



Project Number RVO and/or ISPT(-TKI)	TKI Toeslag 2016 / TKI Toeslag 2017 granted on 7th June 2018 and amended grant on 22 <sup>nd</sup> October 2019
Project Title + Acronym	Reduction of energy use by novel process routes for food
Secretary (penvoerder)	ISPT
Name Cluster Director	Peter de Jong (ISPT)
Name project leader	Peter de Jong (ISPT)
PhD & PDEng (name & title thesis)	<p>Anouk Li-Piang (WUR) – PhD1 – <i>Total refinery for food – Mild fractionation processes in the food industry</i></p> <p>Anna Möller (WUR) – PhD3 – <i>Structured material into functional ingredients – developing fractionation techniques to create functional ingredients</i></p> <p>Eric Suryawirawan (WUR) – PhD2 – <i>Fractionation Routes for solubilised materials</i></p> <p>Hilda Nyambura (WUR) – PhD4 – <i>Increasing the efficiency of membrane separation processes</i></p> <p>Zulhaj Rizki (TUD) – PostDoc casus FrieslandCampina</p> <p>Alexias Constantinos (TUD) – PDEng1 casus DSM <i>Development of a CFD model for protein concentration via ultrafiltration</i></p> <p>Carolina Carillo Dias (TUD) – PDEng2 casus Cosun - <i>Design mildly refined fractions of sugar beet root that can be applied in food products with substantially lower energy consumption and carbon footprint than the existing ingredients</i></p> <p>Jeremy Mantingh (TUD) – PDEng3 casus Pentair – <i>Concentration of milk whey protein by hollow fiber ultrafiltration</i></p> <p>Henrique (TUD) – PDEng4 casus FrieslandCampina – to be defined yet.</p>
Funding	TKI Toeslag 2016 (and TKI Toeslag 2017) + Update Toekenning TKI Toeslag per 1 October 2019
Project start	1-6-2018
Project original end date	1-11-2022
Project final end date	Max. prolongation until 1 May 2023 will be requested by Request for Change in Q1 2022.



Institute for  
Sustainable  
Process Technology

## Project Partners



Institute for  
Sustainable  
Process Technology

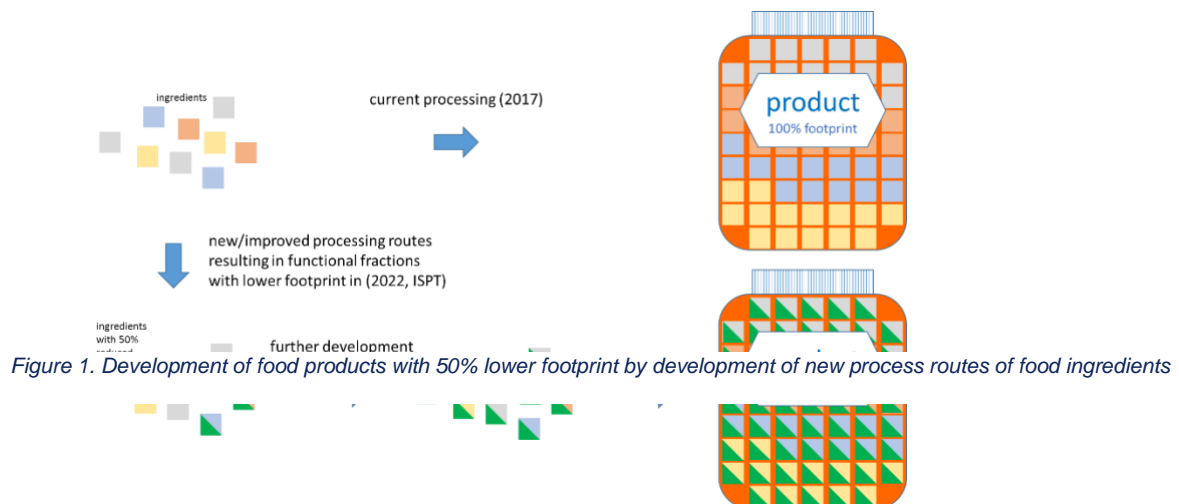
## Third Parties:





## 1. Summary

Industrial partners of the ISPT Mild Fractionation Program are active in different parts of the supply chain. Cosun and FrieslandCampina produce ingredients and consumer products from raw materials (crops, milk). DSM produces enzymes and looks for opportunities to valorize side streams. FrieslandCampina want to use enriched fractions from raw materials as a new basis of functional ingredients in their food products. The drivers for all the industrial partners are sustainability in terms of reduction of energy consumption per kg food product and total use of raw materials



Goal of the project was to develop and demonstrate novel processing routes or new/improved separation technologies for mildly processed fractions from crop and dairy materials generating functional food ingredients with 50% reduction of the energy/carbon footprint. The footprint reduction is realized by replacement of the current ingredients by functional fractions produced by new/improved technologies and new process routes, as depicted in figure 1. This novel, revolutionary approach will in the end lead up to 50% reduction of energy consumption in food processing.

In order to get successful results the following activities have been executed:

- Investigation of portfolio of enriched fractions from dairy and crops
- Design of processing routes for production of enriched fractions with minimal energy consumption and maximal valorization of total crops/raw materials
- Design of separation technologies needed for novel sustainable processing routes
- Application and control of enriched fraction functionality from novel process routes
- Demonstration of successful technologies on pilot scale.

To date the following results were obtained :

- The use of modeling data analysis tool is of great help in finding real opportunities for ingredient replacement by enriched fractions of agri-food streams with 50% energy reduction in processing.
- Targeted fractionation of plant-based protein sources such as yellow pea since is essential to find new opportunities for sustainable processed ingredients. Functionality of the derived ingredients is highly depending on processing and resulting fraction composition.
- Membrane separation technologies are key for the transition to climate neutral food production.
- Making small amounts of new products based on sustainable ingredients will enhance the application of these ingredients.