

“The ultimate goal of the circular economy, is to aim to do good instead of simply trying to do less harm”

(Ellen Mac Arthur Foundation)

WOW!

Wider business Opportunities for raw materials
from Wastewater

Sewage is valuable

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Europe's state of the environment 2020: change of direction urgently needed to face climate change challenges, reverse degradation and ensure future prosperity

Europe will not achieve its 2030 goals without urgent action during the next 10 years to address the alarming rate of biodiversity loss, increasing impacts of climate change and the overconsumption of natural resources. The European Environment Agency's (EEA) latest 'State of the Environment' report published today states that Europe faces environmental challenges of unprecedented scale and urgency. The report says, however, there is reason for hope, amid increased public awareness of the need to shift to a sustainable future, technological innovations, growing community initiatives and stepped up EU action like the European Green Deal.

Sewage as a valuable source

- Energy → (bio) CH₄
- Resources

Kaamera
(soil improver, polymer additive)



Humic acids



Phosphorus



Cellulose
PHA Bioplastics



And also....clean water, fatty acids, metals, organic matter

Sewage potential not yet fully utilized

Why is less than 1% of the raw materials from sewage re-used?!

- The potential is unknown by the market
- It is a technical challenge to extract raw materials
- Sewage has an image of “dirty and unsafe”
- The legal framework to commercialize raw materials is complex



Wow! goals

- We aim to start a transition towards a circular approach in sewage treatment
- For this purpose we want to:



SHOW THAT IT IS TECHNICALLY POSSIBLE TO RECOVER
RAW MATERIALS FROM SEWAGE WATER



CREATE A EUROPEAN FRAMEWORK FOR THE STEPS THAT
NEED TO BE FOLLOWED FROM WASTE TO RAW MATERIAL



LET MARKET PARTIES BECOME ACQUAINTED WITH THE
POTENTIAL OF RAW MATERIALS FROM SEWAGE WATER.



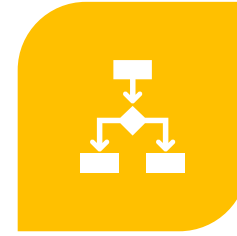
When the WOW! project ends we have...



5 VALUE CHAINS FOR OUR
BIOPRODUCTS FROM
SEWAGE



3 PILOTS FOR THE PRODUCTION
OF 5 DIFFERENT TYPES OF RAW
MATERIAL



A SUPPORTING TOOL TO HELP WATER
AUTHORITIES IN THEIR CHOICES TO A
CIRCULAR APPROACH



A EUROPEAN
LEGAL ROADMAP

Wow! - pilots

CELLULOSE

Bio-oil, biochar and acetic acid
from pyrolyzed cellulose



BIOCHAR

PHA

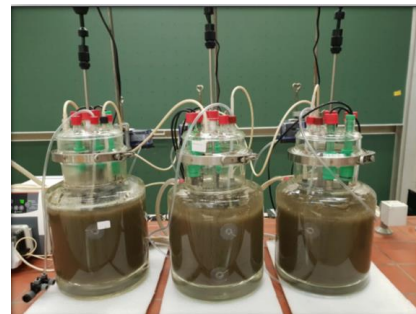
Bioplastics by microbial PHA
accumulation



PHA BIOPLASTIC

LIPIDS

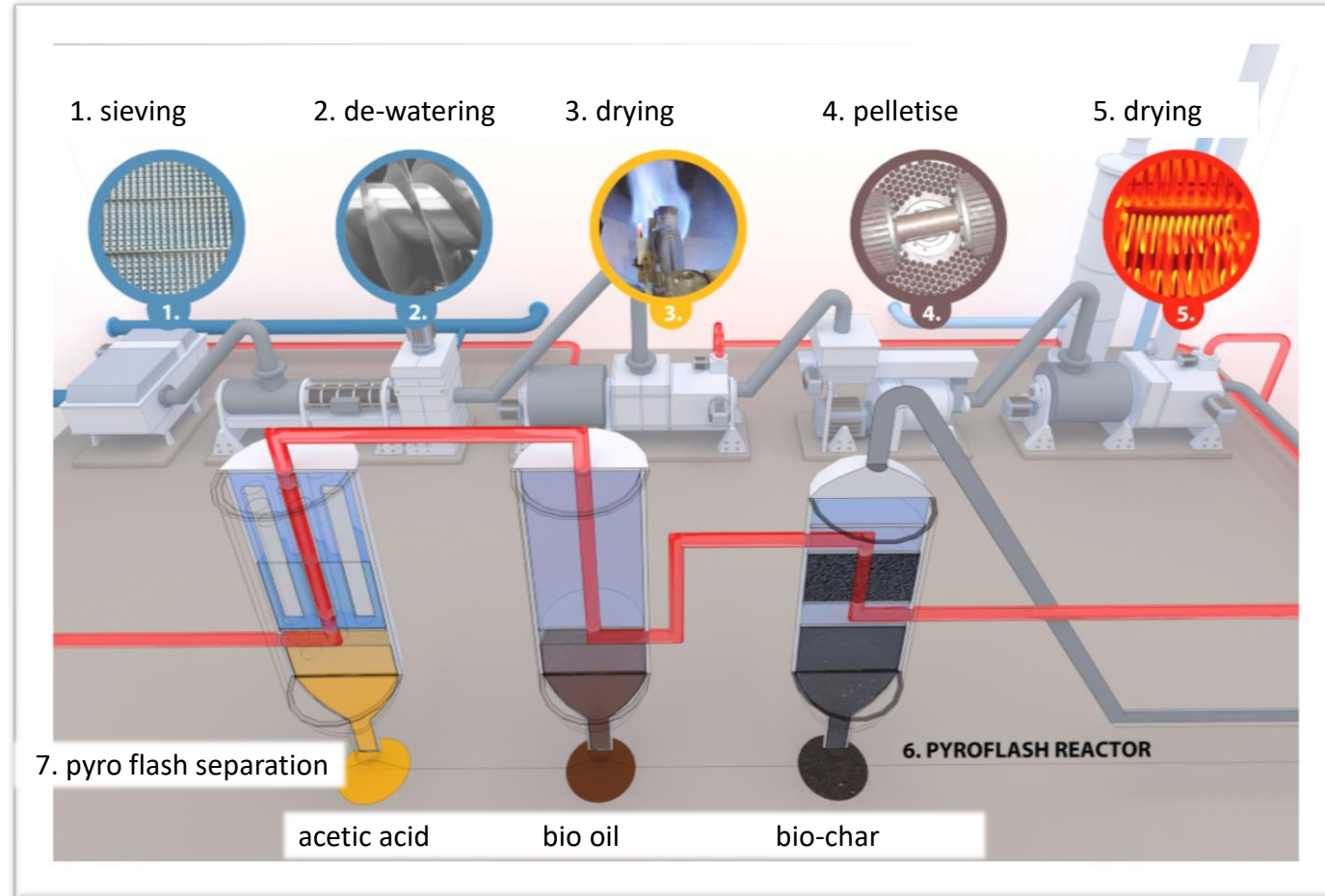
Biofuel from microbial lipids
accumulation



LIPIDS

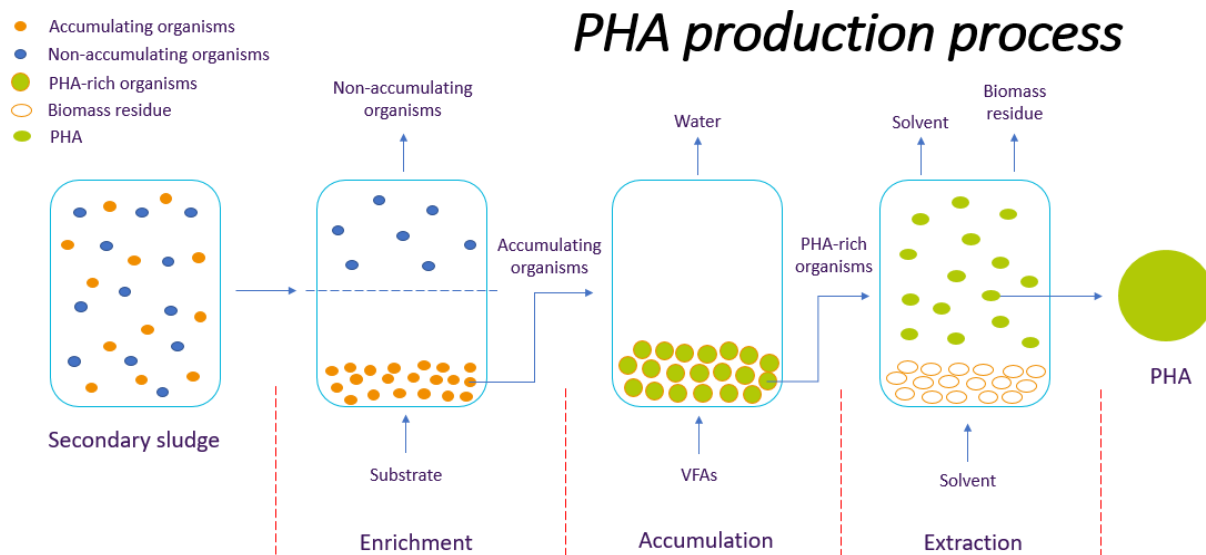
Cellulose

- Cellulose in sewage finds its origin in flushed toilet paper.
 - It can be extracted by using fine sieves.
 - Using pyrolysis, the cellulose (with a “negative value” can be transformed into positive valued products.
- Bio oil - *fuel*
 - Biochar - *adsorbent for the removal of pharmaceutical residues*
 - Acetic acid - *carbon source for sewage treatment*



PHA - bioplastic

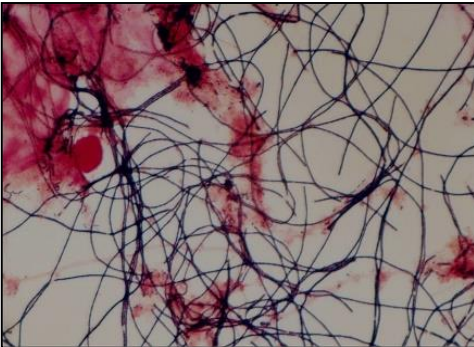
- PHA (polyhydroxyalkanoates) is a fully biodegradable plastic
- Bacteria present in secondary sludge can produce PHA using volatile fatty acids (VFAs) in sewage
- Creating proper conditions enhances this PHA production
- VFAs in sewage can be transformed into positive valued product (PHA)



Lipids



Bulking and foaming is a common PROBLEM in municipal sewage treatment plants



Microthrix Parvicella is known to be responsible for foaming and bulking



- Microthrix Parvicella can also accumulate long chain fatty acids (LCFAs) as lipids
- The lipids that can be harvest for biodiesel production
- So LCFAs in sewage can be transformed into positive valued product (bio-oil)

Today

- Residual streams from sewage treatment plants as a source for PHA-bioplastic end products
- Techno-economic assessment of making bioplastics from sewage
- Tool for water authorities ... how can they use sewage water in a circular manner?

