The future of renewable energy looks promising. The biodiesel industry is growing even though feedstock prices are rising and governmental support programs are uncertain. One major product, biodiesel, is versatile in its use, can be produced from various feedstocks, and can be adapted to requirements through blending. Moreover, it is easy to transport.

In 2005, the Christof Group of Austria, with its subsidiaries CMB and PMS, finished construction of the first fully-automated biodiesel plant in Eemshaven in the Netherlands that has a degree of efficiency of 100 percent. The plant is the first of several expansions and is planned to reach an annual production capacity of 66,000 tons.

The 250 drives and more than 1,500 measuring points are connected by means of 110 kilometers of cable and controlled by the SIMATIC® PCS 7 process control system, providing totally integrated automation from the operation’s management level down to the field level – from the receipt of rapeseed through the presses, esterification, and storage to shipping of the finished biodiesel.

Integrated solution for hazardous areas

Using intrinsically safe SIMATIC ET 200iSP distributed I/O systems, the common IO form factor is extended into the hazardous environment. PROFIBUS penetrates into the Ex zone 1 and allows connection of sensors from the critical Ex zone 0. Consequently, the cabling length was reduced by almost 100 kilometers in the biodiesel plant in Eemshaven.

The biodiesel plants also feature the application of type-tested SIVACON control equipment. This equipment is extremely modular and permits remote maintenance of the control system from CMB headquarters in Austria. If a fault should actually occur, a spare plug-in that is located on-site can be used for replacement in the control cabinet without a problem. Using this totally integrated concept from the control equipment to the control system, CMB can guarantee the biodiesel plant owners continuous operation of the plant.
Reducing Total Cost of Ownership

Overall plant profitability is a key challenge for plant owners and operators. The Siemens answer to this challenge is integrated solutions for automation and power distribution systems using standardized, reliable equipment.

As investors have to oversee the life span of a plant, they must consider hidden and ongoing costs and lots of risks during the design, engineering, installation, operation and maintenance phases. The Siemens answer to meet these challenges is integrated, adaptable solutions based on Totally Integrated Automation (TIA) and Totally Integrated Power (TIP) that reduce the Total Cost of Ownership (TCO) during the entire life cycle.

Integration saves costs

During plant design and construction, TIA and TIP save construction costs by providing a single, comprehensive toolset and an optimized standard system architecture that can be used for multiple engineering projects. Integrated plant asset management systems help prevent unplanned downtime, and a remote monitoring and control capability enables easy access to Siemens technical support to facilitate troubleshooting, repairs, and upgrades. Use of PROFIBUS offers savings in wiring and programming and allows easy integration of third-party products. TIA and TIP can also help save training costs through user-friendly components. A 24/7/365 global network reduces downtime by offering easy access to local technical support. Siemens energy management software allows transparency regarding energy consumption, while energy costs can be saved through Siemens energy-efficient motors or variable speed drives.

Addressing performance and safety

With SIMATIC IT solutions, operators can improve plant and process performance through analysis of key performance indicators. To ensure plant and process safety in biodiesel plants, equipment and devices must meet the ATEX regulations regarding environments containing explosive gases. Siemens offers components with Safety Integrity Level ratings up to SIL 3. In addition, the Siemens Flexible Modular Redundancy (FMR) concept accounts for failsafety, availability, and finally, for reliability and cost savings.

Leadership through service and technology

With over 160 years of proven manufacturing experience, Siemens is well prepared to meet biodiesel challenges. Siemens is present in more than 190 countries around the globe and also works with local solution providers to ensure the best possible solution and service quality. Through research and development, Siemens continuously improves the performance of its products so that customers in the biodiesel industry will remain competitive over the long term.

Portfolio for biofuels

Siemens offers a comprehensive range of automation, drive and power supply systems and solutions for biofuel plants.

- Process Automation: SIMATIC S7 controllers, SIMATIC WinCC process visualization system, SIMATIC PCS 7 process control system
- Drives: SINAMICS low-voltage drives up to 150 kW
- Instrumentation: SITRANS temperature, pressure, level and flow transmitters; SIPART positioners; discrete instruments; gas analyzers; weighing systems
- Core Electrical Power Distribution: SIVACON low-voltage distribution systems, Motor Control Centers; medium-voltage switchboards and switchgear, depending on the size of the plant
- Services: Process automation project management, configuration, commissioning, simulation and training, optimization, maintenance, and extensive after-sales services

With the SIMATIC PCS 7 Box system Siemens sets a new standard of efficiency at a Bio Power biogas plant in Germany
Comprehensive Measurement Solution

Biodiesel producers must address plant performance, efficiency, and asset management as well as meet increasing requirements for process safety and security. Moreover, they have to reduce capital and operating costs. To meet biodiesel industry requirements, Siemens delivers a wide range of process devices for all stages of biodiesel production.

The proven Siemens solutions for instrumentation needs include devices from the SITRANS L series for continuous and point level measurement in feedstock and end-product storage tanks as well as interface detection in process vessels; SITRANS F mass, ultrasonic, and magnetic-inductive flowmeters for applications such as the dosing of catalysts during the transesterification process or the volume measurement of liquids and slurries throughout the production of biodiesel; SITRANS P transmitters for pressure measurement in the glycerol distillation column or level monitoring in methanol storage tanks; SITRANS T transmitters and sensors for temperature measurement in all biodiesel production areas; and SIPART PS2 valve positioners with advanced diagnostic functionality. All Siemens field devices are offered as smart devices; two popular communication options include traditional HART technology and the field-bus-based PROFIBUS PA. In both cases, the instruments have the ability to be parameterized, calibrated, and maintained over a network connection, which greatly reduces the life cycle costs. These features allow remote diagnostics that can improve time to resolution of the fault.

Siemens offers a comprehensive portfolio of level instrumentation that covers every possible level application in a biodiesel facility.

Level monitoring and interface detection in storage and process tanks are one of the most critical measurement tasks in a biodiesel production plant. Application variety requires a sophisticated choice of level instruments. The award-winning SITRANS LR250 high-performance noncontacting radar level transmitter with intelligent signal processing helps eliminate mechanical challenges in level measurement. It works on small or large tanks and provides accurate measurement of various materials throughout the biodiesel production process, including low-dielectric material such as biodiesel or vegetable oils.

Handling of considerable quantities of raw glycerol is a typical task in production. The glycerol is often stored in steel or stainless steel containers. To determine the level in these storage tanks, a noncontact method of measurement is particularly suitable, and can be implemented with the SITRANS LR200 radar level meter.

The advantages of noncontact level measurement can also be realized by using SITRANS Probe LU ultrasonic level meters on biodiesel and glycerol storage tanks. Their features include improved signal-to-noise ratio and accuracy. Redundancy and overfill protection for storage and process areas such as catalyst and biodiesel storage, wastewater tanks, and mixing vessels can be provided by using point level instruments such as the POINTEK CLS switches. They provide reliable, cost-effective limit level detection with diagnostics to determine whether the probes need to be cleaned.

Biofuel production: Siemens technology enables Ohio-based JatroDiesel to provide cost-effective and robust biofuels to worldwide clients
Gold from Straw – The Future of Biomass

Biomass represents one of the nearest-term and lowest-cost options for development of renewable fuel and energy sources, for obvious reasons: Biomass sources such as straw, wooden materials, or manure are available in large amounts, and they do not compete with food production.

Biomass can be exploited in several ways. Traditional methods are the direct combustion of biomass for heating and power generation purposes as well as methane production through fermentation of biodegradable biomass. This biogas can be used as a substitute for natural gas. Other innovative approaches to biomass exploitation include so-called second-generation biofuels that are synthetically produced via Fischer-Tropsch synthesis.

Only recently, the world’s first commercial-scale biomass-to-liquids plant for producing second-generation biofuels was commissioned in Germany – equipped with Siemens automation, process instrumentation, and power supply technology. Additionally, there are several research projects addressing the issue of extracting value-added chemicals from plants on a large scale that can substitute for petroleum-derived substances.

Biomass manufacturers need to closely manage all aspects of the production cycles to be profitable, with a clear focus on minimizing Total Cost of Ownership (TCO). Siemens not only has answers for the needs of today’s customers, but, in partnership with research institutions and industry, helps define and address the challenges of the future as well. With Totally Integrated Automation and Totally Integrated Power, a broad portfolio, and the integration of all components, Siemens is well set to help biomass manufacturers in optimizing performance, minimizing TCO, and implementing a complete process solution.

Did you know that ...

... with Siemens technology, you can check on the current status of your biogas plant?

What does that mean exactly?

+ Alarm Control Center
  Alarm Control Center sends predefined messages fully automated, in the form of a text message to a cellphone, for example

+ Web Client
  Remote access to the operator station via web client for monitoring and control with security functionality e.g. firewall technology

+ Telecontrol
  Central operator station for small distributed plants can be used for narrow-band communication paths and local storage of data messages in case of communication problems

How do you benefit?

+ Automatic notification when the plant state requires intervention by operating staff
+ Transfer of on-call duty to other persons by event and time-triggered calls to different cellphone numbers
+ Via remote access, the biogas plant can be operated without staff on-site
+ Remote maintenance of the control system