



# CanmetENERGY

*Leadership in ecoInnovation*

## Transformation of Liquid Agri-Food Products and Sub-products into Powder with a Compact Energy Efficient Dryer

### Introduction

Agri-food Industries increasingly need to transform products and sub-products into powder, in order to increase storage life and develop new products. CanmetENERGY developed a compact drying technology that uses inert particles as thermal vectors (see Figure). In both laboratory and pilot-scale trials the dryer has successfully processed:

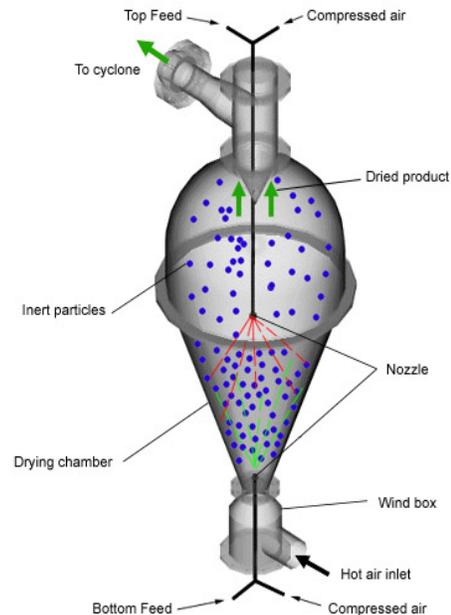
- Pulses
- Vegetable proteins and starches
- Food and nutraceutical ingredients
- Dairy by-products
- Marine biomass
- Crustacean by-products
- Whole eggs

### Drying process

The Figure illustrates the drying process which relies on heat transfer both through conduction of the heat accumulated within the inert particles to the liquid material, and, through convection of the ascending heated air. The inflow of an ascending heated air stream causes an intense agitation of the inert particles, while transferring heat to them for storage. Then, the product is fed in the form of fine droplets that coat these particles, which act as heat accumulator and intermediate drying medium between the hot air and the liquid feed. The ideal drying cycle is based on four successive steps:

- Heating of inert particles
- Coating of inert particles with fine droplets
- Drying of coating, followed by coating fragmentation due to agitation within the dryer
- Peeling off of dried layer and entrainment of dried product, as powder of uniform size, towards cyclone which recovers it from air stream.

The liquid feed can be introduced either from the top or the bottom of the dryer, depending on the physical and biological properties of the product.



**General view of the compact dryer**

### Energy and economic aspects

The specific energy consumption, for this dryer, varies between 0.5 and 1.4 kWh/kg of evaporated water, according to the dryness and the position of the liquid feed. This compact dryer is competitive compared to the conventional atomization dryer, commercially known as a Spray Dryer.

### Marketing

This innovative drying technology is patented in the United-States of America (No. 6993856), and patent is pending in Canada (CA 2439490). A non-exclusive license has been granted to Manitoba Hydro Inc. for its commercial exploitation in food and agri-food sectors. The contact person in this company is:

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