



# Breakthrough Innovation Offers Sustainable Alternatives to Freeze Drying

We compared the most commonly used drying methods used in the production of pharmaceuticals, probiotics and temperature-sensitive materials to help pharmaceutical companies evaluate the best methods for their processing, economic and environmental needs. Drying method influence microorganisms' viability in the pharmaceutical and nutritional supplement industries, both are able to benefit from shared drying improvements.

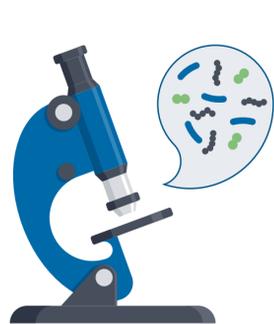
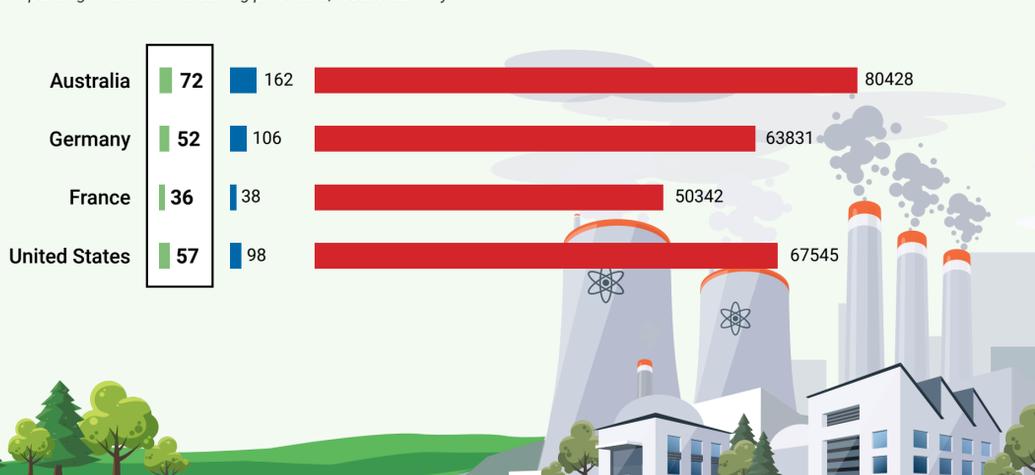
**ESD** - Electrostatic spray drying    **FD** - Freeze drying    **CSD** - Conventional spray drying

## Keeping CO<sub>2</sub> Emissions From Spinning Out Of Control

■ ESD  
■ FD  
■ CSD

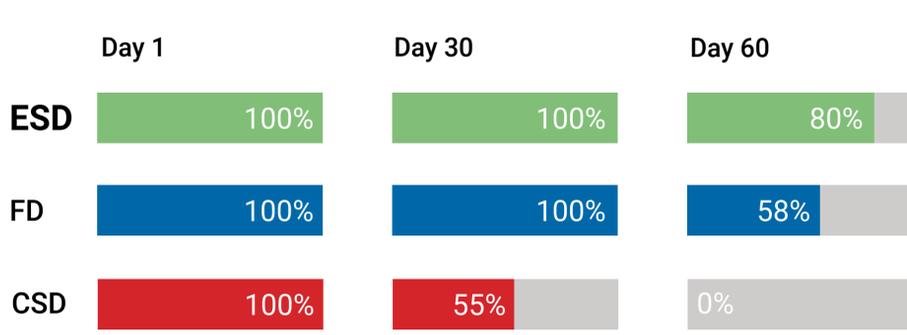
With organizations seeking to reduce their carbon footprints, reviewing drying method emissions are an important part of the process.

*Depending on the materials being processed, results can vary.*



## Working With The Evolution Of Microorganism Viability

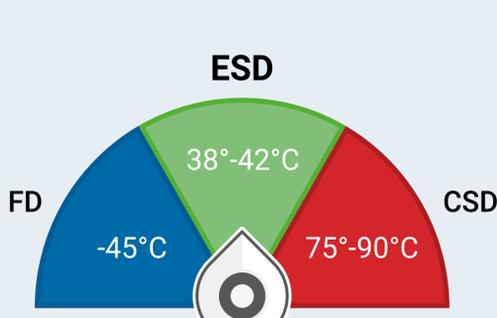
Viability and stability are partners during processing. Drying methods that are gentle provide greater success for living organisms.



*Comparison of the stability of Lactocaseibacillus rhamnosus GG at room temperature in a lab setting.<sup>1</sup>*

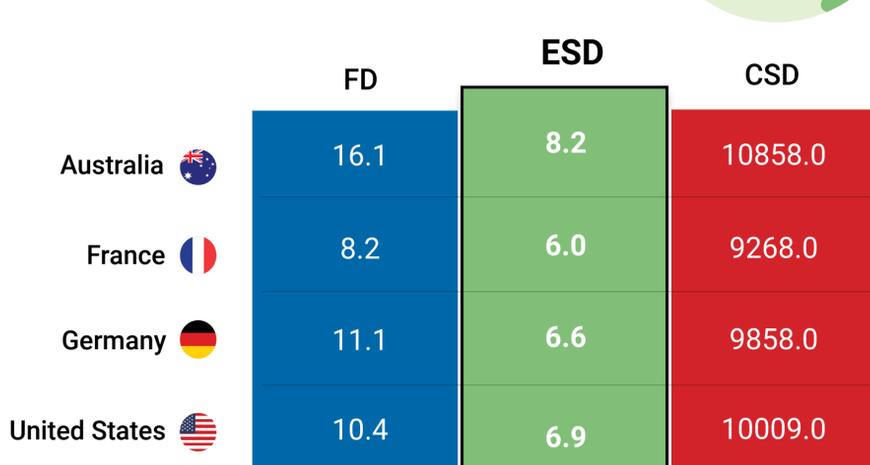
## Sustainable Continuous Drying Methods

Living organisms need a light touch. Biologics are temperature-sensitive, so drying must be gentle enough to stabilize the product without introducing thermal stress or contaminants.



## Scoring Low On Life Cycle Assessments Is Key For Greener Production

As a response to growing concerns regarding environmental contamination from active pharmaceutical ingredients, life cycle assessments help measure organizations' green production.



*Figures are measured in millipoints (mPt).*

## From our clients...

*The Fluid Air staff provide the best service I've come across. The sales engineers go above and beyond for us. I look forward to working with them on all our future projects.*

*- Director, Product Development*

*I'm very impressed by the knowledge and experience of Fluid Air specialists in relating this technology to our process and product development.*

*- Senior Principal Engineer*

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<sup>1</sup> Sustainability study data presented to Fluid Air by EVEA (EVEA - Evaluation & accompagnement (evea-conseil.com)), Life Cycle Assessment of a New Drying Technology at Low Temperature report by Aurelie Perrin, PhD, scientific project manager, a.perrin@evea-conseil.com, and Thomas Montchovet, LCA and eco-design consultant, t.montchovet@evea-conseil.com (April 2022). © 2023 Spraying Systems Co. | All Rights Reserved.