Trading of Carbon Credits

Under the Kyoto Protocol industrialised countries have agreed to reduce the emissions of greenhouse gases. The EU has committed itself to 8% emission reduction compared to the base year 1990. To meet these targets mechanisms to comply with developed countries’ Kyoto commitments can be applied. Joint implementation (JI), Clean Development Mechanisms (CDM) and International Emissions Trading enable the trade of emissions reductions between countries.

Since 1998 BTG has a 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 agri-energy.
- Central America: 10 biomass digestion plants in the coffee industry for the treatment of process waste water.
- Czech Republic: a biomass portfolio of 15 biomass combustion projects.
- American Pacific: projects in Brazil, Costa Rica, Cuba, Guate, Paraguay, Argentina, Atlantic, Peru, and Uruguay.

Based on the experience gained in the Czech Republic, BTG is developing a similar CDM-portfolio in Brazil. Projects are focused on the treatment of process waste water as the main contributor towards the reduction of emissions.

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

Examples of Countries where BTG has field experience

- Americas: Bolivia, Brazil, Chile, Costa Rica, Cuba, Ecuador, El Salvador, Honduras, Mexico, Peru, and Uruguay.
- Asia/Pacific: China, Fiji, Japan, Timor-Leste, Malaysia, Myanmar, Pakistan, Philippines, Vietnam, Thailand, Indonesia, and Thailand.
- Europe: Austria, Belgium, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, the Netherlands, Poland, Portugal, Romania, Sweden, Switzerland, the UK, and the USA.
- Eastern Europe: Armenia, Azerbaijan, Belarus, Bulgaria, Estonia, Latvia, Lithuania, Moldova, Romania, Russia, Serbia, and Ukraine.
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 bio-fuel 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 feasibility, 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 50 bio-energy systems and facilities.

**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 parallel to contribute to a sustainable energy society, BTG works on the development of next generation technologies that help biomass emulate fossil fuels. Coal, oil and natural gas are incompatible 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 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 start the carbon cycle.

The liquid 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.

Bio-energy technologies use renewable biomass raw materials to produce electricity, liquid, solid, and gaseous fuels, chemicals, and other materials. The current BTG target is to double the share of renewable energy in primary energy production from 6% in 1997 to 12% in 2013.

**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 share of bio-energy in the current 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 projects. 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 multinational organisations like the European Commission, World Bank, and United Nations agency.

**Research & Development**

As the R&D department is concerned with research and technology developments, BTG's R&D is aimed at developing moveable technologies for the production of heat, power, transport fuels and chemicals from biomass. The dedicated R&D laboratory offers a range of experimental equipment for biomass combustions, gasification, pyrolysis and anaerobic digestion including test rigs, cleaning reactors, a flame tower, and bio engines.

**Biomass and Bio-energy**

In the energy sector, the term biomass refers to 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 raw materials to produce electricity, liquid, solid, and gaseous fuels, chemicals, and other materials. The current BTG target is to double the share of renewable energy in primary energy production from 6% in 1997 to 12% in 2013.

- **Sustainability issues and logistical of large-scale biofuel production and import.**
- **Production of solid and liquid biomass (pellets, cartonised biomass, various bio-oil).**
- **Permitting and regulatory issues.**
- **Carbon counter-trading.**

Examples of issues on which the Consultancy Group works include:

- Sustainability issues and logistical of large-scale biofuel production and import.
- Production of solid and liquid biomass (pellets, cartonised biomass, various bio-oil).
- Permitting and regulatory issues.
- Carbon counter-trading.

**Commercial Application of Pyrolysis**

BTG has developed a patented biomass pyrolysis process. In pyrolysis, different types of biomass feedstocks 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, transport fuels and chemicals. For each type of biomass input up to 80% of bio-oil can be produced. BTG's technology is unique because the reactor operates without any carrier gas, which results in a remarkable compact and thus cost-effective reactor.

The 1,800 litre pilot pyrolysis plant of the BTG Biomass Technology Group has successfully undergone many types of biomasses and residues. The pilot plant has produced bio-oil of 80% of the theoretical maximum and the commercial production unit with 6,000 litre input was delivered to a power station in Malaysia and is expected that more units will follow.
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 specialized 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 feasibility, feasibility studies and scoping 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 gathered 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 projects worldwide.

For BTG’s activities in bio-energy, the following can be stated:
- More than 15 subsidiaries
- More than 55 spin-off companies
- More than 80 countries
- More than 1,300 assignments
- Field experience in more than 80 countries
- Long-standing dedication to the promotion and implementation of bio-energy

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.
- Business development.
- Project management & implementation.

Feasibility studies cover the technical, legal 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 organisations like the European Commission, World Bank, and United Nation system organisations.

BTG’s Vision

BTG has as its vision 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 order to contribute to a sustainable energy society, BTG works on the development of most advanced technologies that help biomass emulate fossil fuels. Coal, oil and natural gas are invaluable 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 start the carbon cycle. The liquid conversion of biomass into bio-fuels raises the energy density of the biomass. This enables the refined biofuel to be used in the currently existing energy infrastructure.

Bio-energy is a fuel derived from the biological conversion of organic material. Bio-energy plants 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 bio-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 biofuels production and import.
- Production of solid and liquid fuels (biogas, biocrude oil, biomass.
- Permits and regulatory issues.
- Carbon emissions 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.

Biomass and Bio-energy

In the energy sector, the term ‘biomass’ means any organic material available in a renewable basis, including dedicated energy crops and trees, agricultural residues and wastes, wood and woody products, 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 fuels (biogas, biocrude oil, biomass.
- Permits and regulatory issues.
- Carbon emissions 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.

Commercial Application of Pyrolysis

BTG has developed a patented biomass pyrolysis process. In pyrolysis, different types of biomass feedstocks with a wide range of characteristics are converted into a liquid fuel (bio-oil). Bio-oil can be used for the production of heat, power, fuels and chemicals. For each type of biomass input up to 0.7 tone of bio-oil can be produced. BTG’s pyrolysis process is unique because the reactor operates without any carrier gas, which results in an extremely compact and thus cost-effective system.

The 1,000 litre pilot pyrolysis unit of the BTG laboratory has been used with many types of biomass and residues. The pilot plant for production of 300,000 litres per year of biomass and residues. The pilot plant for commercial production was shipped in 1985. The first commercial production unit with an 8,000 litre input was delivered to a private client in Malaysia and it is expected that many more will follow.

Research & Development

As the R&D department, current 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 at BTG’s flash pyrolysis process. R&D work is aimed at developing mature 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 pyrolysis residue analysis, including test rigs, cleaning reactors, a flame furnace, and bio-steam engines.

BTG has delivered a patented biomass pyrolysis process. In pyrolysis, different types of biomass feedstocks with a wide range of characteristics are converted into a liquid fuel (bio-oil). Bio-oil can be used for the production of heat, power, fuels and chemicals. For each type of biomass input up to 0.7 tone of bio-oil can be produced. BTG’s pyrolysis process is unique because the reactor operates without any carrier gas, which results in an extremely compact and thus cost-effective system.

The 1,000 litre pilot pyrolysis unit of the BTG laboratory has been used with many types of biomass and residues. The pilot plant for production of 300,000 litres per year of biomass and residues. The pilot plant for commercial production was shipped in 1985. The first commercial production unit with an 8,000 litre input was delivered to a private client in Malaysia and it is expected that many more will follow.

Conclusion

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 projects worldwide.
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 1982, BTG has completed over 1,300 assignments. Field experience was gained in more than 60 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 50 bio-energy systems and technologies.

BTG has its main offices in the Netherlands, the United Kingdom, the United States, Canada, and China. The company has strongly diversified its markets and now has a presence in some 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 50 bio-energy systems and technologies.

BTG’s Vision

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

As a leader in bio-energy and bio-energy systems, BTG offers a wide range of services and technologies. With its unique combination of Consultancy and R&D, BTG is the base for highly innovative and commercially feasible activities. The company has more than 25 years of experience in the bio-energy sector.

The current R&D activities include:

- Bio-oil production development of a flash pyrolysis process for the production of bio-oil from biomass and bio-waste.
- Bio-oil applications: combustion in industrial boilers and district heat generation and in engines and power. Gasification of bio-oil for the production of synthetic gas and hydrogen, and production of liquid fuels.
- Fluid bed gasification: testing of various biomass feedstocks.
- Two-stage catalytic gasification: the first successful production tests.
- Product gas cleaning, development and implementation of catalytic and thermal inverse reactor for the energy efficient removal of tar from producer gas.
- Gasification of waste biomass in supercritical water production of a hydrogen-rich gas.

Commercial Application of Pyrolysis

BTG has developed a patented biomass pyrolysis process. This pyrolysis, different gases of biomass feedstock with a wide range of characteristics are converted into a clean, pure liquid fuel called biocrude. Biocrude can be used for the production of heat, power, fuels, chemicals. For each tonne of biomass input up to 0.7 tonnes of biocrude can be produced. BTG’s pyrolysis process is unique because the reactor operates without any gaseous carry-over, which results in a remarkable compact and thus cost-effective system.

The 1.4Milot pilot pyrolysis plant of the BTG biomass pyrolysis batch reactor with low energy of biomass and pyrolyse. The pilot plant for production of 300,000 liters per year of pyrolysis oil is the BTG commercial production unit with an 8 MW input. The pyrolysis oil is delivered to a pyrolysis plant in Malaysia which is expected that more sites will follow.

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 simultaneously.

Services offered by the Consultancy Group include:
- Technology assessment and feasibility studies.
- Technical assistance & consulting.
- Project development.
- Project management and 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 non-governmental organisations like the European Commission, World Bank, and United Nations system agencies.

Biomass and Bio-energy

In the energy sector the term ‘biomass’ means any organic material present on a renewable basis, including dedicated energy crops and trees, agricultural crop wastes and residues, wood wastes and sawdust, 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 R&D efforts are in the double scope 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 (kraft, carder and biomass, various bio-sol).
- Permitting and regulatory issues.
- Carbon emissions 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 reports.

Research & Development

As the R&D department is responsible for converting 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.

Research is aimed at developing moveable 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 pyrolysis processes, including test rig, cleaning reactors, a flume tunnel, and bio-engines.

BTG Biomass Technology Group BV
Trading of Carbon Credits

Under the Kyoto Protocol, industrialised countries have agreed to reduce the emission of greenhouse gases. The EU has committed to a 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 has been 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.
- 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 residues.

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

Examples of Countries where BTG has field experience

Africa
- Algeria, Benin, Burkina Faso, Cameroon, Chad, Djibouti, Djibouti, Egypt, Ethiopia, Gabon, Ghana, Guinea, Kenya, Madagascar, Malawi, Mali, Morocco, Mozambique, Namibia, Nigeria, Senegal, South Africa, Sudan, Tanzania, Uganda, and Zimbabwe.

American (Pacific)
- Bolivia, Brazil, Costa Rica, Cuba, Ecuador, Guatemala, Honduras, Jamaica, Mexico, Peru, and Uruguay.

Asia/Pacific
- Brunei, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Thailand, Vietnam, and Vietnam.

Eastern Europe
- Armenia, Azerbaijan, Belarus, Latvia, Lithuania, Moldova, Romania, Russia, Serbia, and Ukraine.

More information can be found on www.carbonconsultancy.com
www.bioheat-international.com
BTG Biomass Technology Group BV
P.O. Box 835
7500 AV 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.
Korunni 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