alternativ til en nyvare
  - 2.4 kg. CO2 udslip sparet/kg. genanvendt plast



# Hvad har vi af viden og guidelines?

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# Største udfordringer!

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- EU: 50% af vores plastemballage skal genanvendes i 2025/55% i 2030!
- Vi brænder eller eksporterer årligt 300.000 tons af vores plast ressourcer!
- Vi fokuserer ikke på at plukke de lavthængende frugter!
- Der skal mere tonnage i projekterne(p.t. gode historier men små mængder)
- Vi skal have modet og troen på at kvalitet betyder mere end kvantitet!








**Skal løsningerne findes i regeringens plastikhandlingsplan?**

**#3** Kortlægning af udviklings- og forretningspotentialer for danske plastvirksomheder

**#5** Sektorsamarbejder indenfor fx landbrug, byggeri, restauration og detailhandel

**#8** Standarder for sortering og indsamling af plast

Hvis potentialet skal indløses, så skal der fokuseres på kvalitet i alle led!

- **Det her klarer vi ikke uden et samarbejde i HELE værdikæden!**




# Ved spørgsmål senere!





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Aage Vestergaard Larsen A/S

Mere end 45 års erfaring med genanvendelse af plast



# MICHAEL LØVE

Vice president

Netto Salling Group

#INNOTALK

Innovationsfonden

McKinsey&Company

UN City
COPENHAGEN



# Innotalk
## on plastic pollution & circular economy

Netto
salling group

# How can the plastic challenge be improved?



**Use less plastic in everything we do**

**Give used plastic a value by demanding recycled plastic**

# What can Salling Group do about it?
# - We want to give used plastic value

**Reduce use of plastic** in all Food and Nearfood Private Labels with 30% by 2023

All Food and Nearfood Private labels to be **designed for full recyclability** by 2023

30% of plastic used for Food and Nearfood Private labels to be **made of recycled plastic** by 2023

All **single-use tableware in plastic** phased out no later than during 2021

All **plastic used for transportation** to be reused or recycled by 2020

# An example...


FRUGTSTANG
MED DADLER
& KAKAO
20 g e
frugtstang
med økologisk blåbær
økologisk blåbær
Castus

# An example...



# An example...




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# If we are to really make a difference, we need more

1. We need **uniform waste sorting** across the country

2. We need **rules and standards** for which types of plastic we use for food and other

3. We need more scale to allow **sorting technologies and efficiency** to improve

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Netto

# Thank you!


KING STREE
byder velkommen
PILEKR
POLITIK LAN
KLIMA AFFALL
KROSTUE SAM
FORMØDE INNOVAT
MUSIK DANS FØDSELSDAG
ALTERNATIVET
NETTO
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# FLEMMING BESENBACHER

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UN City
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# KLAR TIL NÆSTE PLASTREVOLUTION!

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# TAK FOR I DAG

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