



## IFPRI BRIEF TEMPLATE

Check One:    **Project**                       **Review**                       **Collaboration**  
                    **Workshop**                       **Other**

<b>Descriptive Title</b>	Sustainability of Particle Formation Technologies (reduction in energy use – reduced CO <sub>2</sub> footprint)
<b>Working Title<sup>1</sup></b>	Sustainability of Particle Formation Technologies
<b>Technical Area<sup>2</sup></b>	Particle formation
<b>Date</b>	14/06/2022
<b>Short Description</b>	<p>Sustainability has become a key target for manufacturing industries and IFPRI members are no exceptions.</p> <p>Our operations can be very energy intensive, generate significant amounts of wastes, and/or require the use of solvents. This is particularly true for particle formation processes.</p> <p>As an example, the workhorses (in volume) of particle formation processes are spray drying, fluid bed drying and milling, are all very energy intensive. As for crystallizations involve solvents, cooling, and subsequent isolation steps.</p> <p>An envisaged strategy would be two-fold:</p> <ol style="list-style-type: none"> <li>1) First, improve the footprint and reduce energy use within existing plants (process optimization, intensification, heat integration etcetera).</li> <li>2) Second, step away from the workhorses of particle formation processes and identify novel processes (e.g. flash drying or CO<sub>2</sub>-assisted drying) that can produce particles with similar properties to conventionally dried particles, but via a more sustainable route.</li> </ol> <p>Ultimately there is an ambition to render our particle forming processes more sustainable. A previous attempt at generating a review on the topic has failed to convince the IFPRI member as it appeared that the subject was too broad and some common definition of sustainability was missing.</p>

<sup>1</sup> Title used in meeting agendas and file archives

<sup>2</sup> One or more from the following list: W = wet systems; D = dry systems; F = particle formation; SR = size reduction; M = modeling; SE = systems engineering

	<p>Hence it is proposed to organize a sustainability workshop in order to determine a <u>roadmap / strategy</u> for IFPRI to address the sustainability challenge (define scope).</p> <p>Broad interest in powders covering various industries.</p>
<b>Objectives</b>	<p><b>1) Establish the current state (with invited academics and industrials)</b></p> <ul style="list-style-type: none"> <li>- What KPIs/definition should be used to establish sustainability targets?</li> <li>- What is the current sustainability state for particle formation processes?</li> </ul> <p><b>2) Create a sustainability roadmap / strategy for IFPRI:</b></p> <ul style="list-style-type: none"> <li>- Express sustainability options for the various industrial partners</li> <li>- Align &amp; establish sustainability roadmap for IFPRI &amp; define scope</li> <li>- Create inventory of general approaches to improve sustainability &amp; reduce the CO<sub>2</sub> footprint (for existing &amp; new processes).</li> <li>- Prepare position/charter/guidance to industry for sustainability of particulate processing.</li> </ul> <p>Both the current state of the art &amp; the solutions to improve sustainability should be compared on the following basis:</p> <ul style="list-style-type: none"> <li>- Comparison of the resources, energy &amp; water consumption, CO<sub>2</sub> footprint, powder properties, waste recycle streams of the various processes, i.e. green chemistry.</li> <li>- The commercial &amp; technology readiness and the scale of the process (varies between industries from 1 kg to 1000's of tons).</li> </ul>
<b>Scope</b>	<p>Roundtable amongst industrial partners to establish the sustainability targets, scope &amp; general approaches (online).</p> <p>Followed by a workshop, preferably in person (e.g. at Schiphol), but at least hybrid (needs to be done well).</p> <p>Not just pharma and food – covering inorganics. Also cover all scales – commodity goods as well as pharma.</p>

<b>Recommended Contractors (2 or 3)</b>		
<b>Name</b>	<b>Institution</b>	<b>Email Address</b>
Aoife Hamill	FDT Consulting	aoife.hamill@fdt.ie
Mark Talford	Medicines Manufacturing (ISCF) at Innovate UK, UKRI	

<b>Submitted By:</b>	
<b>Name</b>	<b>Organization</b>
Joris Salari	Corbion

Martijn van der Hoeven	Danone
Dennis Golchart	Janssen Pharmaceutical
Christophe Grosjean	Syngenta
Vincent Meunier	Nestle
Alexander Findeisen	Novozymes

