Food & Bio Cluster
Denmark

BIOENERGY AS A ENVIRONMENTAL SOLUTION

– lessons learned from Denmark's biogas boom

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Food & Bio Cluster Denmark is the government supported network for innovation within agri, food and bioressource sectors

Biogas Go Global

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Basic structure of the presentation:

- PREP:
  - Point
  - Rational
  - Evidence
  - Point
- Max 5-6 slides
- 1 key message per slide
- Speak 2, max 3, sentences for each translation

hould answer the question: Why even look to Denmark for biomass solutions?
ey message should be along the lines of:
Ambitious climate actions/goals
Extremely developed and sophisticated agricultural sector
Highly industrialized biomass value chain (small and sophisticated)
--> Combined, this all means that Danish biomass technologies, solutions, processes and methods are **time-tested and future p**

e combined message constitute the P in PREP.

High livestock density and related environmental challengers from…

- 35.000.000 pigs/year on 3200 farms
- 1.500.000 cattle on 11.000 farms

Highly regulated + Ambitious goals backed by all political parties:

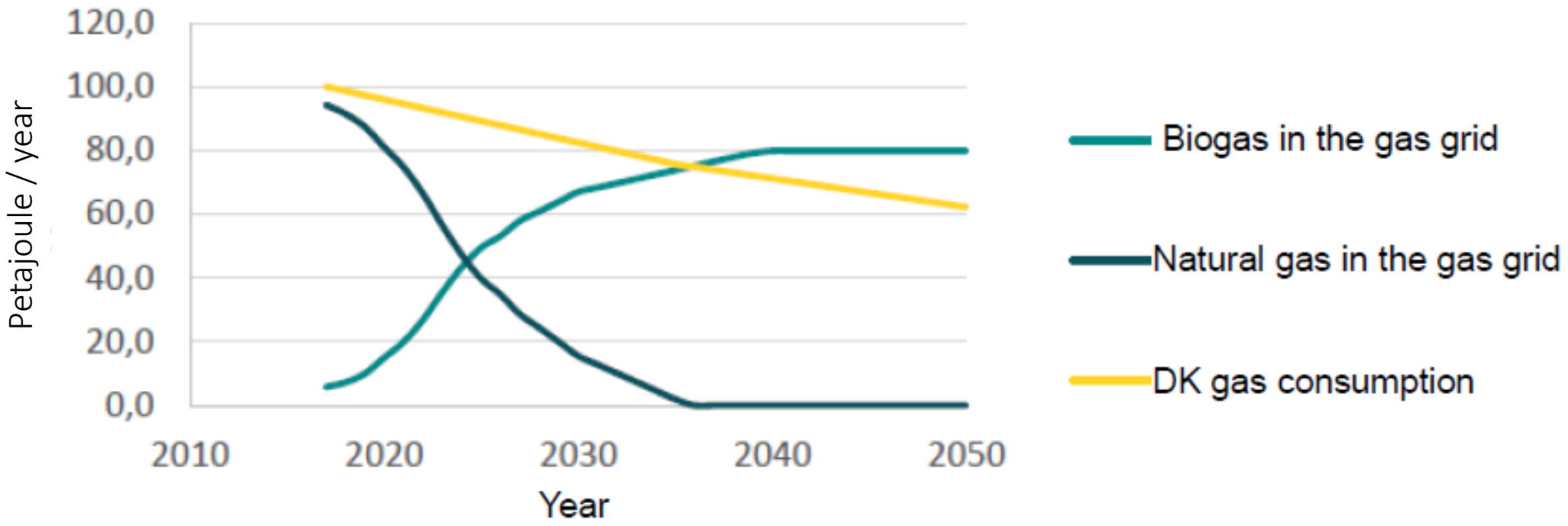
- By 2050: 100% fossil free incl. climate neutral agrisector
- 70% GHG reduction in 2030 compared to 1990 (now 34%)
- 50% of all waste to be recycled by 2023. 65% in 2030.

Home to global companies like Danish Crown, Arla, Carlsberg, Danfoss, Grundfos, Vestas, LEGO Siemens Wind Power, Maersk

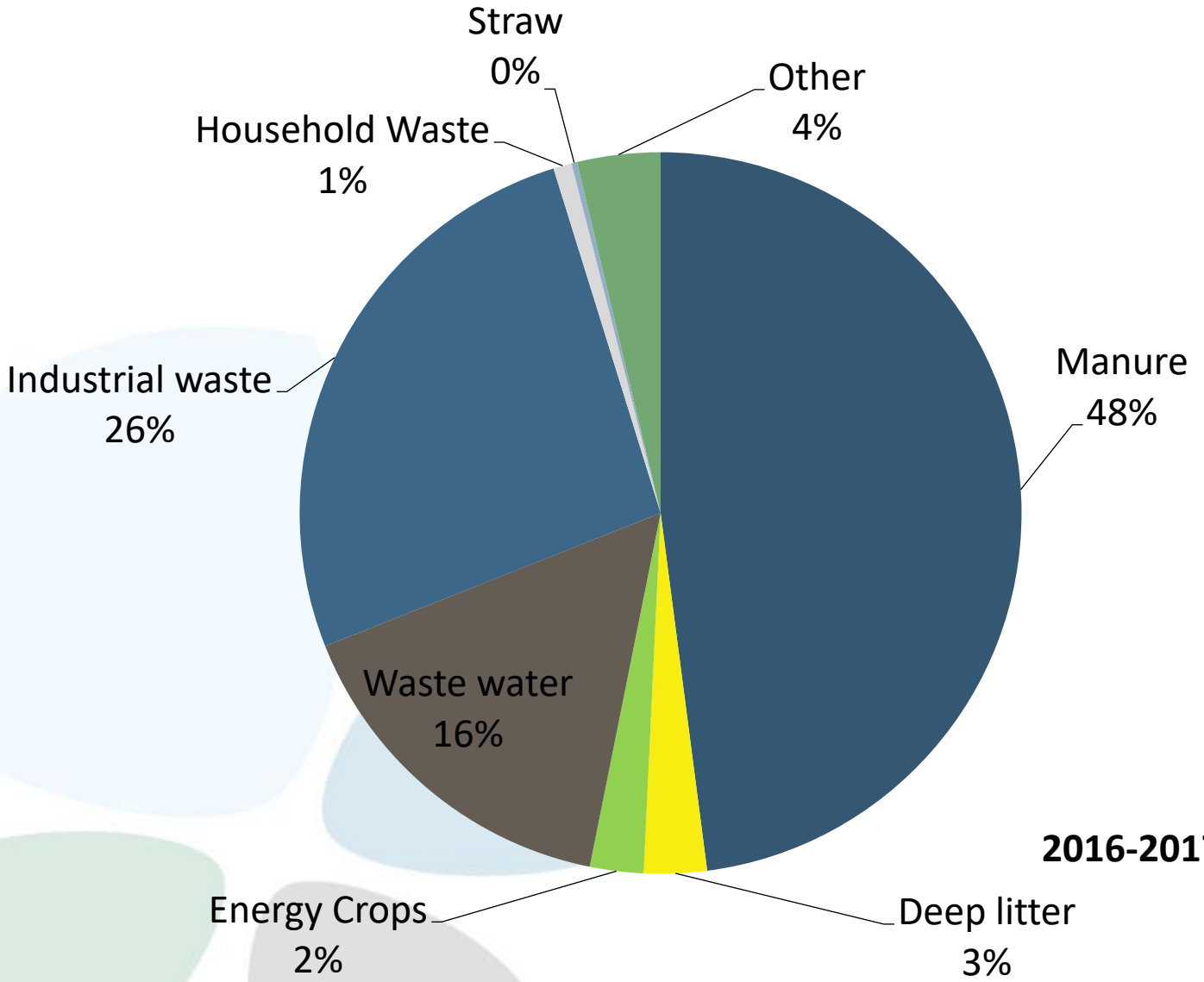
nale:
mbition of the industry is continuously driving the technology forward. Denmark wants to displace natural gas with biogas

Denmark's Biogas Boom: Looking forward toward 4th and 5th gen.

Storable bioenergy with a positive environment impact



nce:
h biogas/-mass has very high portion of ammonia, nitrogen and methane (super potent green house gas) due to its agricultural
r.
even so, we are able to significantly reduce the GHG effect.



Type	Ton
Manure	5033745
Deep litter	295191
Energy Crops	252189
Waste water	1662229
Industrial waste	2753021
Household waste	86604
Straw	26148
Other	391091

Total **+10 mio tons of biomass**

2016-2017 numbers, DEA

Biogas Go Global

INBIOM
INNOVATION NETWORK FOR BIORE

nce:

h biogas/-mass solutions have already made great strides in nutrients preservation, odor elimination and other negative environme
s through our technology

- Less smell and leaching
- Less methane and laughing gas slip
- Jobs through local value chains

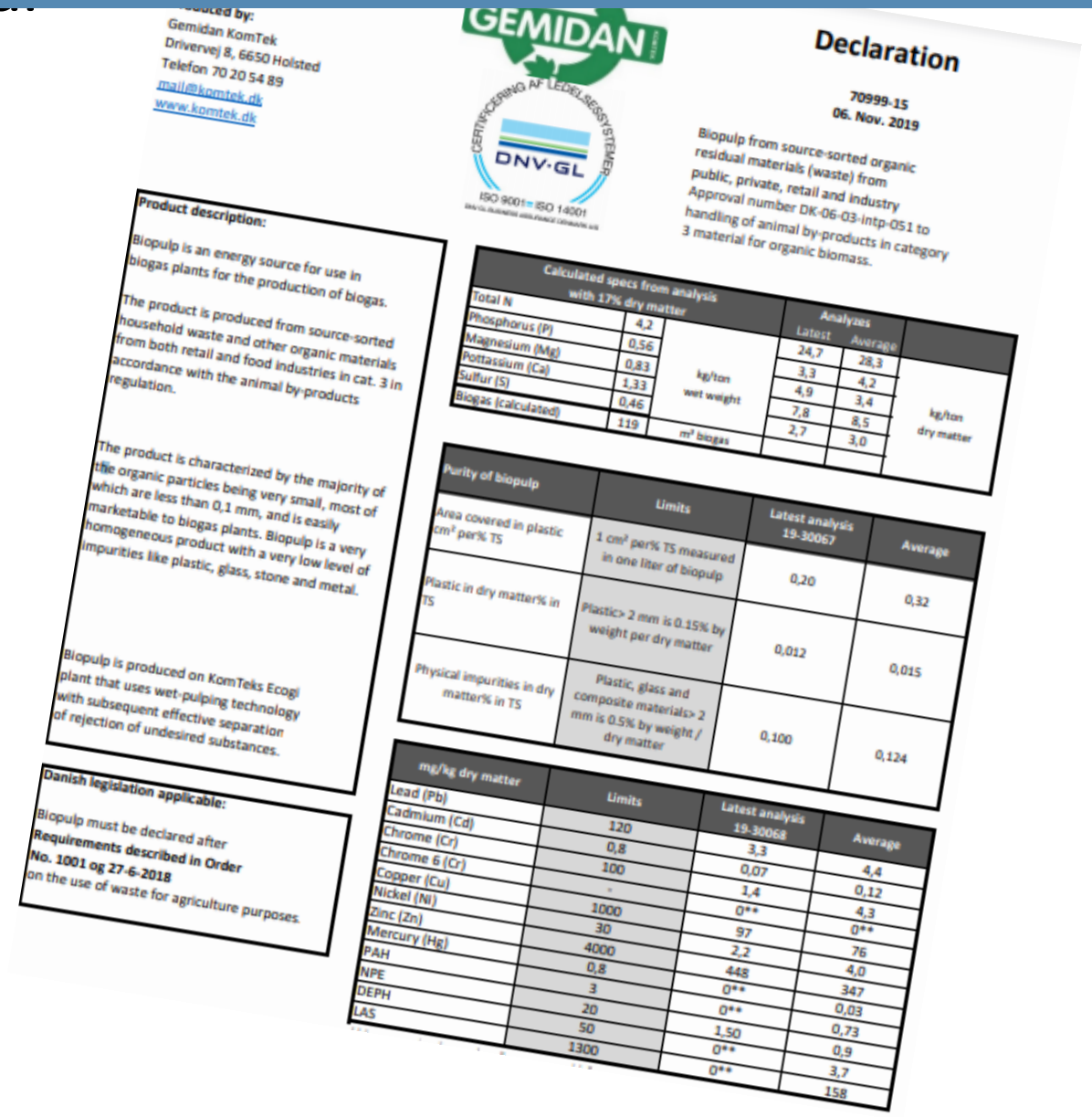
- Higher availibility of nutrients
- Increased recycling of nutrients
- Renewable and storable gas

Externalities - total socioeconomic value of biogas in Denmark: CNY 125/GJ

nce:

nore importantly, the know how we have developed over time has been documented and proven in our methods and processes, ltimately in our quality management systems

Quality management is key



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CERTIFICERING AF LEDELSESSYSTEMER
DNV·GL
ISO 9001 = ISO 14001

Declaration

70999-15
06. Nov. 2019

Biopulp from source-sorted organic residual materials (waste) from public, private, retail and industry
Approval number DK-06-03-intp-051 to handling of animal by-products in category 3 material for organic biomass.

Product description:

Biopulp is an energy source for use in biogas plants for the production of biogas.

The product is produced from source-sorted household waste and other organic materials from both retail and food industries in cat. 3 in accordance with the animal by-products regulation.

The product is characterized by the majority of the organic particles being very small, most of which are less than 0,1 mm, and is easily marketable to biogas plants. Biopulp is a very homogeneous product with a very low level of impurities like plastic, glass, stone and metal.

Biopulp is produced on KomTeks Ecogi plant that uses wet-pulping technology with subsequent effective separation of rejection of undesired substances.

Danish legislation applicable:

Biopulp must be declared after **Requirements described in Order No. 1001 og 27-6-2018** on the use of waste for agriculture purposes.

Calculated specs from analysis with 17% dry matter			Analyses Latest	Average	
Total N	4,2	kg/ton wet weight	24,7	28,3	kg/ton dry matter
Phosphorus (P)	0,56		3,3	4,2	
Magnesium (Mg)	0,83		4,9	3,4	
Pottassium (Ca)	1,33		7,8	8,5	
Sulfur (S)	0,46		2,7	3,0	
Biogas (calculated)	119	m³ biogas			

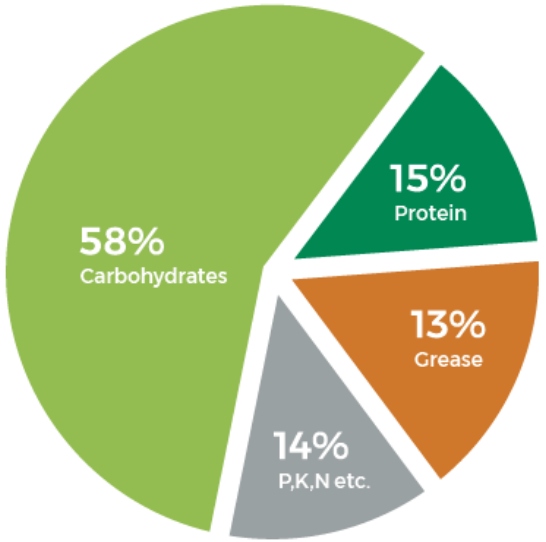
Purity of biopulp	Limits	Latest analysis 19-30067	Average
Area covered in plastic cm² per% TS	1 cm² per% TS measured in one liter of biopulp	0,20	0,32
Plastic in dry matter% in TS	Plastic> 2 mm is 0.15% by weight per dry matter	0,012	0,015
Physical impurities in dry matter% in TS	Plastic, glass and composite materials> 2 mm is 0.5% by weight / dry matter	0,100	0,124

mg/kg dry matter	Limits	Latest analysis 19-30068	Average
Lead (Pb)	120	3,3	4,4
Cadmium (Cd)	0,8	0,07	0,12
Chrome (Cr)	100	1,4	4,3
Chrome 6 (Cr)	-	0**	0**
Copper (Cu)	1000	97	76
Nickel (Ni)	30	2,2	4,0
Zinc (Zn)	4000	448	347
Mercury (Hg)	0,8	0**	0,03
PAH	3	0**	0,73
NPE	20	1,50	0,9
DEPH	50	0**	3,7
LAS	1300	0**	158

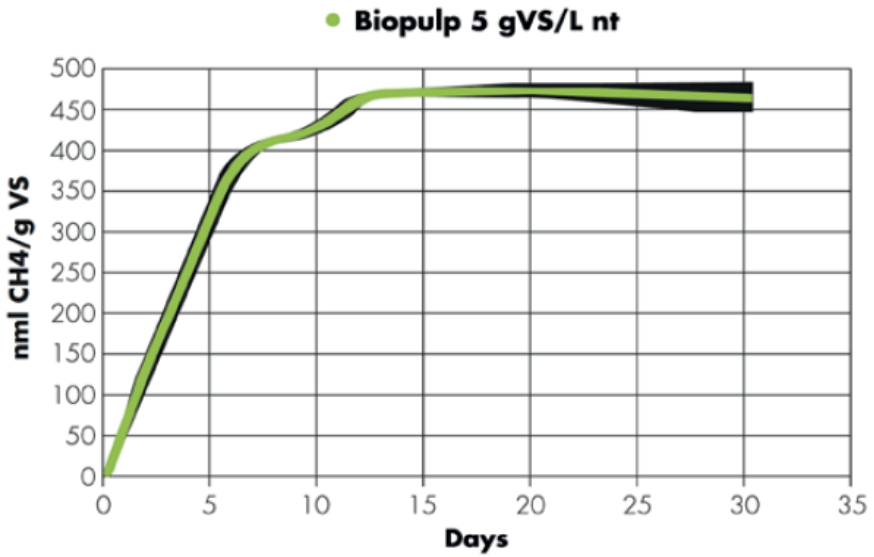
Evidence:
As an example: We have developed technologies and implemented solutions where we are able to separate household waste to a degree where we are able to recover useful nutrients for re-use.

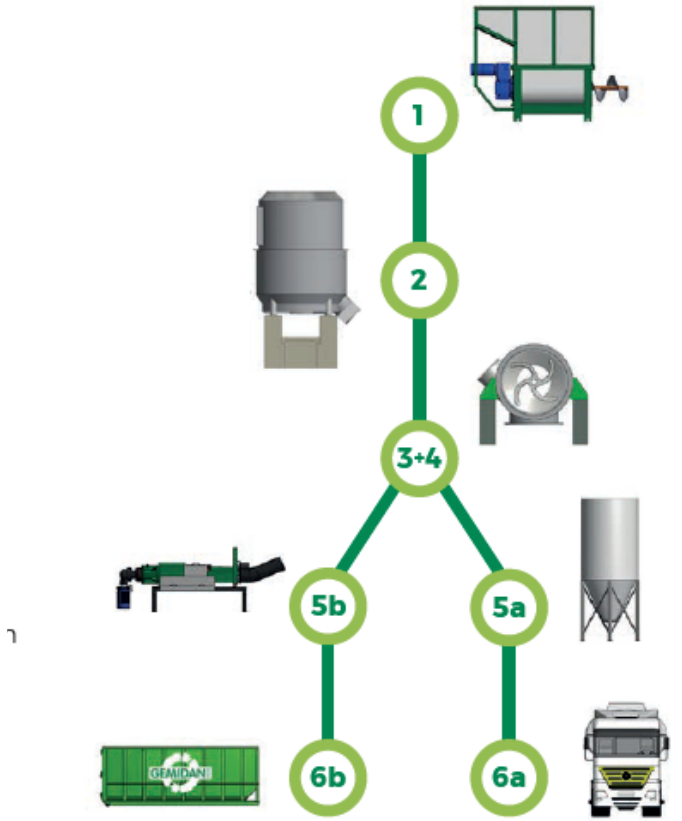
Organic waste diversion from land field can be done without contaminating soil

Composition of TS fraction for KOD



Gas yield





Point:
So, our biogas solutions are ready for the future, where a true circular bio-economy can be a reality.

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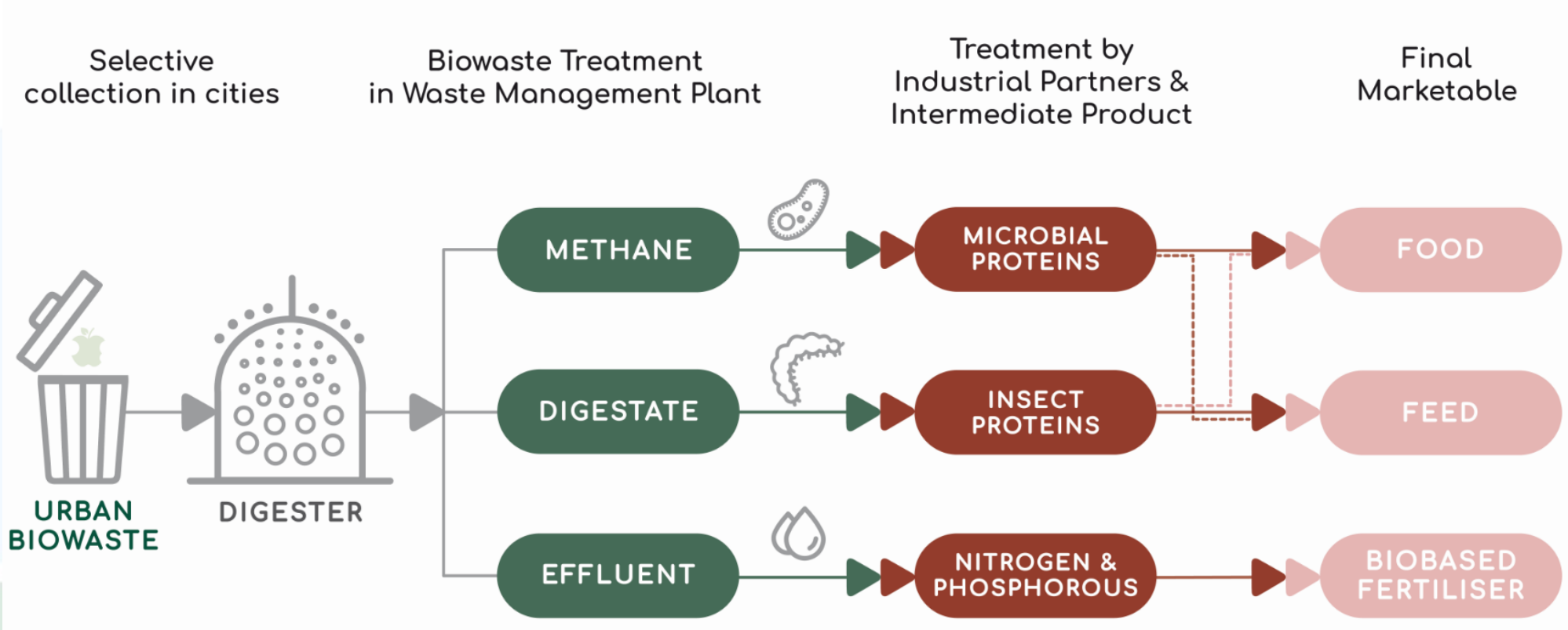
The future of biogas: Integrated with Feed, Food and Fertilizer

Storable bioenergy with a positive environment impact



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Horizon 2020
European Union Funding
for Research & Innovation

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Biogas Go Global

Read more – brand new publication

- Environmental benefits
- Pretreatment of biomass
- Good use of digestate
- Upgrade of biogas to natural gas quality
- Power-2-X: Wind & Solar power integration

目录

Download it here:
shorturl.at/mqABF

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