KaRMA2020 -
Industrial Feather Waste Valorisation for Sustainable KeRatin-based MAterials

• **Call identifier:** H2020-SPIRE-2016
• **Topic:** SPIRE-3–2016 Industrial technologies for the valorisation of European biosources into high added value process streams.
• **Start/end date:** 1st January 2017- 31st December 2019
• **Partners:**
  - 3 Large companies
    - GRUPO SABA
    - Fertiberia
    - SIOEN
  - 5 SME
    - FKUR
    - Daren Labs
    - avantium
    - Ciaotech
    - Vertech Group
  - 7 Research Institutes
    - cidetec
    - AIMPLAS
    - VTT
    - processum
    - SP
  - 1 University
    - CIEMAT
Poultry industry generates huge amounts of waste each year (estimated generation of 3.1 million tons feather waste in 2014 in EU-28). Valorisation of this waste is of utmost importance, not only from the economical point of view, but also in order to reduce environmental impact and health hazards associated to landfill disposal of feathers.

The implementation of an integrated feather waste management strategy that allows a
The adaptation of novel efficient conversion technologies to the current industrial production processes.
The development of a suitable exploitation strategy.

New feather derived raw materials such as:
- Hydrolysed keratin, for fertilizers
- Bioplastics for biodegradable food packaging
- Coatings for textiles

The development of alternative industrial conversion methods and exploitation strategies for poultry feathers will increase the value of feathers as raw material to be used as cost competitive and alternative bio-derived feedstocks.

Value to Customers

How will this happen?

**What are the key expected sustainability impacts of KaRMA2020?**

**Baseline:** 1 ton/yr of waste feathers, treated with conventional biowaste treatment systems (landfilling or incineration) without production of value products, which are produced in conventional pathways using virgin raw materials.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Baseline</th>
<th>Expected Impact</th>
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</thead>
<tbody>
<tr>
<td>Global Warming Potential (mainly CO2 emission reduction)*</td>
<td>460 kg CO₂ / ton of biowaste + CO₂ emissions from targeted product benchmarks**.</td>
<td>At least 30% reduction expected.</td>
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<tr>
<td>Fossil energy intensity*</td>
<td>2786 MJ/ton of biowaste + fossil energy demand from targeted product benchmarks**.</td>
<td>More than 30% reduction expected.</td>
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<tr>
<td>Total material consumption*</td>
<td>Depends on targeted end product. Fossil raw material content ranges between 0-100%.</td>
<td>50-100% reduction in fossil resource use.</td>
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<tr>
<td>Waste management strategy</td>
<td>Waste from each process is handled separately.</td>
<td>An integrated strategy, possible through co-localisation and vertical industrial integration, allows an optimization of material use.</td>
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</tbody>
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*Core SPIRE indicator
** Source: Ecoinvent 3.1 dataset: Biowaste (waste treatment)/Market for biowaste/Alloc Def., S.
What **outputs or learning** from KaRMA2020 could have value for other SPIRE projects here?

**POSITIVE OUTPUTS**

- Some of the case studies from KaRMA2020 could be extended and applied to other waste sources.
- Novel technologies that are expected to be patented.

**LIMITATIONS AND CHALLENGES**

- Legislative issues could be a limitation, for example for food contact applications.
- Unknown performance of new raw materials.
- Complex LCA analysis, no available data.
From a successful KaRMA to a greener HORIZON!
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Project website: www.karma2020.eu