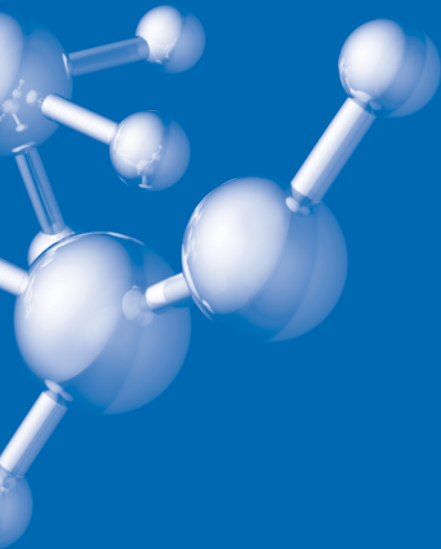




Bioethanol





Partnership for Producers and Investors

An urgent ethanol opportunity

With fuel demand and prices at record levels now is the time for investing in the production of ethanol and its related coproducts. For example, under the 'Renewable Fuels Standard' (RFS) which was signed into law in the USA in 2005, a percentage of the nation's fuel supply will be provided by renewable fuels including ethanol and biodiesel. The RFS started at 12 million tons (4 billion gallons) in 2006 and increases to 22.5 million tons (7.5 billion gallons) in 2012.*) The EU Directive targets to substitute 5.75% of motor fuel in the EU by 2010. This requires approx. 12 million tons per year of ethanol.

The right experience at the right time

Our specialized ethanol expertise has been used to plan and build plants from 50,000 to 300,000 t/a, and to expand and optimize existing production facilities. We also specialize in the design and construction of plants associated with ethanol co-products and processes including protein extraction, distillers grains or biogas.

Energy Efficiency

Our Bioethanol technology is oriented towards a minimum consumption of utilities, in particular of energy and water. Substantial energy savings will be achieved through energetic coupling, leading to an optimized utilization of heat. Also, the hydrologic cycle is oriented towards an optimum degree of efficiency. Up to 70–80% of the total process water demand can be recirculated into the plant.

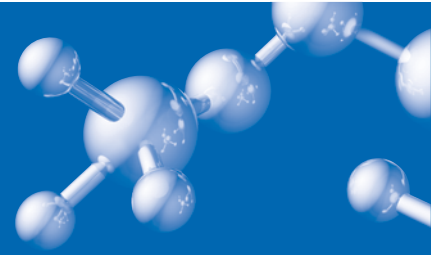
Key figures 100,000 t/a Bioethanol Plant

Production		
Ethanol 99.6%	12.5 t/h	100,000 t/a
DDGS	13.7 t/h	110,000 t/a
Consumption		
Wheat	40.5-45 t/h	max. 360,000 t/a
Steam	35-42 t/h	280,000 t/a
Electricity	3.6 MW	28,800 MWh/a
Light Heating Oil	1.7 t/h	13,600 t/a
Fresh Water	15 m ³ /h	120,000 m ³ /a
Effluents		
Waste Water	15 m ³ /h	120,000 m ³ /a
CO ₂		max. 105,000 t/a

*) Renewable Fuels Association



Adkins Energy LLC, 2002



Specialized Ethanol Expertise

Lurgi as a technology oriented international engineering contractor offers its clients a comprehensive service portfolio including:

- Feasibility studies
- Project development
- Financial engineering
- Product marketing
- Conceptual design
- Front end engineering
- Basic engineering
- Detail engineering
- Equipment supply
- General contracting
- Construction supervision
- Commissioning and start-up
- Lump-sum turn-key project implementation

Lurgi supports investors with tailor-made financing concepts. Amongst others Lurgi develops project finance schemes with favorable feedstock supply and product off-take arrangements in cooperation with reliable trading partners and reputable banks worldwide.

Lurgi's profound technology expertise and engineering experience in the field of renewable resources warrant energetically optimized and environmentally friendly technology schemes. Lurgi plants qualify by low life-cycle cost and high safety and availability standards which result in a long-term profitable operation of the plants.

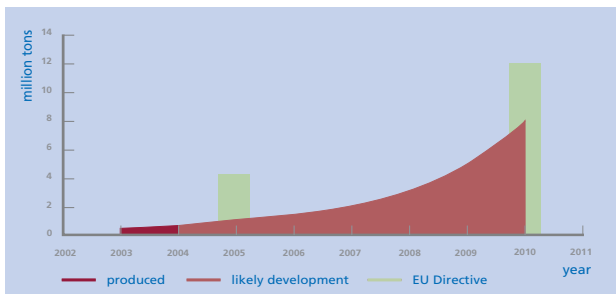
Standardized design and execution concepts allow fast-track project implementation and early commercial production of the plant thus securing an early return on investment to clients.



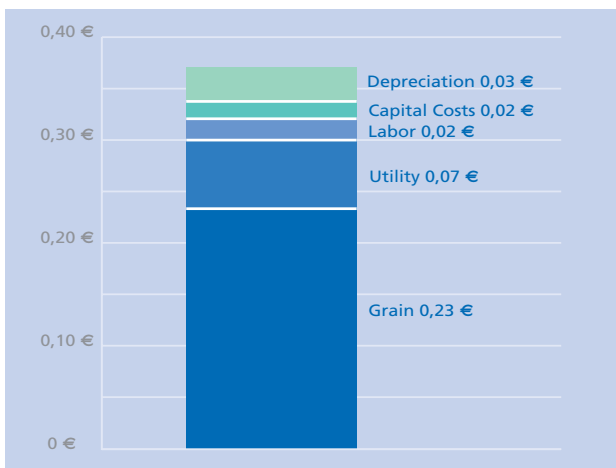
Mol Sieves



Ethanol-European Union



Production Costs per Liter Ethanol



Assumption: Grain Costs €100/t, Plant Capacity 100,000 t/a

Ethanol via Fermentation

Wide range of experience

Lurgi offers a wide range of technologies for handling different feedstocks and their preparation.

Major feedstocks are:

Grains

- Corn (Maize)
- Wheat
- Rye
- Barley
- Sorghum
- Byproducts of starch production

Sugars

- Sugar Juice
- Molasses
- Mixtures of Grains with Sugar Juice

Maximizing ethanol yield

We focus on maximizing the ethanol yield while simultaneously reducing the energy consumption. In addition, we also command know-how and experience in the production and further processing of co-products like biogas or DDGS.

Lurgi is a leading technology company operating worldwide in the fields of process engineering and plant contracting. The strength of Lurgi lies in innovative technologies of the future focusing on customized solutions for growth markets. The technological leadership is based on proprietary technologies and exclusively licensed technologies in the areas gas-to-chemical products via synthetic gas or methanol and synthetic fuels, petrochemicals, refinery technology and polymer industry as well as renewable resources/food.

Lurgi is a member of the Air Liquide Group. 

