Oils and fats
Sustainable growth

Turning Ideas into Reality.
MAN Ferrostaal
Insight
Huge potentials

Vegetable oil and biodiesel are now more sought after than ever before. They form the basis for food, energy in combined heat and power plants and fuel for the transport sector. Demand is growing at a tremendous pace and will keep doing so, matching the world’s rapid population growth and the rising living standards across wide sections of the population in emerging markets.

Great potential lies within the market for industrial agriculture and producers. At the same time, the raw material basis for the manufacture of vegetable oil is very varied. The vital ingredient, however, is assembling the best partners for a project.

MAN Ferrostaal integrates all the relevant market players into one project and assumes responsibility for its long-term economic success. That is what we stand for with our Best Partner principle. With our partners, we rely on a collaboration of trust. The technology that we choose is the best for the project concerned, and for the financing we find individual solutions. We develop projects designed for the future and, as general contractor, ensure smooth plant construction and operation.
The demand for vegetable oils continues unabated. Driven by the increasing consumption of high-quality edible oils for everyday food and the growing demand for alternative fuels in the transport sector, the market is developing its own momentum.

According to forecasts from the Food and Agricultural Policy Research Institute, global production of vegetable oil from the four most important oil seeds will have increased to around 142 million tonnes by 2015. The trend is constantly growing because demand is rising out of proportion to the world population. The main force driving this demand is the enormous population growth and the rising living standards of wide sections of the population, particularly in emerging and developing markets. At the same time, the consumption of animal products is increasing there. This, in turn, has a positive effect on the demand for high-protein animal feed – a by-product of edible oil production.
In addition to the huge demand for high-quality oils for human consumption, the further processing of these oils into biodiesel fuel for the transport sector plays a significant role. Exploding prices for crude oil and mandatory blending quotas in over 40 countries around the world will continue to drive this development in the future. According to forecasts, the worldwide production of biodiesel is likely to rise to 15 million tonnes by 2015. After all, fuel from renewable raw materials promises two benefits: energy security and a reduction of CO₂ emissions, which are known to be a major cause of global warming.

New quality standards, such as energy awareness and more exacting environmental requirements, also play an increasingly important role in the production of vegetable oils – a development which will require the construction of many new industrial plants.

As an experienced plant constructor, MAN Ferrostaal has established itself in the edible oil and biodiesel sectors. We have constructed over 100 edible oil plants around the world. The range of services we provide varies from project development to project financing and management, extending to our expertise as general contractor.

Our plants combine a high level of environmental compatibility with low energy consumption – criteria which are becoming increasingly important in times of diminishing resources.
Agricultural sector and producers
Opportunity

The global development of supply and demand for oilseed provides excellent opportunities for a rapid growth of raw material cultivation and production. Driven by population growth, the rising demand from emerging markets and the requirement for fuel for transport, world production of vegetable oil, biodiesel and vegetable fats will rise continuously in the decade to come.

Worldwide the markets are growing. In future, several million more tonnes of vegetable oil and fats will have to be produced every year to cover this vast demand. As raw materials for oil mills, soya and rape will take the largest market share, followed by sunflowers. For production, new plants will be built and existing plants upgraded. MAN Ferrostaal offers concrete solutions for success for both new and experienced producers, the agricultural industry and interested investors. What is more, we combine project development with the services typical of an experienced plant constructor and the financial strength of a large industrial concern.

Focus on edible oil
For over 35 years, as general contractor, we have been building vegetable oil plants with capacities from 600 tonnes of oilseed per day up to large-scale plants. Worldwide, we have completed over one hundred such plants to date. These plants are spread throughout 30 countries, including Russia, Brazil, Peru and Thailand. This has made us into a world-renowned engineering specialist for vegetable oil plants. In addition to the planning and financing, we also undertake the construction and commissioning of the plants.
As project developer and general contractor, in addition to the planning and financing, we also undertake the construction and commissioning of plants.

**Focus on biodiesel**

In the biodiesel sector, we concentrate on plants with capacities of between 100,000 and 200,000 tonnes per year. We frequently design these as multi-feedstock plants, so that they can react flexibly to the existing raw material basis and to the fuel market. We have completed a turnkey biodiesel plant in Poland for the customer Lotos Biopaliwa. The total investment volume was 25 million euros. At present, we are constructing a further biodiesel plant for the customer J&S Bio Energy B.V. in Amsterdam, Netherlands.
Edible oils are in demand – the rising standard of living in many countries of the world and the resulting strong demand for high-quality vegetable oils is driving the edible oil market on at a rapid pace. At 115.5 million tonnes of oil, production reached a new record level in 2008.

Edible oil is a collective term for a whole range of different oils used unprocessed or as a constituent in countless foods. A variety of raw materials therefore come into consideration for its manufacture. Most frequently used for further processing into vegetable oil are the oily seeds of sunflowers, canola/rape, soya and the oil palm. Together with our project partners, we select the right raw materials for successful projects according to the region. Apart from the oil, the meal that remains after production of the oil is also a sought-after product. This is used as a high-protein feed in livestock farming. The so-called isolates contained in the meal can also be used as a food additive for human nutrition. As a result of increasing affluence, particularly in the emerging and developing countries, and the associated growth in the consumption of meat, the demand for high-quality feeds will rise sharply in the future.

MAN Ferrostaal offers its customers in the edible oil segment intelligent project development right from the initial idea, in which every detail is thought out in advance for the production of edible oil. What is more, we combine project development with the services typical of an experienced plant constructor and the financial strength of a large industrial concern. This means we are in a position to cover the process all the way along the value added chain, from the raw material to the raw oil through to the refined end product – regardless of whether the oil is for human consumption or for technical use.

World production of edible oils has more than doubled since the '60s. In addition to rape, soya and oil palm, sunflowers are an important supply source for production of the valuable oil.

The largest areas of soya cultivation worldwide are in North and South America. This plant is an important raw material for the production of vegetable oil and biodiesel.

Most frequently processed to vegetable oil are the oily seeds of soya and the oil palm.
Biodiesel represents an alternative to diesel fuel from fossil energy sources with one essential advantage: in contrast to its fossil counterpart, it will not run out but instead continue to grow in fields and plantations.

Rape, soya beans, the fruit of the oil palm and even old edible fats are all ideally suited for biodiesel production. The manufacturing process here differs only slightly from that of an oil destined for food use. Together with its partners, MAN Ferrostaal has recourse to its own technology for the manufacture of biodiesel, with a worldwide licence for the Conнемann process. This very economical technology makes it possible to produce biodiesel of a quality above the European standard. Here too, however, our Best Partner principle governs our business. We explore the market for the best solutions – independent of suppliers and technology providers.

In the production of biodiesel, we undertake to maintain the high standards of sustainability. This includes certified environmental compatibility of land use, a verifiable saving of greenhouse emissions and coexistence with food production. We therefore concentrate on countries with sufficient area available to permit the production of biodiesel in addition to a secure food supply – Latin America, South East Asia and Eastern Europe.

Vegetable oils are also suitable for use as an energy source in combined heat and power plants. In this way, power and heat can be generated using vegetable oils with no harmful impact on the environment. A possibility which, against the backdrop of rising energy costs and continuing climate change, will become increasingly important – since every gram of greenhouse gas not emitted into the earth’s atmosphere helps to protect our environment.
Whether as ingredients in mayonnaise, as an energy source in combined heat and power plants or as a fuel for transport, vegetable oils serve as an important primary material for countless products. Regardless of the raw material and the end product, MAN Ferrostaal, as project developer and general contractor in the vegetable oil segment, organises the planning and financing, construction and commissioning of plants.

A wide range of application

Edible oil can be manufactured in different ways. In the case of soft seeds such as those from the sunflower, the oil is pressed from the oily seeds after treatment. A raw oil is produced. In this case, however, since about eight percent of the oil is left in the press cake, another process is often used: By means of so-called solvent extraction, the raw oil is separated from the press cake after the treatment and pre-pressing of the seed. The oil yield can be increased in this way. The process varies slightly according to the raw material. In the case of soya, for example, the pressing can be completely dispensed with. The oil is extracted by means of solvents directly after the preparatory treatment of the raw material.

Raw oils often contain substances that have a negative effect on the flavour, odour and keeping qualities of the oil. For this reason, practically all edible oils are nowadays refined. But refining is also important for the production of technical oil – the higher the purity of an oil, the less emissions are released when it is burnt.
Edible oil
Edible oil is vital for human nutrition. It can be consumed without processing, but it is also used as a constituent in food. By means of special hardening processes, vegetable oil can be made into margarine. The meal left over from the production is used in agriculture as a high-grade feed.

Biodiesel
For the production of biodiesel, a so-called transesterification process modifies the structure of the edible oil. This produces biodiesel and glycerine. Thanks to its outstanding combustion properties, biodiesel has already established itself in the market. The by-product glycerine is an important primary material for the manufacture of cosmetics and plastics.

Oil for combined heat and power plants
Edible oil is also used as an energy source in combined heat and power plants. These are appreciably more efficient and more economical in consumption than conventional power plants, using up to 90 percent of the primary energy that is largely lost in conventional plants. Against the backdrop of rising energy costs, the importance of combined heat and power plants will increase in the future.

Fatty acids and fatty alcohols
The chemical industry already uses edible oil as a primary material for the manufacture of a large number of products. Plastics, detergents, lubricants, cosmetics and printing inks all consist, in part, of fatty acids or fatty alcohols. These fatty acids or fatty alcohols can be produced by means of so-called splitting, in which the refined oil is broken down into its individual constituents. These are mainly used as raw materials for tensides, from which detergents and cleaning agents, cosmetic and pharmaceutical products are manufactured.
Sunflower seed → Reception → Weighing bridge → Railway unloading → Pre-cleaning

Weighing bridge → Truck unloading

Daily bin → Weighing → Cleaning

Crushing → Dehulling

Oil screening → Oil drying → Oil filtration

Decanter

Extractor → Desolventizer/toaster → Meal drier → Meal cooler

Distillation → Water degumming

Absorption → Waste air scrubber

Hexane condensation → Hexane recovery → Hexane storage

Setting pit

Waste air

Waste water
MAN Ferrostaal
Comprehensive expertise – worldwide

Our decades of experience as a general contractor for the construction of large industrial plants all around the world mark out MAN Ferrostaal as ideally suited to develop and build plants for the production of edible oil and biodiesel. Our services cover the entire process, from planning to financing to turnkey handover.

Development and financing
Our services start at an early stage – with the business idea. We put the project on a solid basis with feasibility studies, market analyses, a business plan and the search for strategic investors. In the contract phase we do the preliminary work and devise strategies for the central questions. We have technology providers and engineering partners to assist us. In the financing phase we develop a bespoke, efficient and transparent financing strategy. In selected cases we also get involved financially.

Project management
MAN Ferrostaal generally takes on overall responsibility for a project, frequently as the general contractor controlling the engineering, purchasing and construction of the plant right through to commissioning. Risk management plays a central role here. Our project and quality management is certified in accordance with international standards. A partner-like relationship with customers, suppliers and financial partners which is based on transparency and trust is essential here.

Coordinating the partners
In some projects we bring together more than 100 partners. Our global sourcing is an important success factor here. We cooperate with the world’s best suppliers of material and services, thereby guaranteeing the best possible cost and quality management. Our staff in over 60 countries systematically monitor the regional markets and thus support our global sourcing activities. Precise knowledge of the creditworthiness and quality of the local providers ensures a solid basis for selecting the suppliers. As the general contractor we coordinate the work of all these partners, thus ensuring the high quality of the resulting products and services.

Integration of complex systems
Plants for the production of edible oil and biodiesel are technically complex products. As a service provider acting in partnership, we reduce this complexity for our partners. The partnership does not end with the handover of the turnkey plant – we also take on responsibility for maintenance and service.
Crucial for the success of edible oil production is assembling the best partners for a project. MAN Ferrostaal practises this Best Partner principle. We develop financially viable projects for long-term profitability.

**Our services at a glance:**

- MAN Ferrostaal, as an experienced and dependable partner, undertakes project development on behalf of the customer. We provide this service for an all-inclusive charge.

- MAN Ferrostaal participates in the capitalisation of selected projects on terms individually agreed with the customer.

- MAN Ferrostaal carries out the engineering, procurement and construction for a large number of different types of plants. As a successful general contractor, we undertake the construction of turnkey plants with reliable partners.

MAN Ferrostaal offers its partners an attractive business approach.

### Approach

- Project development

### Risks

- Fair risk distribution among all partners
- Realistic budgets and plans
- Professional joint risk management

### Model

- Best Partner
For vegetable oil projects, we integrate all the relevant market players into one project company. We offer our customers intelligent project development, in which every detail for the production of edible oil and biodiesel is thought out in advance. We know all the technologies that can be considered, but we can act independently in making our selection. This is another reason why we can develop individual concepts that meet the special requirements of our partners.
MAN Ferrostaal – Turning Ideas into Reality.

We know all the regions that are suitable for the economically attractive production of oils and fats. We have been at home there for decades. We contribute our market proximity, our experience and our international connections to ensure the success of our projects.

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