

## Thermal utilisation of biogenic residues and fuels – focus on biomass, sewage sludge and such

A biomass power plant generates electricity by burning solid biomass. A biomass cogeneration plant also provides heat that can be used as district or local heating and/or as process heat. Various biogenic fuels are suitable for use in these plants, such as waste wood (as defined by the Waste Wood Ordinance pollutant classes A I to A IV), woodchips from untreated fresh forestry wood, woodchips from short-rotation plantations etc.

These fuels are described as neutral in the CO<sub>2</sub> balance, as they release the CO<sub>2</sub> they absorbed during growth when combusted. In this context, it is important to mention that the thermal utilisation of sewage sludge in mono-incineration plants also belongs to the broad spectrum of biomass plants. This type of sewage sludge utilisation will be the main disposal path of the future.

Like classic waste incineration plants or related refuse-derived fuel power plants, biomass plants also have a large number of special features that require corresponding expertise, both in construction and in their ongoing operation.

In addition, the variable composition of the fuel (seasonal fluctuations, regional fluctuations, variable dry matter or moisture content, variable particle sizes, etc.) make efficient plant operation difficult.

As well as this, operators are under great cost pressure due to extremely volatile energy sales and fuel markets. It is a compelling competitive advantage for plant constructors, planning offices and the owners and operators of biomass power plants if they can fall back on partners with comprehensive and long-standing expertise in this area.

SAR's process and environmental technology has built up an enviable reputation as a reliable partner for many plant manufacturers and operators over a period of 20 years. Our unique selling point is the extensive expertise throughout the entire power plant process – both in automation and process engineering.

As a general contractor or batch supplier, SAR can take on complete scopes of supply and services for the assembly, electrical engineering and control technology scopes.

However, very specific sub-scopes such as combustion control systems, optimisation of individual plant components, retrofitting of measurement technology, the preparation of function plans, etc. can also be carried out.

To sum up, SAR's Process and Environmental Technology has extensive experience in the entire process of thermal biomass utilisation.

The products and services are tailored to plants in a wide power range from approx. 10 MWth to approx 100 MWth.

### Electrical engineering

SAR's specialists carry out design and planning of low- and medium-voltage switchgear for all voltage levels, including the associated UPS systems. Assembly and commissioning is carried out by experienced assembly workers – including in the medium-voltage range. Coordinating subcontractors is one of our core competencies.

### Process control technology

Designing and installing automation technology and I&C systems form the focus of our range of services for biomass power plants and their auxiliary systems. We ensure flexibility, adherence to deadlines and compliance with the quality standards specific to power stations with our skilled project management and by using our own qualified specialist assembly workers.

It does not matter to SAR whether process control systems or SCADA systems are used – we will find the ideal and future-proof solution for any application!

### Automation and IT infrastructure

These areas are often neglected during construction. Deficits here often only become apparent with the benefit of initial operational experience. SAR has tried and tested, tailor-made solutions to offer here as well.

**Data recording system:** An MIS (Management Information System) enables the operator to carry out a comprehensive analysis of the plant, on which efficient problem analysis and sustainable optimisations are based. the standard repertoire of such systems include long-term data archiving, exporting of operational data and creation of trends and reports.

**Alerting system:** There are often low personnel levels in biomass power plants, so it is usual for staff to work on a wide variety of tasks or operate the plants in "no constant supervision mode".

This makes it all the more necessary for important messages and alerts to be delivered to telephone systems and mobile devices as SMS and, if necessary, also by e-mail promptly and reliably to those in charge. It is important to implement escalation levels, up to alerting the emergency services in case of imminent danger.



**Virtualisation** Operating system and application are independent of the computer hardware. This saves energy and space, systems can be expanded quickly and cost-effectively, and central maintenance facilitates updates and service.

SAR also has extensive expertise in implementing these types of systems and is able to fully advise operators, finding and implementing a bespoke tailored solution for the plant.

### CCS and SNCR

The combustion control specialists at SAR Process and Environmental Technology are conscious that biomass can be just as problematic as fuel as residual waste, for example. The basic issues, including fluctuating fuel quality, are identical.

However, biomass combustion has very specific detailed problems, such as strongly fluctuating inert fractions and dry matter or moisture contents and non-reproducible or problematic conveying behaviour due to variable grain sizes, to name but a few.

SAR developed the SAR-CCS combustion control system, reaching market maturity more than 20 years ago, and now successfully in use in more than 30 biomass combustion lines. This pool of diverse tasks allows plant constructors and operators alike to benefit from our extensive wealth of experience in the control, regulation and optimisation of their combustion processes.

SAR-CCS undergoes continuous further development, both through practical experience and by incorporating the latest findings from research and development. The control concept is designed to be transparent and comprehensible - a philosophy that characterises all of our designs.

SNCR technology for NO<sub>x</sub> reduction plays a special role in biomass plants. Further reduction of the NO<sub>x</sub> emission limits is expected and SNCR plants will have to operate even more efficiently in the future. SAR offers an SNCR control that optimises this process. In the same way as SAR-CCS, the concept remains flexible, open and transparent.

### Digitalisation

SAR sees itself as a pioneer in the field of digitalisation, which is why it focuses on mastering and applying all the tools available and considered value-adding. The spectrum ranges from plant simulations for virtual commissioning or for training and education purposes to applying artificial intelligence or machine learning algorithms, e.g. for combustion optimisation and data analysis.

We also take current IT security issues (e.g. BSI standards or European NIS directives) into account during design and project implementation.

### Conclusion

The goal of the energy transition is to switch the energy supply to renewable energies – in the electricity sector as well as in the heat supply. In this context, biomass plants as mentioned above play an essential role. These are complex facilities that call for explicit expert knowledge during construction as well as operation and maintenance. SAR Process and Environmental Technology enjoys this expert knowledge, gained over 25 years of experience in this field.

Whether it's waste wood incineration or thermal sewage sludge utilisation, SAR is always the right contact partner for you – whether you are a planner, builder or operator – putting all their expertise at your disposal, even after the completion of the project.

### SCOPE OF SUPPLY AND SERVICES

- Delivery, assembly and commissioning of the complete electrical, instrumentation and control systems
- Planning and implementation of automation and process control technology for new plants
- Migration, modernisation or replacement of distributed control systems, especially for existing plants
- Assembly, installation and cabling work for complete systems or partial areas
- Implementation and optimisation of the SAR Combustion Control System
- Modification/optimisation of the SNCR technology

The range of products and services is rounded off by extensive process technology knowledge of the entire energy generation process. Topics allied to automation technology, such as production data acquisition, management information systems and alarm systems, are just as much part of the repertoire as the virtualisation of process control systems.



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## Project references (excerpt)

**BMK Lünen**  
TO = 67 MW<sub>th</sub>

**BMHKW Traunreut**  
TO = 20 MW<sub>th</sub>

**BMHKW Ilmenau**  
TO = 20 MW<sub>th</sub>

**BMHKW Dresden**  
TO = 27 MW<sub>th</sub>

**BMHKW Neufahrn**  
TO = 21 MW<sub>th</sub>

**KVA on behalf of Standark.-Baumgarte**  
TO = 7 MW<sub>th</sub>

**HHKW Berlin-Neukölln**  
TO = 2 x 53 MW<sub>th</sub>

**BMHKW Elsterwerda**  
TO = 44 MW<sub>th</sub>

**BMHKW Sulzbach-Rosenberg**  
TO = 22 MW<sub>th</sub>

**BMHKW Ulm**  
TO = 57 MW<sub>th</sub>

**BMHKW Flohr, Neuwied**  
TO = 32 MW<sub>th</sub>

**BMHKW Siegerland, Liebenscheid**  
TO = 50 MW<sub>th</sub>

**BMHKW Goch**  
TO = 28 MW<sub>th</sub>

**BMHKW Dollbergen**  
TO = 38 MW<sub>th</sub>

**BMHKW Elsfleth**  
TO = 26 MW<sub>th</sub>

**BMHKW Kehl**  
TO = 47 und 20 MW<sub>th</sub>

**HHKW Kempten**  
TO = 21 MW<sub>th</sub>

**BEC Twence, Hengelo**  
TO = 73 MW<sub>th</sub>

**BMHKW Zolling**  
TO = 67 MW<sub>th</sub>

TO = Thermal Output

**steag**  
new energies

**JFE Engineering Group**  
**Standardkessel**  
**Baumgarte**

**DANPOWER**  
GRUPPE

**FUG**  
FERNWÄRME ULM

**FLOHR**  
BHKW Flohr GmbH

**Koehler**  
RENEWABLE ENERGY

**ZAK**

**Twence®**

SAR Elektronic GmbH is an owner-managed, medium-sized company, founded in 1985 in Dingolfing, Lower Bavaria. Due to the constant growth, the establishment of first branches followed in Germany, as well as others in Europe and beyond.

Today, the SAR Group has over 700 employees providing future-oriented automation solutions from a single source, for both the industrial manufacturing and the process and environmental technology sector.

Whether as a general or sub-contractor - with SAR you can rely on the excellence, experience and flexibility of a medium-sized company with flat hierarchies. Our actions are based on in-depth experience and sound expertise. We offer our clients sustainable solutions that do not neglect either ecological or economic aspects.

### Process and Environmental Technology - scope of supply and services

From design to implementation, maintenance and training, you receive all services in the disciplines of process automation, electrical and process control technology, and instrumentation and control technology.

We automate systems for thermal waste treatment (waste-to-energy plants, hazardous waste incineration plants, etc.) with combined power and heat generation. In addition, we provide you with automation solutions for RDF, biomass and industrial power plants as well as the specific exhaust air and flue gas purification thereof. Our know-how in petrol chemistry is also in great demand.

Further reference projects can be called up at  
[www.sar.biz](http://www.sar.biz)

Our core competencies in the area of combustion technology are compiled at  
[www.combustioncontrol.biz](http://www.combustioncontrol.biz)

Among other things, lectures from various conferences and trade fairs are available here.

Detailed information regarding the Premium Plant Library PPL can be found at  
[www.ppl.biz](http://www.ppl.biz)

Ask for our reference lists!

Also feel free to contact our customers to find out more about SAR's work and quality.

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**Environmental Technology**  
Thermal utilisation  
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