

# Plate Heat Exchangers



## Renewable Energy

Nature's energy source



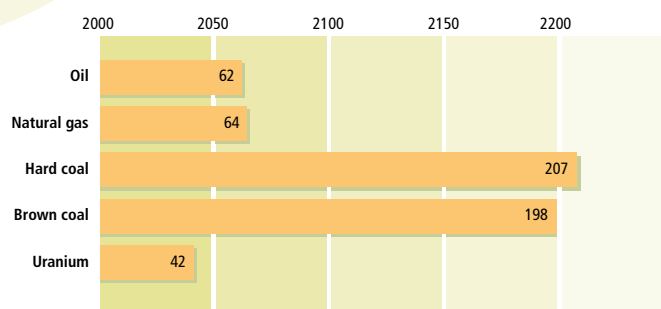
Process Equipment Division  
**GEA PHE Systems**

# The fuel of the future

The increase in energy consumption throughout the world and the limited availability of fossil fuels will soon lead to grave energy shortfalls – if other resources such as renewable raw materials are ignored. For this reason biofuel is gaining in importance as a fuel for future energy supplies: Biofuel possesses qualities in sustainability, eco-balance and as an alternative energy that make it a serious economic factor in the future.

## Biofuel – a fuel with special properties

Biofuel is a regenerative fuel that is obtained from raw materials containing starch and sugar such as cereals, maize, sugar cane and sugar beet, tapioca or from oil-containing plants like rapeseed, soya bean and oil palms. This makes it an alternative to fossil fuels such as crude oil or natural gas. Biofuel production also has a number of valuable by-products that considerably increase its economic viability.



Availability of resources – technically and economically exploitable at today's level

## Concentrating on competence – for your benefit

Within the GEA Process Equipment Division of the international GEA Group, GEA PHE Systems is responsible for plate heat exchanger technology. Strong individual companies: GEA Ecoflex, GEA ViEX, GEA WTT, GEA Ecobrazex and GEA PHE Systems NA with production locations in Germany, Sweden, the USA, Canada and India produce gasketed, fully welded and brazed plate heat exchangers for worldwide distribution for use in almost all industrial applications.

GEA EcoServe – the GEA PHE Systems service organisation – operates customer service centres in many countries to provide a rapid and competent maintenance and spare parts service, all around the world.

# GEA PHE Systems: Your partner for optimized biofuel processes

Plate heat exchangers from GEA PHE Systems have proved their worth in all biofuel production processes: Their quality and the unsurpassed long operating times ensure that the correct temperature is adhered to throughout every production step and that maintenance intervals can be considerably extended.

In comparison with shell and tube or spiral heat exchangers, GEA PHE Systems plate heat exchangers provide higher thermal performance and unsurpassed flexibility to changing process requirements and capacities. The large range of available plate sizes and shapes can meet all demands.

## To an exact degree

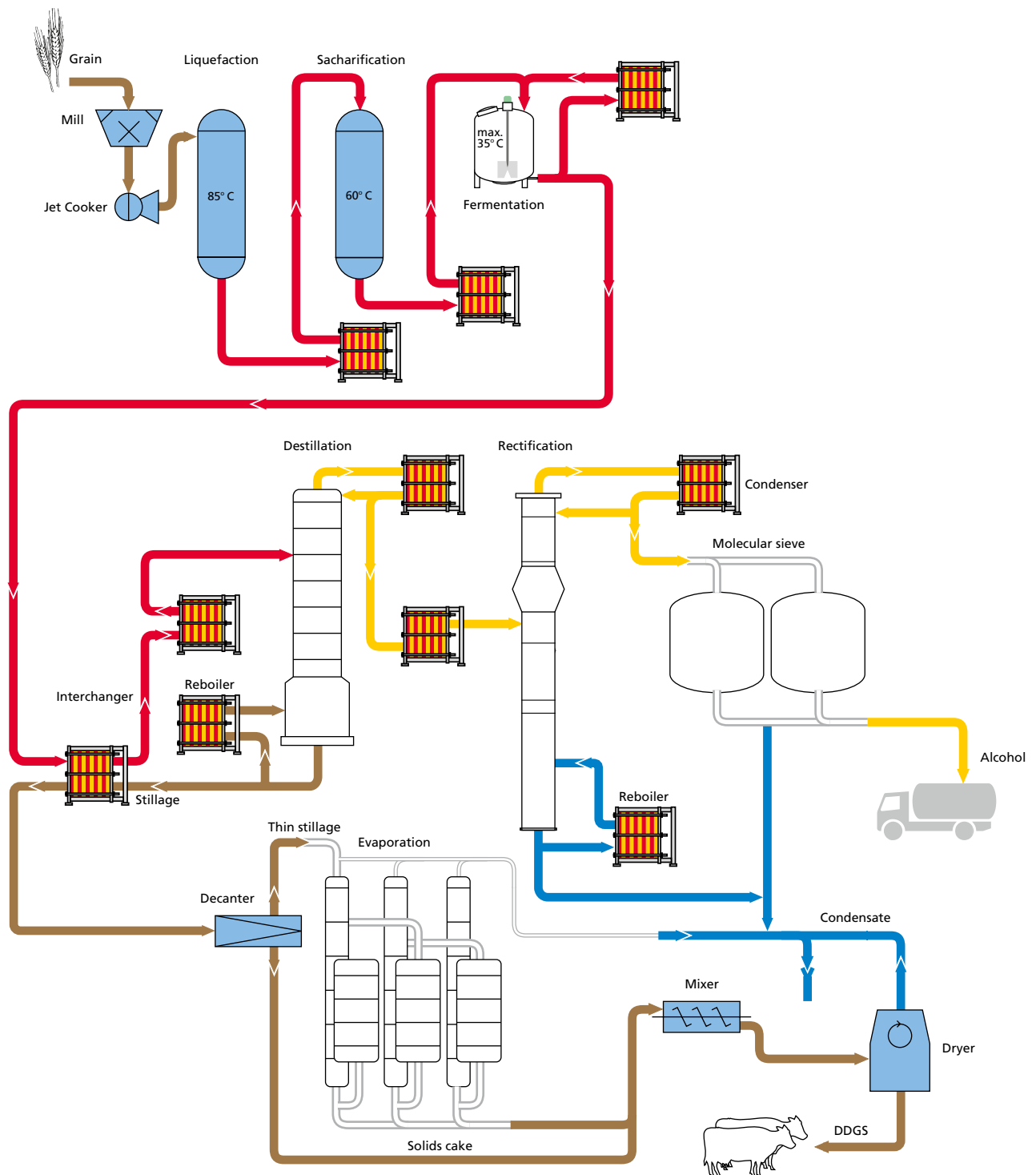
The manufacturing process for biofuel is complex, but quality and volume can be specifically increased using optimised temperature management. Plate heat exchangers from GEA PHE Systems help to keep the manufacturing process at precise temperatures and ensure a troublefree process.



# Bioethanol production

GEA PHE Systems plate heat exchangers with their specific temperature management create optimum conditions for the use of the enzymes and enable effective starch digestion. Plate heat exchangers are also used in fermentation where yeasts are used to convert the sugar in the mash into alcohol. Energy is released in this reaction that would otherwise cause the temperature in the mash to increase. If the temperature increases too severely, the effectiveness of the yeasts is impaired, so even coarse-grained mash is fed

## Production from cereals and maize





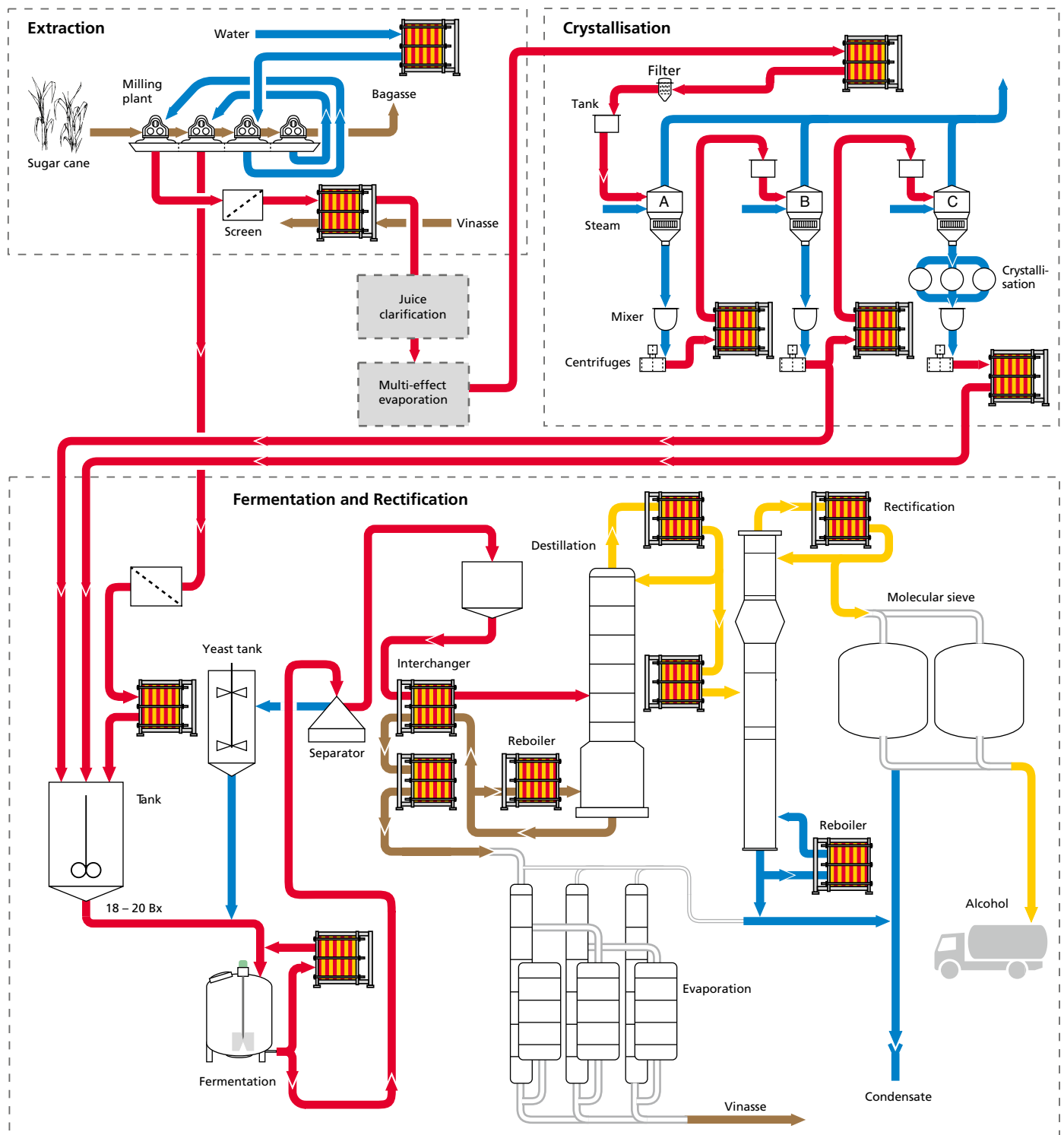


Fermenter

Fermenter cooler

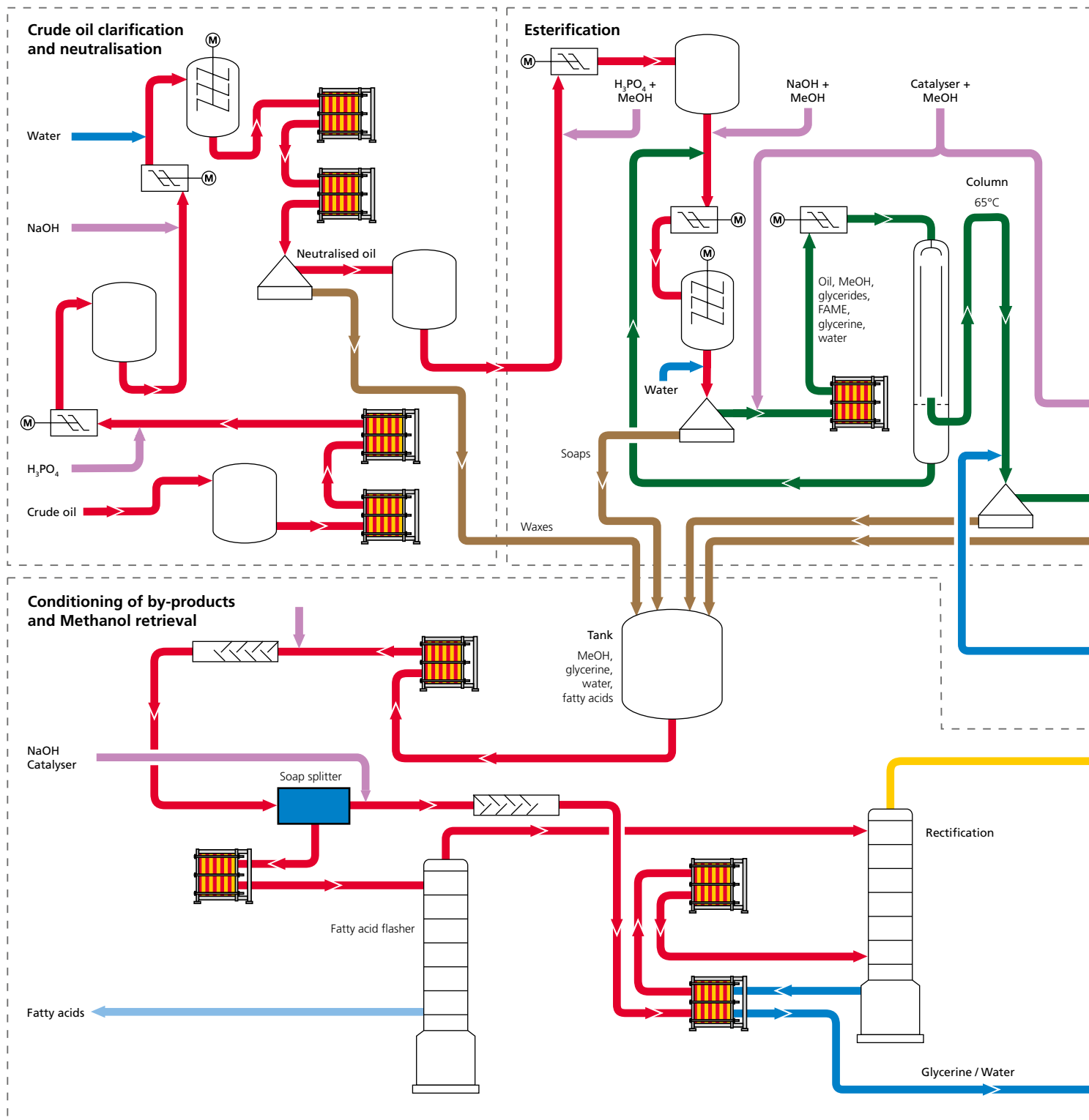
through special plate heat exchangers that are used as fermentation coolers. In the downstream distillation section the alcohol is separated off from the mash and our plate heat exchangers are used to condense the ethanol vapours, to cool the liquid ethanol and for the further treatment of the residual vinasse.

## Production from sugar

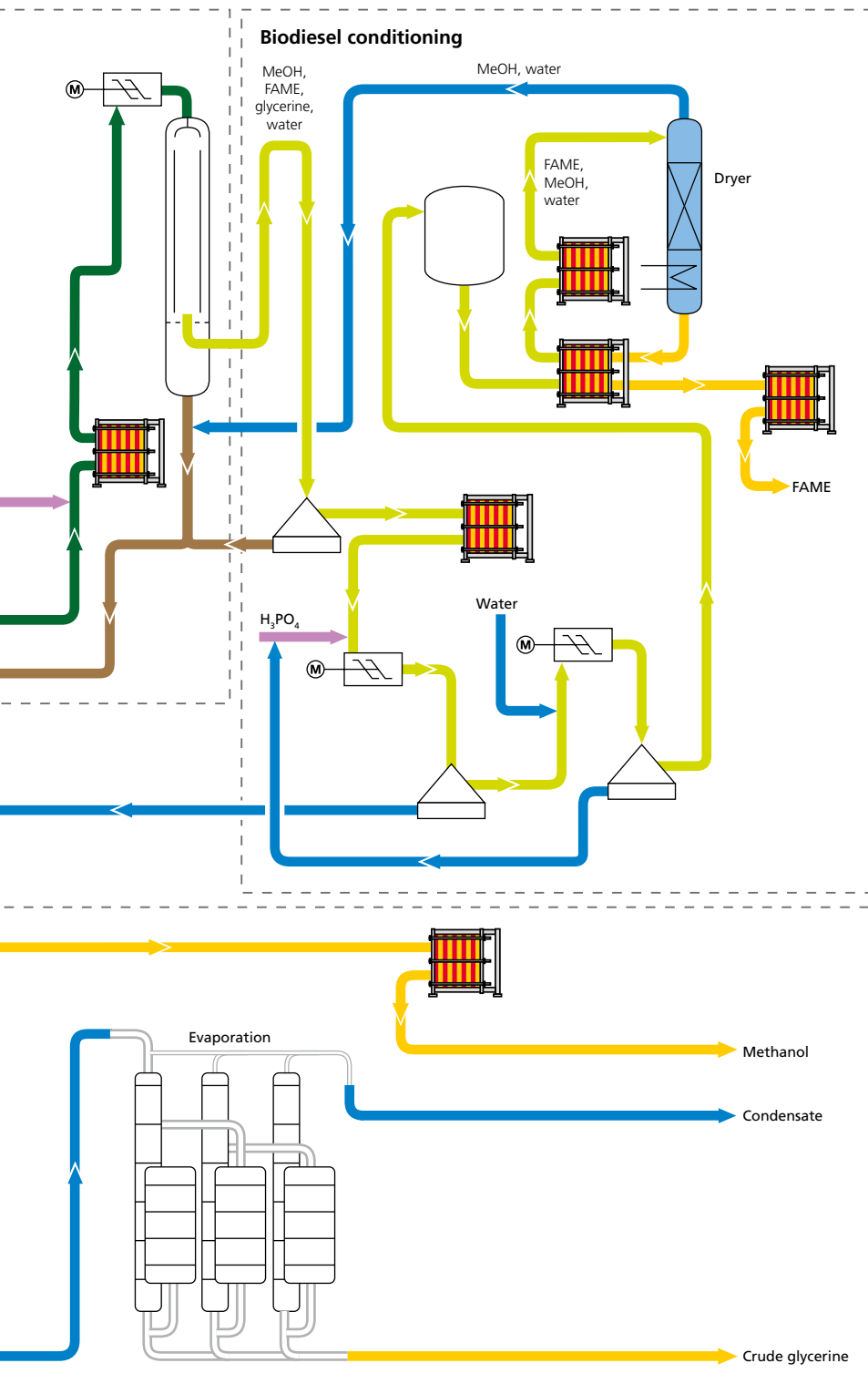


# Biodiesel production

In a preparatory stage for biodiesel production crude plant oils or animal fats are chemically cleaned and neutralised for the esterification under specific conditions using alkaline solutions and/or acids. After pretreatment the neutralised oil is esterified using methanol and catalysts in a mostly multistage process. The reaction results in a number of products that are separated using thermal and mechanical separation processes. The efficiency



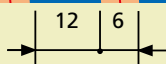
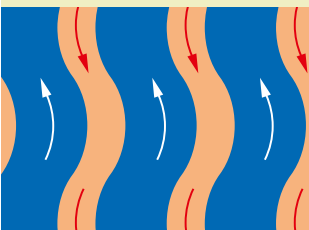
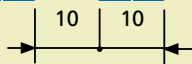
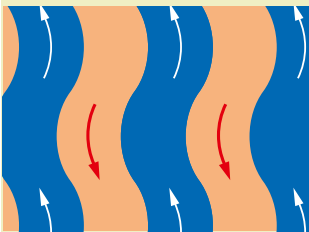
of the product yield in all process stages is highly dependent on temperature. The optimum temperature management in GEA PHE Systems plate heat exchangers always results in high yields and maximum heat recovery. The comprehensive product range of plate and gasket materials together with fully welded solutions enable using these apparatus in all process stages of the biodiesel production process.



# Let it flow: with plate heat exchangers from GEA PHE Systems

The suitable unit for every stage of the process – with our gasketed EcoFlex, fully welded EcoWeld and brazed EcoBraz plate heat exchangers. The range stands for the highest quality and economic efficiency. Every unit is made of high-quality steel grades and gasket materials, has a flow-optimised channel geometry to guarantee high heat transfer rates and ensure troublefree operation. Strict quality assurance measures guarantee reliable operation and a long service life. The compact design, low volume and weight simplify installation and subsequent maintenance.

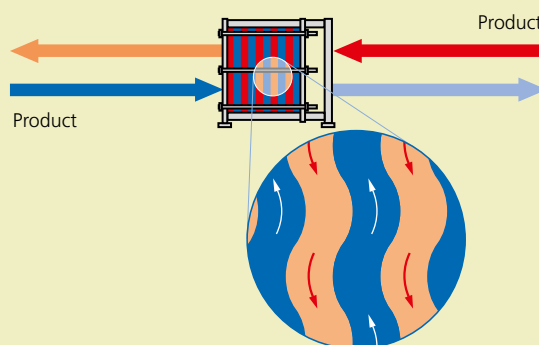
## EcoFlex – gasketed plate heat exchangers



### Free Flow – free flow for all media

Wherever conventional plate heat exchangers meet their limitations is where the field of application for our unique Free Flow plate heat exchangers begins. The special feature is the constant width of the flow gap between the individual plates as well as the coarse corrugation of the plates.

- blockage-free operation thanks to constant-width gaps
- THE alternative to shell-and-tube and spiral heat exchangers thanks to:
  - higher heat transfer rates
  - lower investment and operating costs
  - reduced space requirements
- suitable for media loaded with fibres and solids
- flow channels from 5 to 12 mm (also on both sides)

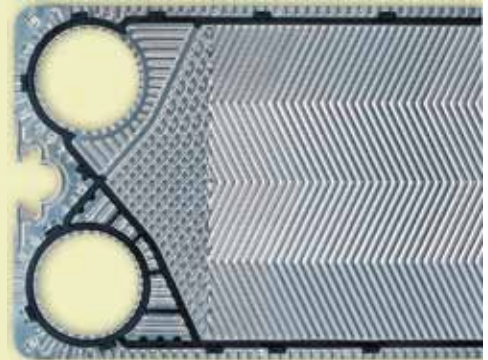




### NT Series – the new generation

The NT Series sets new economic standards with low investment, operation and maintenance costs. The optimised OptiWave plate design requires less heat transfer surface for the same performance. The innovative glueless EcoLoc gaskets guarantee fast and uncomplicated gasket replacement.

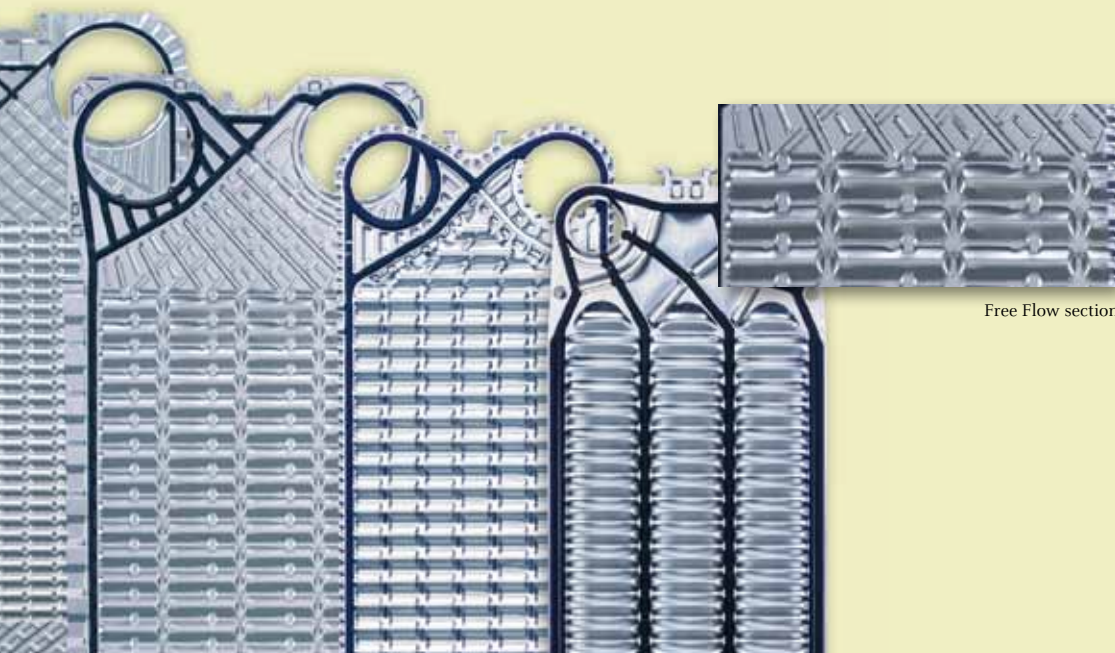
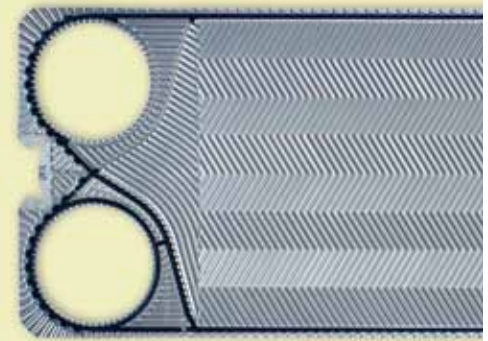
- designed for maximum performance and economic efficiency
- maximum performance values thanks to variable lengths and profiles
- especially weight-saving compact design, easy-maintenance
- innovative flow geometry, installation and gasket engineering



### Varitherm – the tried-and-tested adaptation specialist

The Varitherm plates are combined to form an individual plate pack. This design allows the system to be easily expanded. Within the plate pack the heat exchanger plates metalically support each other reciprocally at the profile intersections to guarantee the stable behaviour of the plate gaps.

- extremely variable in performance, geometry and material selection
- heat exchanger areas from 0.1 to 2,000 m<sup>2</sup> per unit
- throughput of up to 3,600 m<sup>3</sup>/h per unit
- up to six different plate profiles in each size
- max. pressure of up to 25 bars, max. temperature 180°C



Free Flow section

# EcoWeld – fully welded plate heat exchangers

We offer individually configured fully welded plate heat exchangers of various types that can be used wherever critical media or extreme operating temperatures and pressures place particularly high demands.

## **GEABloc – standard yet customized to your needs**

GEABloc is a fully welded frame-mounted plate heat exchanger in which two different types of plate may be used. Each plate is positioned at 90° to the adjacent one and welded, the channels formed differing depending on the plate profile.

- temperatures of up to 315°C
- operating pressure of up to 32 bars
- plate pack can be accessed from both media sides

## **GEAShell – extremely reliable**

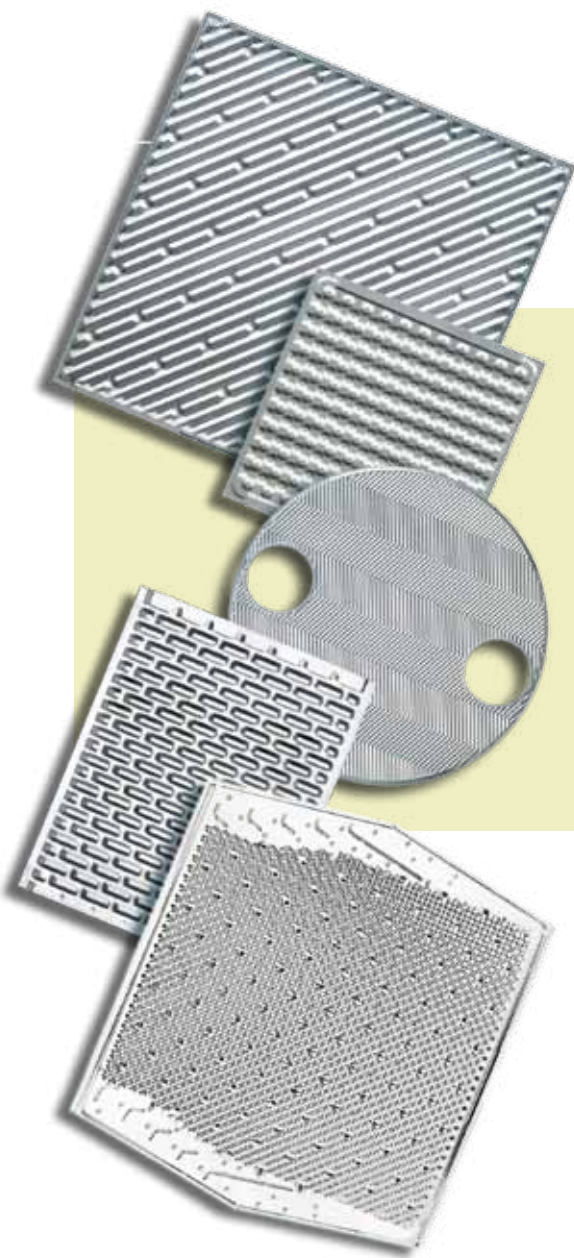
GEAShell is a fully welded plate heat exchanger which satisfies very exacting requirements in relation to process reliability. The heat exchanger plates designed for individual solutions are welded into a pack and mounted in the fully welded pressure vessel. This design principle ensures that the exchanger is both highly resistant to pressure and temperature and also leak-tight.

- temperature range from -200°C to +950°C
- operating pressure of up to 100 bars

## **GEAFlex – solves many problems**

The GEAFlex is manufactured to customer requirements. The fully welded plate heat exchanger makes installations with a heating surface of up to 8,000 m<sup>2</sup> possible. Its asymmetric plate design and special tube and corrugation pattern make the GEAFlex a popular choice for handling two-phase flows. The ideal applications for the GEAFlex are in condensation and evaporation and for handling markedly different primary and secondary volumetric flow rates.

- preferred in the treatment of two-phase product flows
- temperature range from -200°C to +900°C
- operating pressure of up to 60 bars
- plate pack can be accessed from one media side





# EcoBrazе – brazed plate heat exchangers

Our brazed plate heat exchangers in the EcoBrazе product group are made of stainless steel for normal and aggressive media, brazed with copper or nickel, and are extremely resistant to pressure and temperature, thanks to our decades of experience. Comprehensive quality assurance checks ensure the highest operational reliability. The compact design, the low weight and the individual connection variants with numerous switching possibilities make both installation and operation especially simple.

- compact, small unit size, low weight
- temperature range from  $-160^{\circ}\text{C}$  to  $+200^{\circ}\text{C}$
- operating pressure of up to 45 bars



## GEA EcoServe: for a long life

GEA EcoServe – the service organisation of GEA PHE Systems – offers you an extensive international service network. Whether you use products by GEA PHE Systems or by another manufacturer – at GEA EcoServe you receive complete service from a single source, whenever and wherever you need us. For maintenance and repair we use high-quality spare parts exclusively for all makes. This guarantees reliable seating, optimum function and a long service life.

## GEA PHE Systems Competence in Heat Transfer

With emphasis on the highest quality standards and constant innovations, GEA PHE Systems continues to expand its market position: Within the GEA Process Equipment Division, GEA Ecoflex together with GEA ViEX, GEA WTT, GEA Ecobrazo, GEA PHE Systems NA and GEA EcoServe forms GEA PHE Systems, the Center of Competence and Service Center for gasketed, fully welded and brazed plate heat exchangers of GEA Group:



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