



**DELIVERABLE D.T1.1.4 “ANALYSIS OF PAPER-PLASTIC VALUE CHAIN AND INNOVATION SYSTEM”**

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## MARKET SITUATION

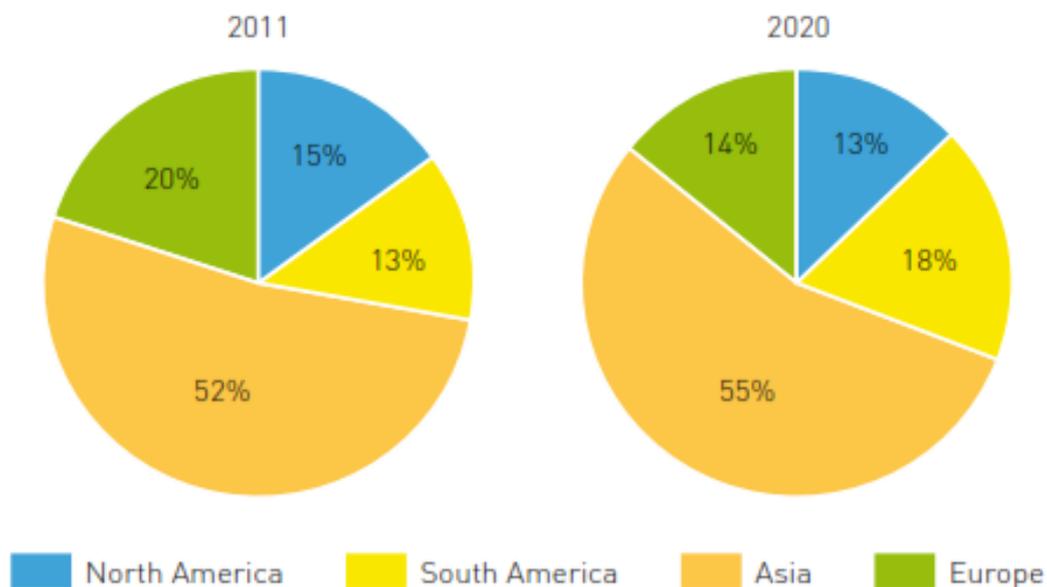
There is an increasing demand for the processing and utilization of bioplastics within the European Union. Although production has shifted to North-America and Asia, at the moment political environment is not conducive to the production of bioplastics.

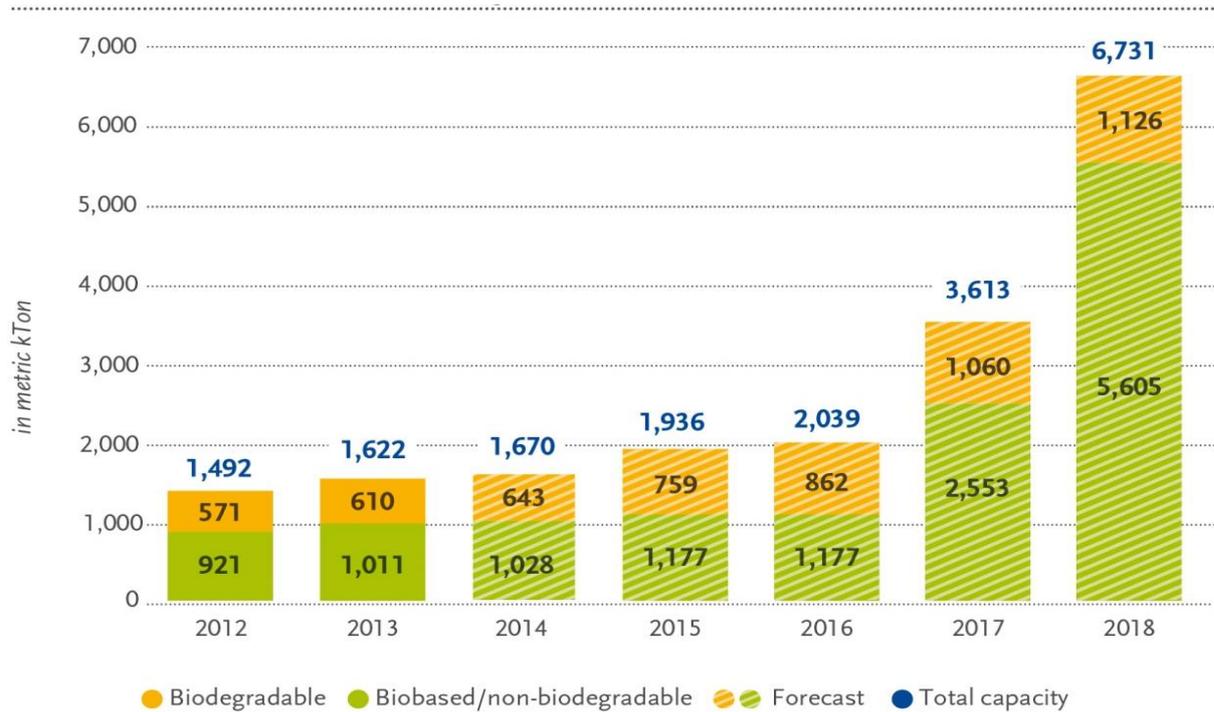
**Framework Programs are already in force for biofuels and bioenergy in the EU -including tax incentives, regulation for utilization of green energy, market entry support etc.- but there is no initiatives for the bioplastic production yet.**

Consequently, in relation of bioplastic production the market position of the European Union is weak. The emergence of private capital is also lagging behind compared to the extent of investments in North-America and Asia. Only a few well-known bioplastics are represented at the European market however TPS is produced in the most significant extent. At the moment this means approx. 0.3 million tons/year, however the capacity would be increased to 0.7-0.8 million tons/year by 2020. Share of bioplastics within the total plastics production is only 2% that would be increased to 4% by 2020. In Europe, the largest TPS manufacturer is the Italian Novamont factory.

0.3 million tons of bioplastics were produced in Europe in 2013, by 2018 0.51 million tons are forecasted to be produced. Counting with the total production capacity of the top 25 plants in the world, PLA is one of the leading bioplastics materials, produced on the extent of 180.000 tons/year. The largest manufacturer, the American NatureWorks, produced 140.000 tons of PLA in 2011. Now days other manufacturers are operating with a production capacity of 1.500-10.000 tons yearly. The European production capacity of PLA remains far behind the American production capacity. First industrial-scale PLA factory was set up in the Netherlands in 2014. By 2020 manufacturers are planning to increase their PLA production to 800.000 tons.

### Distribution of production from renewable resources across different regions around the world in 2011 and by 2020





Source: European Bioplastics, Institute for Bioplastics and Biocomposites, nova-Institute (2014)  
 More information: [www.bio-based.eu/markets](http://www.bio-based.eu/markets) and [www.downloads.ifbb-hannover.de](http://www.downloads.ifbb-hannover.de)

### European bioplastics manufacturers, brands and their approximate capacity

Biopolymer	Manufacturer	Country	Brand	Capacity (ton/year)
<b>Europe</b>				
TPS/PLA	BiomeBioplastics	UK	Biome	50.000
TPS/AP	Novamont	Italy	Mater-Bi	100.000
TPS	Biopolymer Technologies	Germany	BIOPar	18.000
TPS	Rodenburg Biopolymers	Netherlands	Solanyl	47.000
TPS	Limagrain Group	France	Biolice	n/a
CA	Innovia Films	UK	NatureFlex	10.000
CDA	Clarifoil	UK	Clarifoil	n/a
PLA	Pyramid Bioplastics	Germany	Pyramid	60.000 by 2012

PLA/AAC	FkuR	Germany	Bio-Flex, Bio-Grade, Fibrolon	8.000
PLA	Futerro	Belgium	Futerro	1.500
AAC	BASF	Germany	Ecoflex, Ecovio	60.000
AAC	Novamont	Italy	Easter Biio	15.000
PCL	Perstorp	Sweden	Capa	n/a
PHA	Bio-On	Italy	Minerv	10.000

## SITUATION IN HUNGARY

In addition to the current regulation, which is not specifically provided for the biodegradable plastics/materials in the Act about environmental product fee, it is difficult to set up a domestic base of production capacity. The paper-plastic (composite) packaging materials collection is not standard in Hungary. Most of the collectors handle these materials in paper material flow (e.g. drink cartons) but there are some who collect them with plastic.

## PAPER PRODUCERS AND WASTE HANDLINGS

In Hungary work one big and about five smaller paper mills. The big one is the Hamburger Hungária Ltd, it is the member of the Austrian Prinzhorn Group. First of all it produces paper by the recycling of the waste paper-corrugated sheet, its annual capacity is about 600.000 tons. The main raw material is the waste paper-corrugated sheet but there is not enough quantity in Hungary therefore producers need to import. Besides, there are several smaller producers with different profiles.

In Dunaújváros the Dunafin produces adhesive paper (what we can separate from the adhesive label).

In Diósgyőr are made the bank notes and other security papers.

In Szolnok is produced household paper, the Vajda Paper now is building a new mill for toilet paper production.

## RECYCLING OF PAPER-PLASTIC

The Hamburger Hungária Ltd's paper waste handling technology is not suited for handling of drinks carton or other paper products which are combined with plastic in huge volume. There is not any information about it from the other producers. At present waste bales of drink cartons are taken to Austria, the paper mill has another technology (soaking of waste paper takes more time). Otherwise it would be valuable waste in our country because the component of paper contains primary and long fibers.

## PLA PRODUCTION PLANS

6 years ago Nitrokémia Zrt. planned to set up a bio-refinery in its factory site, in Balatonfűzfő within a Hungarian-Chinese joint venture. The capacity was planned for 80.000 tons per year and the costs of investment was budgeted for HUF 40 million. The project has not been implemented yet, that means there is no bio-refinery production capacity available in Hungary in 2018.

Price of bioplastics are still much higher comparing to the price of conventional, bulk plastics. Occasionally the prices of **plastics consist of renewable resources and/or biodegradable plastics might be 3-4 times more expensive than bulk plastics.**

With its approx. 1,5 multiplier on the price level, PLA is an exception, which price level per kilogram (approx. EUR 2-3 /kg) approaches the conventional plastic's price. This is due to the leading role of PLA among bioplastics. Actually PLA is the bulk plastic of bioplastics, that can be produced by many manufacturers. An approx. 1,5 multiplier in prices is still significant, considering that purchasers are highly price sensitive in case of purchasing e.g. **a plastic vs. PLA teaspoon** and even a 10% surplus cost is not acceptable for them.

The situation in case of paper cups coated by PLA/ normal PE and in case of other paper products coated with PLA is better, because the selling price would be increased only with the extent of the PLA raw material (coating, PET film etc.), that means a significant possibility for increasing market penetration. Concluding from above, it would be appropriate to change legislation regarding environmental product fee for a more favorable charge or zero in case of bioplastics. That would enhance the competitiveness of paper products coated with PLA or even approaching the price level of paper products coated with plastics.

As an example, FUSION Zrt., managing **Burger King Magyarország, is open for environmentally friendly products on the domestic market. For boxes, bags and other paper products members of Omnipack Cluster are suppliers of Burger King chain in Hungary.**

Coated paper cups are currently purchased from abroad. The operator of Burger King Magyarország has provided their forecasted demand of paper cups by 2018 that means about 10 million pieces of paper cups. On average a paper cup weights 14 g and a 7-9% PLA coating might be applied, that means 1,12 g/cup on average. The annual PLA usage by Burger King, in case of coating 9,5 million pieces of paper cups means approx. 10,6 tons of PLA.

Considering that a normal bio-refinery plant operates economically with 40-50.000 tons of annual capacity, it is obvious, that in case of solely paper lined cups, the annual demand of PLA from other restaurants and coffee chains would be around 100-150 tons. Thus, in addition to the above mentioned materials, in order to establish a proper production capacity for the domestic market, there should be an increased need for producing only PLA based packaging materials and utensils. Currently pilot experiments are running in the manufacturing industry with PLA granulates ordered from the USA and China, for testing of films and other coatings made by different processing.

In the future manufacturers with the appropriate production instructions and recipe will be prepared for the application of PLAs and other bioplastics on their existing machine lines instead of traditional plastics.

**Annual paper cup utilization of Burger King Magyarország\*:**

COLD DRINK PAPER CUP 0,4L	5 100 000
COLD DRINK PAPER CUP 0,3L	2 200 000
COLD DRINK PAPER CUP 0,5L	900 000
HOT DRINK PAPER CUP 0,2L	450 000
HOT DRINK PAPER CUP 0,3L	320 000
KING FUSION PAPER CUP	500 000
HOT DRINK PAPER CUP 0,5L	35 000

## AEROBIC COMPOST OPPORTUNITIES IN HUNGARY

For the aerobic compost there are more companies, for instance the Főkert in Budapest, the Szegedi Környezetgazdálkodási Nonprofit Kft. in Szeged, which have these kind of services. Furthermore exists a biowaste management company – PROFIKOMP- who installs such systems. Mostly not for biodegradable plastics but the opportunity is given in the future in Hungary.

## INTEGRATED ANAEROBIC / AEROBIC COMPOST PLANTS

Solely the Hamburger Hungária Ltd. has a biogas production unit which produces gas (which can be burned) from the non-usable paper fibers in anaerobe way. However it is in only one unit with the whole production and power plant.

\* Source: Purchasing Department, FUSION Zrt. (18 April, 2018)  
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