



Voortgangsrapportage Regio Deal Zeeland

Project:

Innovative PS foam recycling

Deel 1	<i>De uitvraag voor dit onderdeel is eenmalig en dient als basis voor de verdere verantwoordingsrapportages</i>
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Algemeen		
Looptijd project	Startdatum project	1-6-2018
	Einddatum project	31-12-2023

Betrokkenen	
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Betrokken partners:	PolyStyreneLoop B.V. (PSLoop) is the company under PolyStyreneLoop U.A., a cooperative with currently over 70 members from the entire EPS / XPS value chain from 18 countries in Europe. Among the members are: raw material producers, EPS/XPS converters, national and European associations, system applicators, flame retardant producers and waste collectors and recyclers.



Projectplanning in jaren	<i>Beschrijving van de belangrijkste inhoudelijke activiteiten per jaar uit het projectplan</i>
2018	The year 2018 was used to develop the Project Plan to the actual version (27 Dec. 2018), to set up a first organisation and to arrange the financial contribution of € 300.000 spread over 2019, 2020 and 2021 from Europe's XPS producer association EXIBA.
2019	<p>In 2019 preparatory research, trials, market research and the basic engineering (needed for the permit) plus the detailed engineering of the project will be conducted. The output of the trials will inform which technology or sequence of technologies is best suited for the removal and capturing of (H)CFCs. Analyses by our partner Fraunhofer will allow us to understand how XPS will react within the CreaSolv® Process used by PolyStyreneLoop. The permit will be submitted by the end of 2019.</p> <p>As the depreciation of equipment is a major revenue from the subsidy we receive, we would like to request the extension of the subsidy period by 1 year until 31-12-2023. The purchases are expected as previously planned. Most of the equipment will be bought in 2020. In 2023 no more spending's will occur, the extra year is solely to extend the depreciation over a longer period.</p>
2020	The year 2020 will be used for engineering of the equipment for the project followed by the tendering and procurement. Receiving an irrevocable permit is scheduled for second half of 2020.
2021	In these years the PSLoop demonstration plant will be fully operational. Process optimization will continue. The PSLoop facility is open for dissemination activities.
2022	The year 2021 will be used for the construction and installation of the XPS extension in the EPS plant. The plant will become operational and processes will have to be reviewed and if necessary optimized.
2023	The PolyStyreneLoop demonstration plant further increase its capacity. Process optimization will continue. The PolyStyreneLoop facility is open for dissemination activities.



Financiële kosten- en inkomstenraming per jaar	<i>The project Innovative PS foam recycling that is subsidized by this Regio Deal Zeeland focuses on XPS. PolyStyreneLoop runs another project that focuses on EPS and that is subsidized by an EU LIFE grant. In the next tables the “financiële kosten- en inkomstenraming per jaar” are presented for (1) the EPS project, (2) the XPS project. Table 1 gives an overview of the initial planning and table 2 of the actual situation ytd 2019-</i>
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Table 1: Planning

POLYSTYRENE LOOP

Plannig
EUR x 1.000

EPS

financiële kosten raming per jaar	vul hier de totale kosten in conform de meerjarenbegroting in totalen per jaar
2017	213.0
2018	1,220.0
2019	6,743.0
2020	3,412.0
2021	3,117.0
2022	2,699.0
2023	2,666.0
Totaal	20,070.0

financiële inkomstenraming per jaar	vul hier de totale inkomsten in conform de meerjarenbegroting in totalen per jaar uitgesplitst her herkomst bijdrage					
	Netto omzet	Bijdrage EU life grant	Bijdrage Regio Deal	Private/Eigen bijdrage	Publieke bijdrage	Totale inkomsten
2017	84.0	65.0		1,175.0		1,324.0
2018	42.0	276.0		665.0		983.0
2019	722.0	533.0		4,500.0		5,755.0
2020	2,500.0	340.0				2,840.0
2021	3,750.0	251.0		-325.0		3,676.0
2022	3,750.0	171.0		-650.0		3,271.0
2023	3,750.0	86.0		-650.0		3,186.0
Totaal	14,598.0	1,722.0	-	4,715.0	-	21,035.0

XPS

financiële kosten raming per jaar	vul hier de totale kosten in conform de meerjarenbegroting in totalen per jaar
2017	
2018	
2019	512.5
2020	629.3
2021	72.5
2022	84.5
2023	419.5
Totaal	1,718.4

financiële inkomstenraming per jaar	vul hier de totale inkomsten in conform de meerjarenbegroting in totalen per jaar uitgesplitst her herkomst bijdrage					
	Netto omzet	Bijdrage EU life grant	Bijdrage Regio Deal	Private/Eigen bijdrage	Publieke bijdrage	Totale inkomsten
2017						-
2018						-
2019			412.5	100.0		512.5
2020			529.3	100.0		629.3
2021			57.8	100.0		157.8
2022						-
2023						-
Totaal	-	-	999.6	300.0	-	1,299.6



Table 2: Actual YTD 2019

POLYSTYREN LOOP

Realisatie
EUR x 1.000

EPS

financiële kosten realisatie per jaar	vul hier de totale kosten in conform de meerjarenbegroting in totalen per jaar	vul hier de totale investeringskosten in conform de meerjarenbegroting in totalen per jaar	Totaal uitgaven
2017	365.0		365.0
2018	399.0	331.1	730.1
2019	303.0	658.3	961.3
2020			
2021			
2022			
2023			
Totaal	1,067.0	989.4	2,056.4

ontvangen voorschot 903

financiële inkomsten realisatie per jaar	vul hier de totale inkomsten in conform de meerjarenbegroting in totalen per jaar uitgesplitst her herkomst bijdrage					
	Netto omzet	Bijdrage EU life grant	Bijdrage Regio Deal	Private/Eigen bijdrage	Publieke bijdrage	Totale inkomsten
2017	84.0	65.0		1,175.0		1,324.0
2018	65.0	343.0		524.0		932.0
2019	468.0	335.4		305.0		1,108.4
2020						-
2021						-
2022						-
2023						-
Totaal	617.0	743.4	-	2,004.0	-	3,364.4

XPS

financiële kosten realisatie per jaar	vul hier de totale kosten in conform de meerjarenbegroting in totalen per jaar	vul hier de totale investeringskosten in conform de meerjarenbegroting in totalen per jaar	Totaal uitgaven
2017			
2018			
2019	150.7	125.2	275.9
2020			
2021			
2022			
2023			
Totaal	150.7	125.2	275.9

financiële kosten realisatie per jaar	vul hier de totale inkomsten in conform de meerjarenbegroting in totalen per jaar uitgesplitst her herkomst bijdrage					
	Netto omzet	Bijdrage EU life grant	Bijdrage Regio Deal	Private/Eigen bijdrage	Publieke bijdrage	Totale inkomsten
2017						-
2018						-
2019			135.0	-	-	135.0
2020						-
2021						-
2022						-
2023						-
Totaal	-	-	135.0	-	-	135.0

ontvangen voorschot 512,5



Voortgangsrapportage Regio Deal Zeeland

Project:

Innovative PS foam recycling

Deel 2

Peildatum

01-01-2020

halfjaarlijkse rapportage peildatum 1 januari 2019

Inhoudelijk

Voortgang project

Beschrijving van de voortgang van het project ten opzichte van de oorspronkelijke planning (Zie Deel 1)

In 2019, PSLoop had to renegotiate the loans of the banks as the initial loan had expired due to a delay with the environmental permit for the PSLoop plant. The conditions of the former loan could not be provided anymore, instead an additional subordinate loan had to be obtained through the National Green Fund (NGF). Securing the NGF loan turned out to be a long process. Fortunately, we have now however secured the funding. End 2019 we could therefore also finally give the official GO for the building of the demonstration plant. On 16. December the first spade was put in the ground for the entrance road. In 2020, the plant will now be built, planning to be operational in Q1 2021.

In 2019, the project team around XPS has continued to work together and conduct a number of activities. The team meets during bi-weekly telephone conference to discuss the status of different activities and to plan future activities. This has allowed for continued progress.

Activities conducted Q3-Q4 2019

1. Environmental permit (omgevingsvergunning)

End 2019, the application procedure for the environmental license (omgevingsvergunning) for the extension of the PSLoop plant for the treatment of XPS with (H)CFCs was submitted. It is expected that in Q4 2020 the license will be issued. SPA-WNP, located in Middelburg, is the contract company working on the application process.

2. Market research

We are continuously monitoring end-of-life information and legislation for PS-foams and plastics in general. National legislation is different across Europe. Also, the collection of PS-foams from demolition sites and current disposal practices appear to show differences. Where possible we are collecting cost information for XPS disposal/incineration to assess competitiveness of the PSLoop process. Information received from the market in Germany, BeNeLux as well as other European countries is continuously collected and updated to stay up to date on the market developments around XPS, such as alternative end of life treatments and their costs, different XPS applications and their expected contaminations, market volume of XPS from demolition, etc

3. Dissemination activities

PolyStyreneLoop through its core Management Team as well as the members and supporters of its cooperative continuously promote PSLoop. The project focusing on XPS and the support received by the Province of Zeeland and the Dutch authority is also always explicitly mentioned. A high-level presentation summarizing the project activities and goal has been prepared and made available to everybody interested to use during own meetings and external conferences. Next to smaller meetings and networking events, some of the bigger events that took place in the past half year, were:

- BASF Live Talks during K Fair in Düsseldorf
- Presentation during World Congress of the International Solid Waste Association in Bilbao



- Meeting with Sunpor in Austria to discuss collection in Austria, during which the urge to find a solution for XPS was paramount
- Tour through Germany to visit current and new suppliers
- Publication of a guideline on collection and pre-treatment of PS-foam (EPS and XPS)
- Newsletters
- LinkedIn posts
- Publication of a scientific article

Evidence of the dissemination activities is included as a link to a separate file.

4. Trials

4.1. Detection via XRF-scanner

Analysis on the detection of (H)CFCs via an XRF scanner have been conducted. The historical (H)CFC blowing agents used for XPS contain chlorine and fluorine. The analysis showed that detection of chlorine is possible. This is sufficient for detection of (H)CFC foams as modern XPS does not contain any chlorinated additives. Measurement of an accurate quantity is however insufficient due to the low penetration depth of the XRF but more experience will be collected to have a better understanding. Detection of fluorine via XRF is only possible via more expensive equipment, due to the even very light weight of the molecule. Being able to detect chlorine via the XRF is sufficient screening to determine whether or not the XPS contains (H)CFCs and must therefore undergo pre-treatment for the release and capture of the blowing agent. Analytical procedures for sample preparation and analysis are being prepared.

4.2. Tests on the volatility of blowing agent

Tests on the volatility of the propellant was conducted showing that the gas diffuses quickly once broken open. This means that detection of chlorine on old boards might be difficult whereas the results on a freshly cut board offers more accurate results. Additionally, it underlines the urgency not to break the XPS plates to prevent release of gases in the atmosphere.

4.3. Compaction of XPS

Demolition XPS shall be compacted to release blowing agent and to minimize transportation cost to the PSLoop transportation plant. Initial trials were conducted at XPS user companies showing the feasibility to reach densities between 200 and 900kg/m³. These tests did not involve (H)CFC foams.

4.4. Shredding of compacted XPS

Trials were conducted on shredding of compacted XPS material which is required prior to the solvent dissolution process. Sieve analysis was performed as knowledge of the particle size is relevant to avoid dust explosions during handling. The shredder of choice was able to disintegrate even highly compacted XPS cylinders.

4.5. Tests on dissolution

The shredded material was also used for a solubility test. Goal was to detect whether the previously compacted and shredded material would dissolve in less than 1 minute. The results showed that the shredded XPS dissolves in a timely manner.

5. Purchase of equipment

5.1. XRF-scanner

An XRF-scanner was purchased for the screening of material on the presence of chlorine, in order to determine whether or not the XPS has to undergo pre-treatment (release and capture of blowing agents) prior to further treatment in the PSLoop plant.

5.2. Cryogenic unit



Via Coolrec/Recydel a refrigerator recycler, PSLoop was able to get access to a second-hand cryogenic unit for the capture of the gases. The unit will become available around May 2020 and therefore purchased in the course of 2020 (200 k€). A new cryogenic unit would have been outside the financial capability of the project, both with respect to the investment required (900 k€ instead of the budgeted 500 k€) and also delivery time of over 2 years. This is due to a current high demand for these units. Additional costs (150 k€) are expected for the revamp, transportation and installation of the unit based on preliminary quotes.

5.3. Energy

The process/heating energy for the PSLoop plant will be electric. While oil/gas-generated steam is associated with CO₂-emissions, the electricity contract can be for 100% non-fossil (CO₂-free) sources. We are aiming to source from an energy supplier from Zeeland with access to the wind and solar energy.

6. Working together with local partners

We work closely together with partners in Zeeland:

- SPA-WNP (Middelburg) is leading the application of the environmental permit for the extension of the PSLoop plant for the treatment of XPS in Terneuzen
- KWS Infra (Terneuzen) is laying the road pavement for the entrance road and construction of pavement and fencing
- Foreseen H4A (Sluiskil) will be executing the construction of the building
- Engie provides the construction management and advise on instruments piping, vessels and pumps.
- Sigma (Terneuzen) is doing the HRM administration for PSLoop.

Planned activities Q1-Q2 2020

1. Environmental permit

It is expected that additional information will have to be provided for the environmental permit.

2. Market Research

The information obtained from the market throughout the year 2020 and subsequent will be continuously be updated and supplemented to get a good understanding on the developments around XPS.

3. Dissemination activities

Upcoming activities include:

- General Assembly PolyStyreneLoop
- Presentation during Deutsche Abbruchverband Congress in Berlin, IERC2020 and IARC2020
- Continued monitoring of the progress of the plant
- Monthly and quarterly newsletters
- LinkedIn Posts
- Writing of scientific articles
- Conducting interviews
- Plastics Recycling Europe Award – Finalist
- Blue Tulip Awards – Class of 2020
- Nederland Circulair

4. Further Trials planned in 2020

4.1. Compaction

Compaction trials will be conducted at machine manufacturers to determine the correlation between compaction density and residual XPS cell gas. Furthermore, data on the behaviour of the material



during compaction with different parameters (compaction level and possible water content) will be collected. The compacted material will be used as input material for trials with regards to the CreaSolv® Process.

4.2. Contamination

PolyStyreneLoop will in first instance focus on determining the technology/equipment required to adequately release and capture the (H)CFCs. Next to this we will however conduct trials on the separation of different contaminations on XPS, for example cement and mortar.

4.3. GC analysis of current and historical XPS blowing agents

Fraunhofer will continue to develop GC methods for XPS blowing agents. This is required to quantify gas residuals in polymer and will be required to demonstrate that the legal targets of the CFC capture process are met.

5. Purchase and revamp of cryogenic unit

The cryogenic unit will be purchased and revamped.

6. Working together with local partners

PSLoop is looking to work together with students of the HZ University of Applied Sciences (Hogeschool Zeeland). Collaboration is likely to start in September 2020.

Overall planning for construction of plant

2020 is an important year for PSLoop as the plant will be build. The planning is to construct the building until the summer vacation and then install the actual plant with all the necessary pipes and pumps after the summer vacation. The plant will then become operational in Q1 2021. The equipment necessary for the treatment of XPS will be planned for. But purchase and installation shall only be pursued after the permit for the treatment of XPS has been obtained – expectation Q4 2020. Also this summer a special storage for XPS will be constructed (plan 800m²).

Projectindicator	<i>Zie bijlage 1 met overzicht van indicatoren uit de Regio Deal Zeeland . Vul hier de betreffende indicator voor het project in.</i>	
The realization of a new installation in the field of circular economy for the reuse of polystyrene foam (EPS and XPS) demolition waste containing the flame-retardant HBCD and the blowing agent (H)CFCs (XPS only).		
	Planning	Realisatie tot nu
Streefwaarde indicator	1	0

Financieel		
Financiële kostenraming per jaar	<i>Begroting conform planning (Zie deel 1)</i>	<i>Werkelijke realisatie</i>
2018	Zie begroting deel 1.	
2019		
2020		
2021		
Totaal		