In one month, this is what you left in my street.

Samuel (9 years)
The Plastics Perception

Blue Planet II
Nov 2017

Planet or Plastics
National Geographic
June 2018
From Food to Non-Food to Food
Transformation Activities in Fribourg

The Case of the Swiss Plastics Cluster and the Cluster Food & Nutrition
What is the Problem?
Strategic Motivation: Sustainable Materials
The Plastics Value Chain

Fossil Energy → Hydro-Carbon Chemicals → Consumable Products → Convenience Applications → Shun Accountability

Petroleum systems international
BASF – Ludwigshafen
National Geographic – June 2018 – John Seymour
Triona Hartman poster
Convenience and Individualization

From Cow to Consumer?

Source pictures: INCPEN
Marketeers

Source Picture: indiamart.com

~ 500 Billion = ~ 16000/sec
The True Life of the PET Bottle

Read more at: https://inews.co.uk/opinion/need-plastic-free-aisle-supermarkets-oceans-reach-breaking-point/
Microplastics

Photography:
Mandy Barker
National Geographic
Global production capacity data for 2015/2016 (solid bars) and announced production capacities for 2020 (shaded bars) of bio-based biodegradable polymers (Green), bio-based non-biodegradable (drop in) polymers (Blue) and fossil-based biodegradable polymers (Red) (IFBB, 2016); (European Bioplastics, 2016) (van den Oever, Molenveld, van der Zee, & Bos, 2017)
A Paradigm Shifting Wave

http://ec.europa.eu/environment/circular-economy/

Bali, 29 October 2018 - A Global Commitment to eradicate plastic waste and pollution at the source has been signed by 250 organisations including many of the world’s largest packaging producers, brands, retailers and recyclers, as well as governments and NGOs.
EU BioEconomy Action Plan

• Strengthen and *scale-up* bio-based sectors

• Deploy *local* bioeconomy rapidly

• Understand the ecological *boundaries*
Solutions
Driving Circularity

Renewable Energy
Renewable Chemicals
Sustainable Applications
Renewable Products
Engaged Accountability
Towards a Renewable & Circular Plastics Industry - BioEconomy

• Act 1:
  – Address the existing
    • Simplification, Identification, After-use Infra-Structure (Recover, Re-use)
• Act 2:
  – Address the novel
    • Use nature’s polymers (un-valorized Biomass)
• Act 3:
  – Alternative synthetic polymers
    • Use nature’s chemicals (un-valorized Biomass)
Act 1
EU2030: 70% all packages – 55% Plastics (~30 MMT)
Act 2
# Nature’s Polymers

<table>
<thead>
<tr>
<th>Monomer</th>
<th>Polymer</th>
<th>Cellular Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amino Acid</td>
<td>Polypeptide</td>
<td>Intermediate Filament</td>
</tr>
<tr>
<td>Nucleotide</td>
<td>RNA, DNA</td>
<td>Chromosome</td>
</tr>
<tr>
<td>Mammalian Zucker</td>
<td>Starch</td>
<td>Storage in a chloroplast</td>
</tr>
<tr>
<td>Polyol</td>
<td>Fat</td>
<td>Adipose cells with fat droplets</td>
</tr>
</tbody>
</table>

**Function**

**Information**

**Energy**

**Facilitation**
Packaging in Nature
Act 3
Apply Learnings from Nature
Vitrimer Systems

W. Denissen et al., Chem. Sci., 2016, 7, 30

Ludwik Leibler
ESPCI – Paris (F)

https://www.espci.fr/en/directory?recherche=leibler&r_en_cours=on&type=recherche&unique_id=CgRcAjAeBDw%3D&lang=en
The Future is Now

https://gomobi.info/blog/mobile-is-the-future-and-the-future-is-now/
Building on Strength

• Regional Leadership

Cluster Food & Nutrition  swiss plastics cluster

PLASTICS INNOVATION
Competence Center

Network Technology New Business Models Digital Society Infrastructure Political Vision
Building on Strength

S3 Strategic Project

Biological Cycle
- Agro-coprocess
- Biodegradable

Biomass-Material-Product Value Chain

Technical Cycle
- For use products

New Manufacturing Process
- Recycled Products

Recycled Pellets

Bio-sourced Polymer Pellets

Chicken Feathers

Chicken Farming

Food Production

Protein based barrier film packaging

Use of products from bio-material foils / fibers

New Business Models

New Products & Markets

New Manufacturing Process

Biodegradability

For use products

Recycled Products

Building on Strength

Courtesy: Pascal Bovet – Innosquare -FRI
PICC – Plastics Innovation Competence Center

A multi-disciplinary industrial R&I platform for driving Science and Technology towards a Circular Economy development.

Offering Chemistry, Processing, Product Design, End-of-Life Solutions, Digital Services, Business models

+ INDUSTRY Partners
The Future begins Now
A new scientific truth does not triumph by convincing its opponents and making them see the light but rather because its opponents eventually die and a new generation grows up that is familiar with.

Max Planck
Thank You!