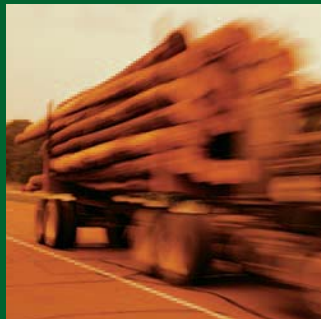


BTG Biomass Technology Group

Energy Consultants, Researchers and Engineers



BTG Biomass Technology Group BV

BTG: Your Partner in Bio-energy

BTG Biomass Technology Group BV (BTG) is an independent, private firm which for the past 25 years has specialised in the process of conversion of biomass into biofuels and bio-energy.

BTG's two business units, Consultancy and R&D, work in synergy. The business units work on technology and project development, provide strategic advice to customers and carry out availability, feasibility and scenario studies. BTG has proven to be leading as an innovative company in the bio-energy field. The unique combination of Consultancy and R&D is the base for highly innovative and commercially feasible activities.

Since its establishment in 1979, BTG has completed over 1,300 assignments. Field experience was gained in more than 80 countries. The long-standing dedication to the promotion and implementation of bio-energy has resulted in the establishment of more than 15 subsidiaries and spin-off companies, as well as more than 55 bio-energy systems and factories.

BTG's Implementation Track Record

BTG has initiated 12 spin-off companies, three subsidiary companies and two foundations and maintains an extensive network of business relations covering the globe.

Bio-energy plants that have been built or facilitated by BTG number more than 55 and include:

- > Biomass combustion plants: 22, mostly in Central and Eastern Europe and Bolivia (wood, straw and rice husks).*
- > Biomass carbonisation plants: in seven different countries (The Netherlands, Estonia, Ghana, Mali, China and Sudan).*
- > Anaerobic digestion plants: 18, in Costa Rica, The Benelux and Central and Eastern Europe.*
- > Biomass pyrolysis plants: pilot plants in China and The Netherlands, and the first commercial plant in Malaysia.*

Special attention is paid to countries and regions that have the potential to develop into large supplies of biofuels (the so-called 'Green OPEC' countries). These include Southeast Asia, Brazil, Canada, Northwest Russia and the Baltic States.

BTG's Vision

BTG has as its mission to contribute significantly to increasing the share of bio-energy in the primary energy supply. Production and use of bio-energy shall take place in an environmentally, socially and economically sustainable manner.

In its pursuit to contribute to a sustainable energy society, BTG works on the development of smart technologies that help biomass emulate fossil fuels. Coal, oil and natural gas are non-renewable fossil fuels that are produced in naturally occurring processes in which organic material is converted over a period of millions of years. BTG strives to dramatically reduce the conversion time of these processes in order to shorten the carbon cycle. The rapid conversion of biomass into bio-fuels raises the energy density of the biomass. This enables the refined bio-fuel to be used in the currently existing energy infrastructure.



Consultancy

The Consultancy Group carries out studies for a range of clients. By developing and implementing various bio-energy projects it contributes directly to an increasing role of bio-energy in the energy supply of the future. The Consultancy Group has about 40 projects under contract continuously.

Services offered by the Consultancy Group include:

- > Technology assessment & feasibility studies.
- > Technical assistance & consulting.
- > Project development.
- > Project management & implementation.

Feasibility studies assess the technical, logistical and financial possibilities to realise bio-energy plants. These studies range from a "quick scan" that briefly assesses bio-energy options at a given site or in a certain region, to comprehensive feasibility studies assessing all relevant issues in detail.

Clients come from agro-processing and wood processing industries, energy generation and waste management companies, multinationals and small and medium enterprises (SME's), national and regional governments, and multilateral organisations like the European Commission, World Bank, and United Nation system agencies.

Biomass and Bio-energy

In the energy sector, the term 'biomass' means any organic material available on a renewable basis, including dedicated energy crops and trees, agricultural crops wastes and residues, wood wastes and residues, aquatic plants, and animal wastes.

Bio-energy technologies use renewable biomass resources to produce electricity, heat, liquid, solid, and gaseous fuels, chemicals, and other materials.

The current EU target is to double the share of renewable energy in primary energy production from 6% in 1997 to 12% in 2010.

Examples of issues on which the Consultancy Group works include:

- > Sustainability issues and logistics of large-scale biofuel production and import.
- > Production of solid and liquid biofuels (pellets, carbonised biomass, various bio-oils).
- > Permitting and regulatory issues.
- > Carbon emission trading.
- > Targeted knowledge transfer and wider information dissemination on selected bio-energy issues through study tours, seminars, target training courses, and the production of handbooks and videos.



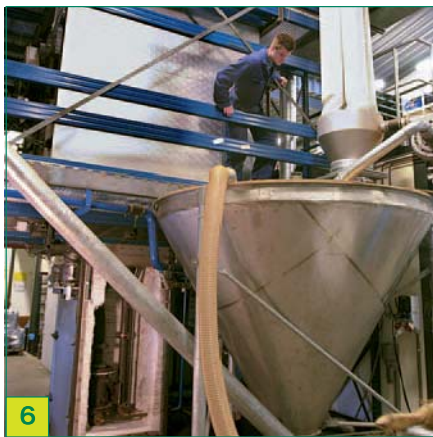
- 1 Anaerobic digestion plant in Denekamp (The Netherlands)
- 2 Biomass combustion plant in Hostetin (Czech Rep.)
- 3 Charcoal production plant in Pärnu (Estonia)
- 4 Targeted knowledge transfer by training course

Research & Development

At the R&D department contract research is carried out and new technologies are developed. Working closely together with industrial partners these technologies are scaled-up to (semi-) commercial scale production units. An example of a technology that is currently being scaled up is BTG's flash pyrolysis process.

R&D work is aimed at developing marketable technologies for the production of heat, power, transportation fuels and chemicals from biomass. The dedicated R&D laboratory offers a range of experimental equipment for biomass combustion, gasification, pyrolysis and anaerobic digestion, including test rigs, gas cleaning reactors, a flame tunnel, and test engines.

- 5 BTG research laboratory
- 6 Fast pyrolysis pilot plant at BTG laboratory
- 7 Bio-oil made in BTG's pilot plant
- 8 Bio-oil production plant in Malaysia



Commercial Application of Pyrolysis

BTG has developed a patented biomass pyrolysis process. In pyrolysis, different types of biomass feedstock with a wide range of characteristics are converted into a clean and uniform liquid: bio-oil. Bio-oil can be used for the production of heat, power, fuels and chemicals. For each tonne of biomass input up to 0.7 tonne of bio-oil can be produced. BTG's innovative technology is unique because the reactor operates without any carrier gas, which results in a remarkable compact and thus cost-effective system.

The 1 MWth pilot pyrolysis plant at the BTG laboratory has been tested with many types of biomass and residues. The pilot plant has produced over 30 tons of bio-oil. In 2005 the first commercial production unit with 10 MWth input was delivered to a private client in Malaysia and it is expected that many more will follow.

The current R&D activities include:

- > Bio-oil production: development of a flash pyrolysis process for the production of a liquid fuel (bio-oil) from biomass and bio-waste.
- > Bio-oil applications: combustion in boilers for industrial and district heat generation and in engines for power, gasification of bio-oil for the production of synthetic gas or hydrogen, and production of liquid smoke.
- > Fluid bed gasification; testing of various feedstock materials.
- > Two-step catalytic gasification: tar-free producer gas production.
- > Producer gas cleaning: development and application of catalytic or thermal reverse-flow reactors for the energy efficient removal of tar from producer gas.
- > Gasification of wet biomass in supercritical water: production of a hydrogen-rich gas.

- 9 Timber ready for processing
- 10 Wood processing residues Slavičín (Czech Rep.)
- 11 Senegal's President and Minister of Energy with BTG's Piet Visser observing ethanol combustor



9



10



11

Trading of Carbon Credits

Under the Kyoto Protocol industrialised countries have agreed to reduce the emission of greenhouse gases. The EU has committed itself to 8% emission reduction compared to the base year 1990. To help achieve this reduction so-called Kyoto mechanisms can be applied (Joint Implementation (JI), Clean Development Mechanisms (CDM) and International Emissions Trading) which enable the trade of emissions reductions between countries.

Since 1998 BTG is active in the business related to the reduction of greenhouse gases and has realised the following:

- > Central and Eastern Europe: eight JI-projects based on biomass combustion and digestion.
- > Central America: 10 biomass digestion plants in the coffee industry for the treatment of process waste water.
- > Czech Republic: a bio-energy portfolio of 15 biomass combustion projects. The carbon credits of this portfolio are being sold to the Dutch government via subsidiary company BioHeat International BV.

Based on the experience gained in the Czech Republic, BTG is developing a similar CDM-portfolio in Brazil. Clients are companies from the top 10 of the agro and wood industry. BTG focuses on the development of plants for the combustion of rice husk and wood, as substitutes for fossil fuels.

More information can be found on:
www.carbonconsultancy.com
www.bioheat-international.com

Examples of Countries where BTG has field experience

Africa > Algeria, Burkina Faso, Burundi, Cameroon, Chad, Ethiopia, Ghana, Guinea, Ivory Coast, Kenya, Madagascar, Malawi, Mali, Morocco, Mozambique, Niger, Nigeria, Senegal, South Africa, Sudan, Tanzania, Uganda, and Zimbabwe.

Americas > Bolivia, Brazil, Costa Rica, Cuba, Ecuador, Honduras, Jamaica, Peru, and Uruguay.

Asia/Pacific > China, Fiji, India, Indonesia, Kiribati, Malaysia, Mongolia, Nepal, Philippines, Sri Lanka, Thailand, Vanuatu, and Vietnam.

Baltic States > Estonia, Latvia, and Lithuania.

Central Europe > Croatia, Czech Republic, Hungary, Poland, and Slovak Republic.

Eastern Europe > Belarus, Bulgaria, Georgia, Moldova, Romania, Russia, and Ukraine.



BTG Biomass Technology Group BV

Business & Science Park

P.O. Box 217

7500 AE Enschede

Colosseum 11

7521 PV Enschede

The Netherlands

Tel: +31 53 486 1186

Fax: +31 53 486 1180

E-mail: office@btgworld.com

Web: www.btgworld.com

BTG Central Europe s.r.o.

Korunní 79

130 00 Prague 3

Czech Republic

Tel: +420 224 257 998

E-mail: office@btg.cz

Web: www.btg.cz

BTG Brazil

Av. Loureiro da Silva, 2001 Cj 801

90.050-240 Porto Alegre-RS

Brazil

Tel: +55 51 3028-7858 and 3228-7881

Fax: +55 51 3028-7857

E-mail: ptz@ptz.com.br

Web: www.ptz.com.br