



# Solutions for Plant-Based Beverages

# A growing care for health and environment

Globally, more people are adopting flexitarian eating habits, vegetarianism or vegan diets as a response to concerns about the ecological footprint of some foods.

The rapid uptake in plant-based foods and beverages is keeping manufacturers on their toes. Plant-based beverages are gaining a significant consumer base, driven most recently by people's increased focus on health and sustainability as well as the fact that there are simply more high-quality products available for people to explore and enjoy.

## What are dairy alternatives anyway?

The dairy-alternatives sector encompasses products that are 100% plant-based, made from beans, nuts, seeds or grains, which replace dairy-based products in the form of beverages, spreads, ice cream, yogurt and other ready-made food products. Once in

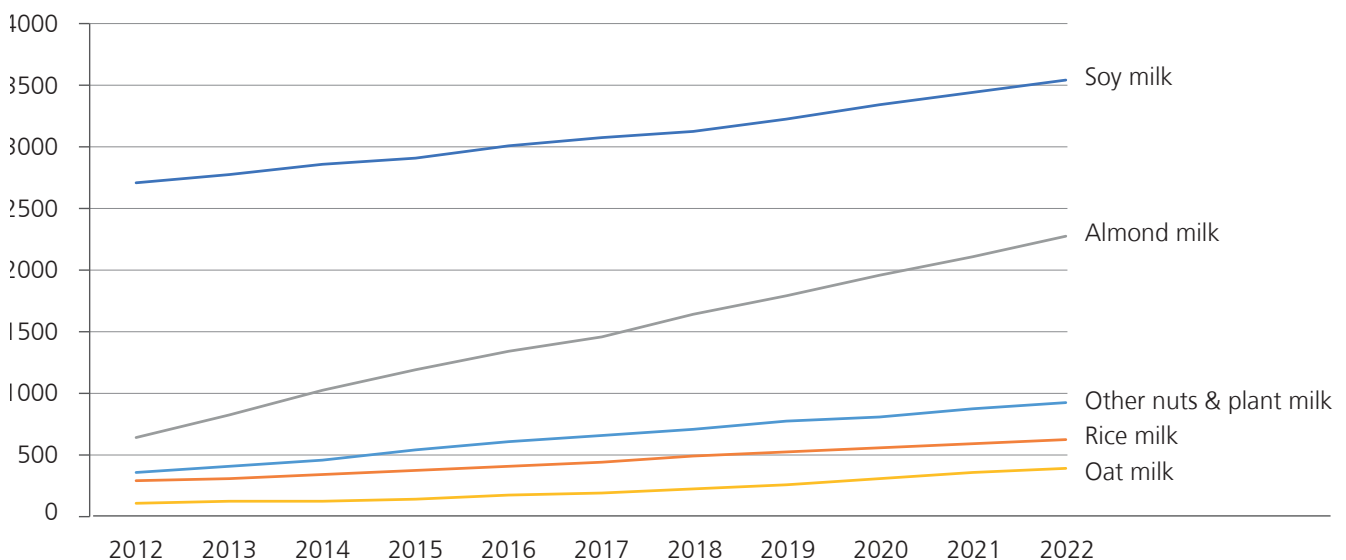
aisles mostly frequented by consumers with lactose intolerances or with a preference for a more plant-based diet, today, plant-based options have become mainstream as more consumers pursue healthier lifestyles, seek to reduce their ecological footprint – or simply discover they really like the taste.

## Global market trends

Over the past years all plant-based beverages show growth. A trend that is expected to continue during the years to come. Producers are also looking for more plant based protein sources such as pea or chickpea to form components for a variety of products across the food and beverage industry.

## PRODUCTION VOLUME (in million liters)

Source: © Zenith Global Ltd 2019



Almond milk



Peanut milk



Oat milk



Soy milk

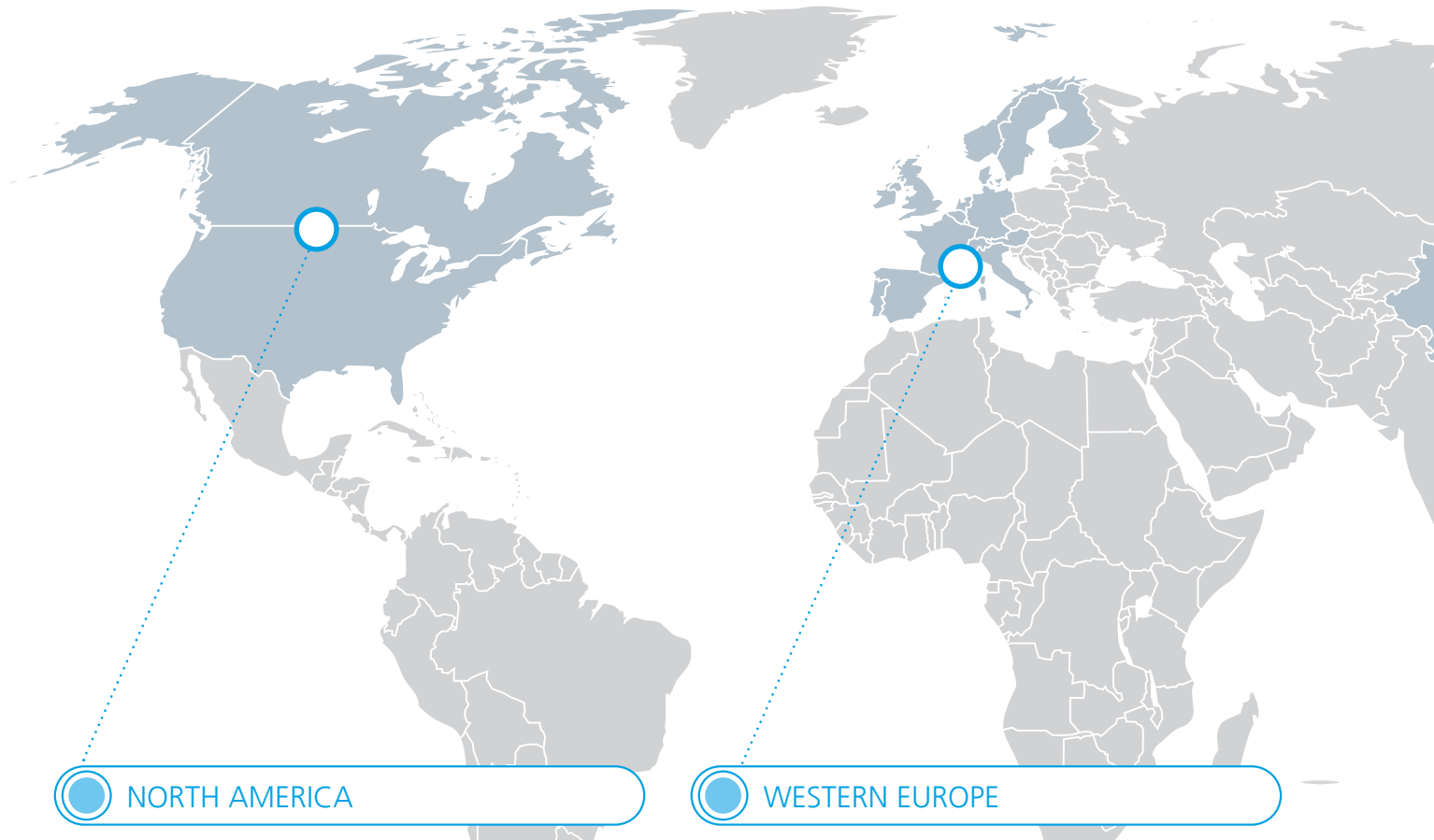


Coconut milk

Rice milk



# Global market trends in plant-based beverages



## NORTH AMERICA

- Consumers are thinking more about sustainable food supply, the environment and animal welfare
- Oat, rice and especially almond milks are among the products growing steadily
- Plant-based yogurts, desserts, ice cream, creamers and cheese are coming more into focus
- Pea identified as a sustainable high protein content raw material to satisfy a variety of product categories with increasing demand

## WESTERN EUROPE

- A surge in demand for vegetarian and vegan options
- High levels of innovation and increasing premiumization in some of the larger markets such as the UK and Germany
- Retail ranges reflect ever more sophisticated consumer tastes
- Oat and rice milks are among the products growing steadily



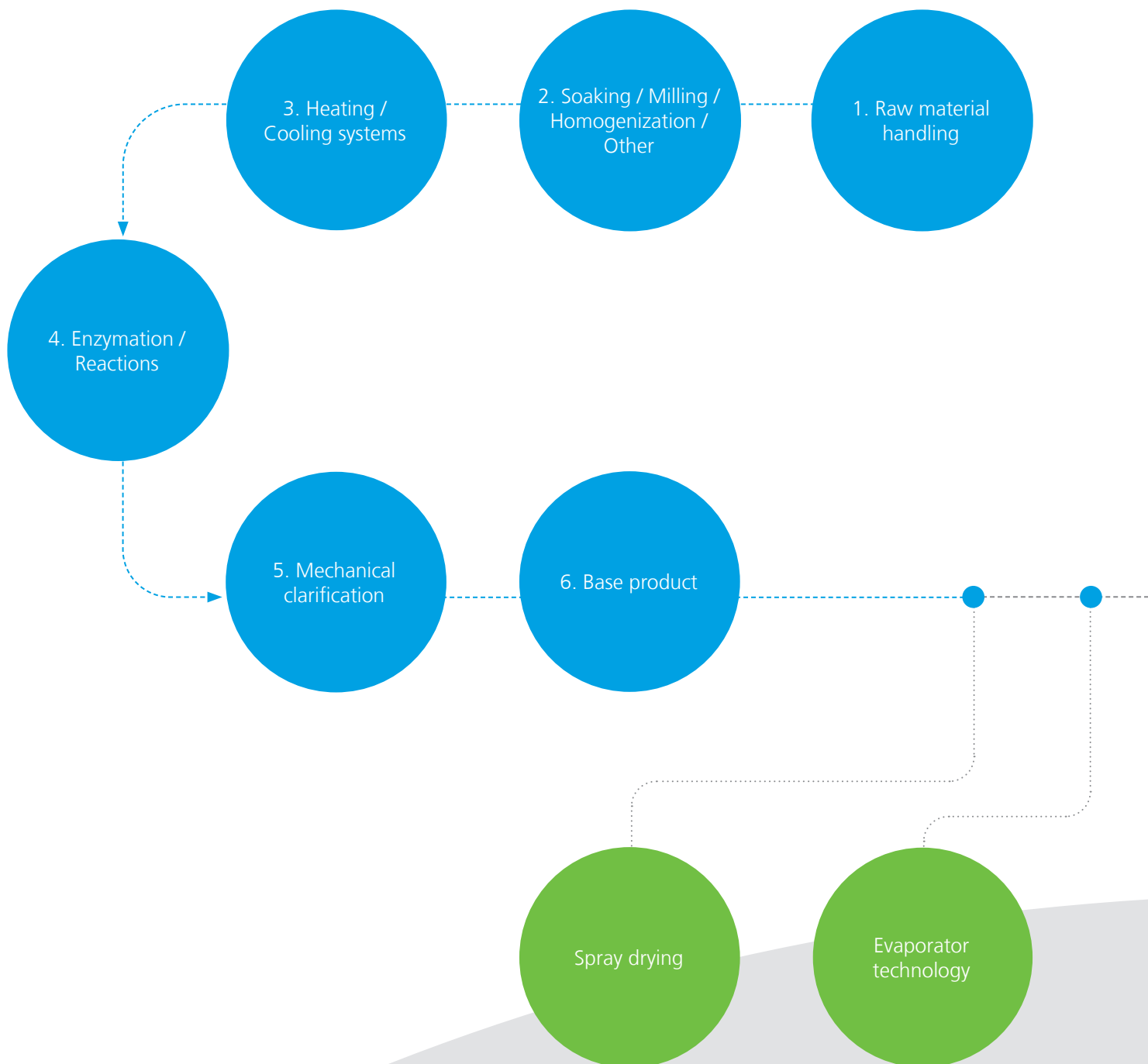
## CHINA

- Due to the growing health concerns and the large lactose-intolerant population in general, there is a shift in preference to alternative dairy products
- With the society urbanized there is more demand for convenience, therefore more packaged products have emerged in the market
- Consumers demand clear ingredients from sustainable sources and also, quality manufacturing processes



# A solution tailored to your needs

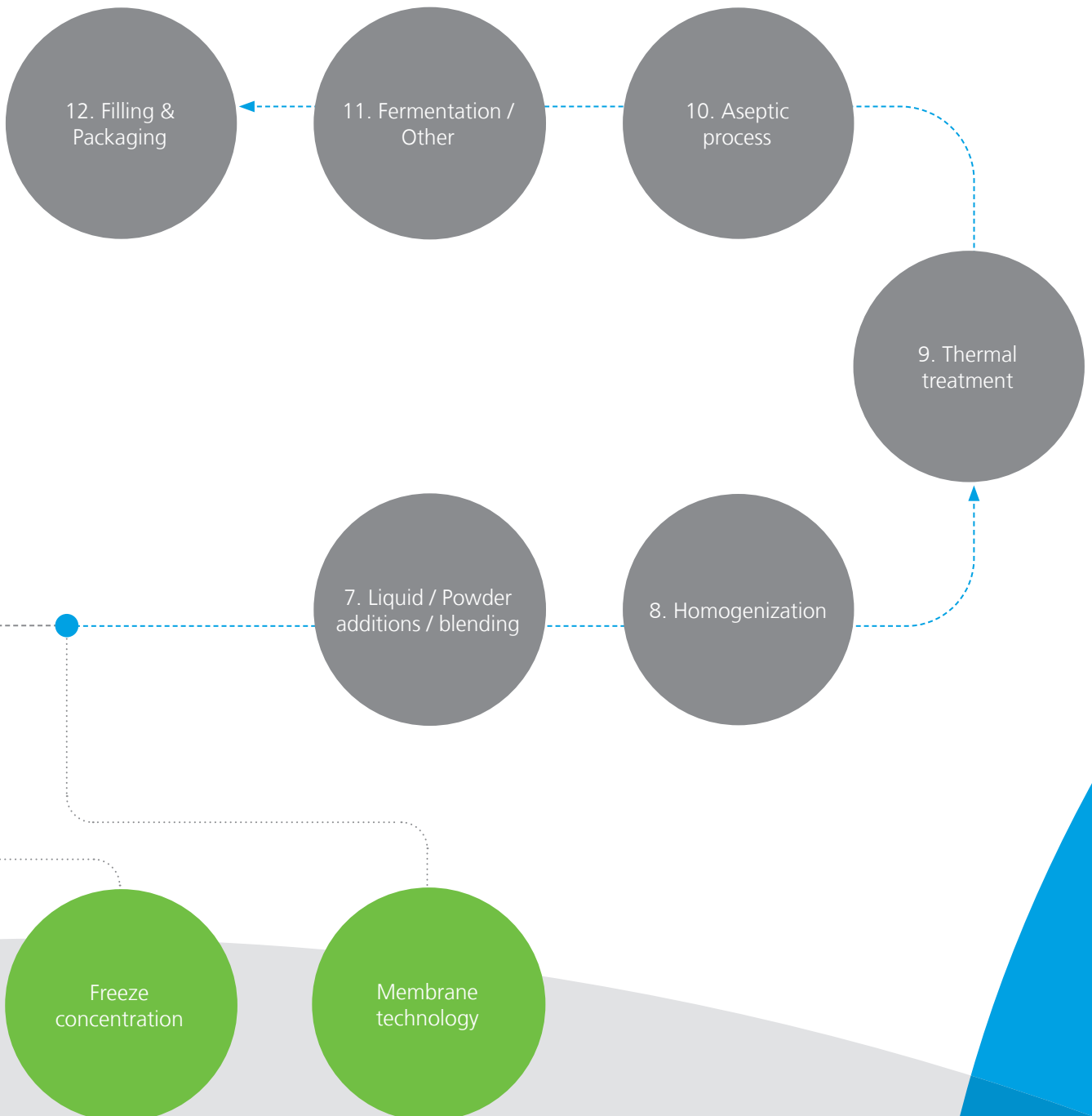
Are you a beverage manufacturer who wants to discover a new market? Or a dairy producer who wants to expand his product range? Or a mature manufacturer of plant-based beverages who wants a partner to develop an innovative product with? Together, we design the solution that is tailored to your needs.



#### Four Pillars

GEA has access to market-leading technology and, possibly, the most comprehensive portfolio of processing knowledge and expertise in the world today. All our solutions for plant-based beverage applications are based on four pillars:

- Maximum flexibility
- The perfect flavor & texture
- Efficiency & sustainability
- Innovation





**Karen (49), Düsseldorf, Germany**

“Last year, our 16-year-old Sarah turned vegan for ideological reasons. She gets her calcium from calcium-fortified soy milk. Her decision was definitely pushed by cooking capabilities. And rightfully so. Nowadays, we have at least one vegan meal per week with the whole family.”





# Build in maximum flexibility

In order to respond to the diverging demands in the marketplace, you need to build in maximum flexibility in every step of the process.

## Handle various raw materials

Soy, rice, oat, almond... You want to minimize your investment while still being able to produce a range of products. We design a process that gives you flexibility and especially considering challenges like allergen control.

## Interchangeable modules

We achieve this by forming the overall process with independent modules for each step of the process. In this way, a single module can be added where necessary to enable the full process

line to be used to produce and fill a new product.

GEA supports the handling of:

- bulk liquids
- bulk powders
- IBCs/drums
- big bags and sacks
- bottles and containers





**Lifang (63), Beijing, China**

"I'm definitely quite picky when it comes to my daily cup of almond milk. I've compared several brands from supermarkets and organic stores to compare taste and texture. My favorite brand has a few extra drops of almond extract and a wonderful creamy, somewhat thickened texture."



# Create the perfect flavor and texture

Do you prefer a creamy or rather milky texture for your almond milk? A beany or non-beany taste for your soy milk? Let's go through the key process steps that allow you to create your perfect flavor and texture.

## Enzymation

Enzymatic adjustment makes it possible to design your flavor. When, for instance, a beany flavor is desired for your soy milk, this flavor can be produced by adjusting the corresponding process parameters in the extraction stage. The same goes for rice milk, oat milk, coconut milk, etc. In this way, you can obtain a wide variety of flavors demanded by markets world-wide.

## Homogenization

High-pressure homogenization is primarily used for stabilizing emulsions and improving palatability. Thanks to fluid dynamic effects, the homogenization process allows liquid particles to be downsized to the micrometer range which results in more uniform and stable emulsions. Particle aggregation can be a challenge, for example, in processing protein-based products. However, homogenization overcomes this by breaking down agglomerates and preventing sedimentation, while maintaining the primary structure of cells and therefore, their nutritional values.

## Thermal treatment

Pasteurization for longer shelf life and better taste: customers rely on our in-depth knowledge and expertise to tailor pasteurization and UHT plants for a diverse range of products. Our high quality portfolio of direct and indirect heat treatment technologies include tubular heat exchangers, direct steam injection and infusion systems. Depending on the particular plant based product and quality desired, the most suitable technology can be selected.

## Gentle processing and aseptic filling

If you want to bring these complex beverages to consumers, high hygienic standards must be in place for processing and filling to ensure gentle handling, avoiding any unnecessary stress on the delicate ingredients. GEA aseptic filling ensures quality products with a long shelf life without the need for preservatives.



**Tom (25), Los Angeles, US**

“Since I graduated from college last year, I’ve adopted a healthier lifestyle. I try to run three times a week. I’ve adapted my eating and drinking accordingly. Since I’ve turned to plant-based beverages I have more energy, a healthier digestion and I’ve lost some weight.”



# Discover the many faces of efficiency and sustainability

Efficiency has many faces. It's about optimizing yield, minimizing costs and measure energy reduction.

## Gentle treatment, higher yield

GEA separators and decanters have been used for decades in process lines for soymilk and for cereal drinks production. Thanks to their high throughput capacities and maximum separating efficiency, they have proved a success in tough daily production conditions. GEA decanters are also available in hygienic design. High throughput capacity and maximum separating efficiency in a reproducible quality – that is what GEA centrifuges and decanters bring to the industry in sophisticated process steps.

## Concentrated products

Concentrated products allow you to massively reduce transportation costs and optimize your supply chain. We offer a number of innovative concentration technologies around which integrated process plants can be developed.

- Our state-of-the-art evaporation technologies meet your needs and expectations with respect to plant capacity, run times, operational excellence, product quality and plant maintenance.
- If heat treatment is not appropriate, GEA's freeze

concentration technology uses low temperatures to process delicately structured liquids. This approach, which enables long run times, produces high-quality concentrates that retain perfect flavor after reconstitution.

- Evaporation, freeze concentration and/or membrane filtration can be offered as part of an integrated solution that can reinforce concentration and provide you with flexibility, choice, and optimum plant capability.
- Our cutting-edge spray drying solutions meet the highest standards of safety, hygiene and plant performance. You will obtain excellent physical characteristics of the powder for optimum product quality. Reduced energy consumption of our spray dryers helps in saving costs and resources.

## Measurable energy efficiency

Our industrial cooling solutions provide the right temperature for each application. Our heat pumps upcycle waste process heat while the use of natural refrigerants ensures both long-term functionality and minimal environmental impact. All of this contributes to reduced operational expenses as well as a lower carbon footprint and, in some cases, zero emissions.

# Make innovation happen in our test center

Innovation is at the core of engineering. So, when a customer wants to bring a new idea to life, we roll out the red carpet.

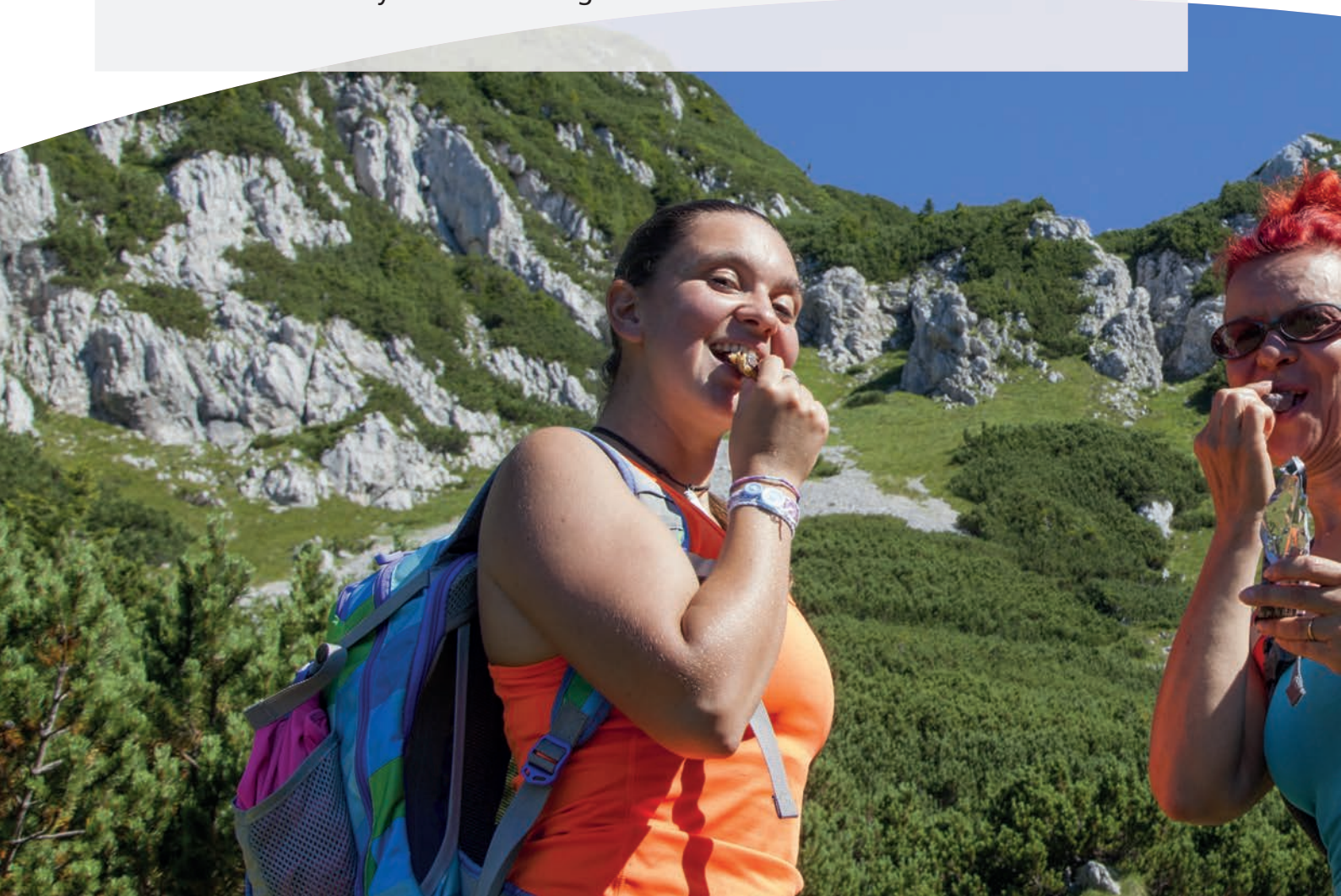
In our laboratory and pilot plant testing facilities you can try out new recipes and formulations, and work on process development and validation. Our experts offer an unparalleled range of equipment and industry-leading know-how for any recipe and every stage of your process. From early-stage product development to final process refinement.

Together, we work out what the most sustainable and hygienic design for your plant can look like. How can we integrate product safety via CIP-ability and reproducible cleaning? How can we build in the flexibility to produce multiple products, yet retain efficiency? And finally, how can we future-proof the solution to manage new and exciting recipes?

Looking forward to meeting you there!

**Freja (30), Stockholm, Sweden**

“I just LOVE granola. I often have it for breakfast or as a quick snack to lift my sugar level while hiking. I also LOVE kombucha! Come to think of it: could you make me a granola bar with kombucha flavor?”



# GEA Service – For your continued success

Working with GEA Service means partnering with a dedicated team of service experts. Our focus is to build, maintain, and improve customer performance throughout the entire life cycle of the plant and its equipment.

- Beginning of Life Services - Getting you started with seamless support for instant productivity and performance
- Lifetime Services - Keeping it running with the cost-efficient way of ensuring safety and reliability
- Extended Life Services - Constantly improving by sharing our knowledge to safeguard your investment
- Consulting & Enhanced Operations - Together with you by enduring commitment to you and your business



## We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA is one of the largest technology suppliers for food processing and a wide range of other industries. The global group specializes in machinery, plants, as well as process technology and components. GEA provides sustainable solutions for sophisticated production processes in diverse end-user markets and offers a comprehensive service portfolio.

The company is listed on the German MDAX (G1A, WKN 660 200), the STOXX® Europe 600 Index and selected MSCI Global Sustainability Indexes.

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