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# Climate and Energy

Our approach to a changing world



## Climate and Energy

The world's climate is changing. The science of this is now beyond reasonable doubt.



Global warming is a naturally occurring phenomenon and makes life on Earth possible.

However this natural process is being altered by an increase in the emission of human produced greenhouse gases such as carbon dioxide, methane and nitrous oxides gathering in the atmosphere. As the concentration of greenhouse gases increases, so too does the average global temperature. This is known as the enhanced greenhouse effect and is a key cause of climate change.

The full extent of the effects caused by climate change are unknown but is thought to include rising temperatures, changing sea levels, ocean acidification and melting of glaciers.

### Sustainable Development

In the face of this changing climate, the need to be more sustainable in all that we do is ever more real and immediate. Whereas previously, sustainable development was a term employed by lobbyists, it is now a mainstream concept, and playing our part in achieving a more sustainable world is now an every day activity for industry, commerce, communities and individuals.

### Fully Committed

At Grontmij, we take our responsibility towards sustainability very seriously. We have clear policies and activities aimed at ensuring our operations are as sustainable as we can make them. We have also reshaped our consultancy activities to deliver more sustainable solutions to our clients.

Our people are fully committed to the sustainability agenda. We understand that our clients appreciate how we embed sustainability into everything that we do and how we integrate the latest technologies with delivery to time, cost and quality objectives.

### Climate and Energy

The link between our changing climate and the emissions of CO<sub>2</sub> and other greenhouse gases is another well established fact. As these emissions are mostly linked to our use of energy derived from fossil fuels, this makes the association of climate and energy inescapable in all that we do.

### Strategy and Advice

We recognise the importance of getting the strategy right before making management decisions regarding the direction an organisation should take to tackle climate change. We understand the challenges and opportunities you face and the legislation, financing and technologies that will assist you in those tasks.

### Adapt and Mitigate

There are two ways to respond to our changing world; we can adapt to it by changing the way we design civil infrastructure and/or we can mitigate through the decarbonisation of our energy generation. At Grontmij, we have a broad range of skills and services supporting both strategies.

## Our projects

### A sample of our current and recent projects



#### Helping the Isle of Wight become an 'eco-island'

Grontmij has been appointed as sole consultant by the Isle of Wight Council, for the provision of consultancy services to support the development of renewable energy solutions. The Isle of Wight is planning to become an 'eco-island' by becoming non-dependent on fossil fuels by 2020.



#### Crop Digestion at Stoke Bardolph

Grontmij carried out a feasibility study and produced a report on a crop digestion system for Severn Trent Water. The system has the potential to be fuelled by 37,050 tonnes per annum of feedstock, which would generate 16,819 MWh/a electrical output at 100% availability. The project involved collaboration between experts from Grontmij's UK and Swedish offices.



#### Creating Griffin Wind Farm for Scottish & Southern Energy

Grontmij has received a commission to undertake client's engineer role for Griffin Wind Farm as part of the Scottish & Southern Energy / Airtricity Framework Agreement. This includes the site investigation, geotechnical review, design of access tracks, design of wind turbine bases etc.



#### Kings Buildings Site, University of Edinburgh

Grontmij helped the client to install a Combined Heat & Power (CHP) system and a Low Temperature Hot Water (LTHW) network. Our work included design, analysis and assistance to secure £1,630,948 in grant aid funding. The installation should reduce CO<sub>2</sub> emissions by 2,130 tonnes, and save the University an estimated £400,000 per annum.

# Mitigating a changing climate

We offer a wide range of skills and services that will allow some mitigation of the increasing effects of our changing climate. First among these is our approach to sustainable energy. As we move to decarbonise our energy generation, we have to look more to renewable supplies and increased energy efficiency and management.



## Sustainable Energy

Sustainable energy is the creation of energy in a way that does not deplete the earth's natural resources, does not create added waste products and does not add unsustainably to the world's naturally occurring greenhouse gases. These technologies are critical in securing the supply and demand balance whilst minimising our impact on the planet. Grontmij has decades of Europe-wide experience in providing sustainable energy solutions.

### Combined heat and power (CHP) and district heating (DH)

Grontmij has vast experience in this field ranging from large scale district heating projects associated with energy from waste incineration and tri-generation, to smaller scale CHP schemes such as digester heating projects for water utilities.

#### Technology options

At Grontmij, we ensure that a detailed investigation into the various fuel supply and conversion options ensures the most efficient and cost effective solution is selected.

#### Design

Grontmij is involved at all stages of design from conceptual and detailed design of pipe systems, pumping stations, and connecting installations at local district heating companies.

We have not only been involved in the design of new installations but also in the extension and strengthening of existing transmission pipelines, rehabilitation of substations / heat exchanger systems, water supplies and roads.

## Wind energy

Grontmij has been involved in wind farming for decades and is now one of the leading consultancies offering professional services in all aspects of on and offshore wind energy generation. Our professional services cover the initial feasibility study, site selection, data capture and energy yield analysis. In addition we undertake planning and environmental assessments as well as design and project management as part of an integrated service for this renewable energy technology.

#### Our services in this area include:

- Project feasibility
- Environmental Impact Assessment
- Noise and vibration assessment
- Civil infrastructure design
- Grid connection
- Geotechnical engineering
- Operation and maintenance
- Project implementation

## Energy recovered from waste

Wastes represent an increasingly important fuel source. Using wastes as fuel can have important environmental benefits such as reducing CO<sub>2</sub> and methane emissions. They can also provide safe and cost-effective destruction and volume reduction options for wastes that otherwise present significant disposal options.

At Grontmij, we have a range of experience in delivering viable and successful waste management and waste infrastructure schemes.

#### Our services in this area include:

- Selection of appropriate waste conversion technology based on fuel supply
- Energy from landfill gas
- Power purchase contract formulation as part of project feasibility studies

## Bioenergy

Electricity, heat and transport fuels can be generated from many forms of plant material and/or animal waste. Our expertise in the field of bioenergy covers feasibility and detailed design, exploring operating regimes to maximise the effective use of available bioenergy sources, whilst minimising the need for fossil fuels.

At Grontmij we have many years of experience in designing solutions for a variety of bioenergy fuels:

#### Biomass / Biogas

Advance conversion technologies allow the production of biogasses.

#### Our services in this area include:

- Anaerobic digestion
- Pyrolysis
- Gasification

Grontmij has extensive experience in designing all the above advanced technologies which can provide electricity, steam, heat and/or hot water.

## Energy efficiency and zero carbon development

Grontmij | Roger Preston & Partners has developed an extensive reputation in all aspects of energy consumption and supply in a range of low-carbon building projects. Our experience includes assessing passive and active energy efficiency measures and renewable technologies. Our BREEAM and Code for Sustainable Homes teams work to achieve the best possible commercially realistic rating for all building developments.

Towards zero carbon development, we specialise in site-wide trigeneration schemes, the use of low carbon fuels, and the export of electricity and heat to neighbouring sites.

## Hydropower

By harnessing the kinetic energy of flowing water, innovative solutions in established industries can give a positive yield of renewable energy. Grontmij is experienced in providing clients with micro-hydro schemes, from initial feasibility through to full detailed design and project management. The consultancy is able to undertake flow and energy yield analyses as well as the cost benefit studies for on site consumption and electricity export. We provide clients with full lifecycle management from feasibility through detailed design to project delivery.

#### Our services in this area include:

- Optioneering and feasibility
- Hydrological survey
- System design
- System costing
- Estimate of energy output and annual revenue

## Solar

Our sun provides renewable energy to all of earth's processes and can be harnessed for many of humankind's energy needs. In addition to active solar thermal heating and solar photovoltaic (PV) electrical generation, the sun's energy can be utilised to drive passive systems such as cooling, ventilation and irrigation.

Grontmij provides cost benefit analysis and project feasibility for all types of solar energy utilisation technologies. Our team integrates solar technologies into both new design and existing buildings to maximise energy recovery and reduce energy demand from external sources.

In addition we can advise on grant availability, tax exemptions and ensure solar energy schemes are compliant with current legislation.

# Adapting to a changing climate

At Grontmij, we assist our clients to adapt their working environments to our changing climate. As temperature and rainfall patterns alter and planning for predicted rises in sea levels affects our operations and development, we must look to innovation in our approach to adapting to our new environment.

## The Built Environment

Grontmij takes an active role in the design of ground conditions and buildings helping to establish a more sustainable option for development.

### Ground Engineering

Our geotechnical engineers have a wide ranging knowledge of ground conditions across the UK. We ensure that as our soils react to changing water regimes, we provide robust and more resilient designs capable of responding to the challenges of shrinkage, heave and landslip.

### Indoor Environment

To develop sustainable buildings, Grontmij | Roger Preston & Partners works with architects and design teams to optimise the built form prior to the integration of systems active in controlling the indoor environment.

Sophisticated suites of software form part of our toolbox, allowing us to model potential solutions and scenarios on three-dimensional virtual models of your building to ensure a comfortable indoor environment for occupants.

## The Water Environment

Ensuring the availability of sufficient water resources, reducing flooding risks and ensuring that the optimum balance is achieved between human and environmental demands are key challenges. Grontmij's wide ranging multidisciplinary technical and project management skills means that such challenges can be met.

### Water Resources

Grontmij works with both public and private sector clients on surface and groundwater projects. We have the depth of skills and experience to deliver the full range of water resources services including individual source developments. We provide client focussed solutions based on the latest legislation from European and statutory body requirements including a detailed understanding of the requirements of the Environment Agency and SEPA.

### Rivers and Coastal Engineering

Our team has in-depth experience of feasibility studies, optioneering, modelling and the detailed design of flood risk mitigation measures and structures such as harbours, tidal barriers and locks. We have an extensive track record of projects throughout Europe including the UK's first new canal link for 100 years.

### Flood Management

Grontmij has specialist teams with extensive experience of flood risk management across the UK. This experience covers flood risk and flood consequence assessments as well as the optimisation of design engineering that can be used to manage and mitigate flood risks and to satisfy statutory requirements.

### Sustainable Drainage

We offer extensive experience of sustainable urban drainage schemes (SUDS) incorporating innovative advancements and of wider sub-regional integrated urban drainage schemes where our modelling and design skills are integrated to provide cutting edge engineering design.

# Strategy and Advice

At Grontmij, we have the knowledge and experience to advise you on the strategic options available to your organisation as you face up to our changing climate. We can guide you through legislation, the funding options that may be available to you and the technological solutions that will make your organisation more resilient in a changing world.

## Strategy

Companies now take environmental and sustainability issues very seriously. Performance is of increasing interest to many stakeholders from investors and clients to employees and suppliers. Increasingly, stringent legislation is affecting a growing number of sectors and the need to minimise environmental impact is becoming a key business objective.

Grontmij provides strategic advice on a wide range of sustainability issues. We specialise in providing advice on strategies for the use of sustainable energy, in reducing your carbon budgets and devising options to meet pre-defined environmental objectives. We are fully conversant with the sustainable technologies and financial incentives available to augment your strategic options and are therefore able to recommend the best solution to meet individual requirements.

## Legislative advice

The policy and legislation associated with energy generation can be daunting and may affect the commercial and technical viability of operations or projects. Grontmij has the capability to prepare energy strategies that are fully compliant with current local, national and international legislative and financial mechanisms including:

- The Climate Change Bill
- Carbon Reduction Commitment
- Renewables Obligation
- Climate Change Levy
- EU – Emissions Trading Scheme
- Large Combustion Plant Directive

## Financial support

Grontmij is able to identify relevant incentive schemes and has extensive experience in facilitating grant aid assistance from the various government funding streams or technology suppliers. With regard to energy purchase, our experienced team of advisers can select tariffs based on energy consumption and demand profile analysis. We advise and negotiate commercial energy contract purchases to ensure risk minimisation and best pricing.

## Carbon budgeting

Carbon is increasingly becoming the measure of choice for demonstrating environmental awareness available to the market. It is a useful shorthand for our use of energy and materials, our travel and our waste. Armed with state of the art carbon toolkits, Grontmij is able to assist in measuring and assessing the carbon footprints of products, services or organisations. Using the data we collect we are able to better inform the strategic options facing an organisation and to assist the management decision making processes that control organisational behaviours.