General information	
PPP number	TKI-BBE-1703/AF16072 TKI toeslag project
Title	Environmentally benign process starch derivatisation
Roadmap/Umbrella	TKI AF Kernthema Circulair
Executive knowledge institution(s)	WFBR
Research project leader (name + e-mail address)	Prof. Dr. P. Buwalda, Avebe, piet.buwalda@avebe.com
Coordinator (on behalf of private parties)	Dr. D. S. van Es, daan.vanes@wur.nl
Government contact person	Jan van Esch
Start date	01/01/2017
End date	31/12/2019

Approval coordinator/consortium	
The coordinator has assessed the annual report on behalf of the consortium:	approved
Possible feedback on the annual report:	

Short content description/aim PPS
The starch producing sector in the EU is a growing agricultural sector and is increasingly depending on adding value to its products to retain a competitive position in the world market. Derivatisation of starch enables technical applications, for instance in adhesives, construction and textile. This project aims to develop a more environmentally friendly reagent for the derivatisation of starch that will half the amounts of chemicals required, and develop technology to synthesise this reagent from biobased feedstock. If successful, the application potential is substantial: besides the above-mentioned technical applications, the biobased reagents may also be used for other products like coatings, sequestering agents for detergents or personal care products or in the derivatisation of other polysaccharides besides starch, like cellulose or inulin.

Planning and progress	
Is the PPP going according to plan?[1]	Yes This project was submitted as a 3 year project. TKI funding has been allocated for 1 year, with a possibility of extension for the remaining 2 years, provided that three (technical) criteria are met, and the industrial partners involved (Avebe, Akzo-Nobel) agree on a positive go/no-go decision. The three criteria are: 1) The hydrolytic stability of the malonic acid derivatives under neutral conditions should be sufficient: the half-life should be > 6 h in neutral aqueous conditions; 2) The reaction efficiency (incorporation of malonic acid derivative) in starch should be >30% (mol/mol) after the initial screening in year 1.

[1] If applicable, use the explanation from the financial project report

	3) The outcome of the TEE, which is a first estimate, should be positive (order of magnitude level). All three criteria were met by the end of year one, resulting in a positive go-decision of both Avebe and Akzo-Nobel. Once all necessary signatures have been obtained, expressing the commitment of the industrial partners towards continuation, an official request will be made to the TKI bureau for extended funding for year 2 and 3.
Have there been changes in the consortium/project partners?	No
Is there a delay and/or deferred delivery date?	No
Are there any substantive bottlenecks? Provide a brief description	None
Are there any deviations from the projected budget?	No
Do you expect a patent application to arise from this PPP?	Probably, from second phase of the project.

Current summary of the project for the website Kennisonline
The starch producing sector in the EU is a growing agricultural sector and is increasingly depending on adding value to its products to retain a competitive position in the world market. Derivatisation of starch enables technical applications, for instance in adhesives, construction and textile. This project aims to develop a more environmentally friendly reagent for the derivatisation of starch that will significantly reduce the amounts of chemicals required, and develop technology to synthesise this reagent from biobased feedstock.

Highlights:

- All three technical and economic criteria for continuation have been met within year one.
- The reagent used for this project showed superior hydrolytic stability compared to the currently used reagent, enabling a substantially increased window of operations, and potentially reduced waste stream due to more efficient use of the reagent (to be confirmed in year 2).
- Starch derivatisation experiments thus far showed that the required reaction efficiency can be achieved, although optimisation studies still need to be performed in year 2.
- After derivatisation, colourless products were obtained.
- The preliminary TEE was positive, and will be data update during the remainder of the project in year 2-3 as more data are being produced.
- New HPLC protocols for the analysis of the new reagent were successfully developed.
- NMR protocols were successfully developed for the characterisation and quantification of the starch products**.**

Number of delivered products in 2016			
Academic articles	Reports	Articles in journals	Introductions/workshops
-	-	-	-

Appendix: Names of the products or a link to the products on a public website

TKI AF:

Environmentally benign process for starch derivatisation

http://topsectoragrifood.nl/project/environmentally-benign-process-for-starch-derivatisation/

Bij de start was dit een EZ gefinancieerd project; het is later een TKI toeslag geworden.

https://www.wur.nl/en/Research-Results/kennisonline/Environmentally-benign-process-starch-derivatisation.htm