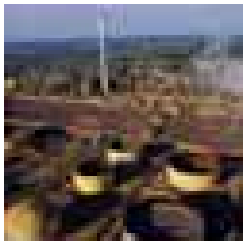
Process efficiency

Competition in the business environment continues to grow. For many, the use of raw materials, utilities, packaging and other material resources represents a significant percentage of their total business costs. In addition, legislation, government policy and pressure from stakeholders to minimise the environmental impacts of business activity continue to increase.



Capability statement

Reducing business costs and minimising environmental impacts

Customers

Many companies need to continually review how to improve the efficiency of their processes to meet customer demands for lower prices. The efficient use of materials and plant is critical to maintaining a profitable and competitive business.

Competitors

The globalisation of markets is increasing competition for many companies. In some organisations, operating sites in different parts of the world are in direct competition internally for business.

Legislation

The introduction of new environmental legislation continues to increase the costs of waste management and disposal. For example, the industries covered by Pollution Prevention and Control legislation have to demonstrate how they are minimising the use of materials, water and energy.

Government policy

Policy makers are placing ever increasing emphasis on minimising the consumption of resources to eliminate environmental impacts. UK policy measures include the Climate Change Levy and the Aggregates Tax.

Stakeholders

A wide range of stakeholders, including employees, investors, pressure groups and local communities, are placing increasing pressure on business to make its contribution to sustainable development.

However, these pressures are also opportunities. The most successful companies in the future will be those which continually strive to improve the efficiency of their processes. They will gain competitive advantage and become more sustainable by reducing the material resources they consume. This will reduce both the costs of production and the costs of waste management and environmental compliance.

Entec

Entec is one of the UK's largest environmental and engineering consultancies. Our technical and business skills are dedicated to delivering strategic, technical and engineering solutions which bring commercial benefit to customers at home and overseas. This know-how is based on over 60 years' consulting experience in the public and private sectors.

Certificate No. EMS 69090 Certificate No. FS13881

Entec operates a Quality Management System in accordance with the latest requirements of the international standard BS EN ISO 9001 and an Environmental Management System compliant with BS EN ISO 14001. Both are audited by BSI Management Systems.

The Entec approach

Our process efficiency specialists have a wide range of experience that includes:

- Waste minimisation and energy efficiency consultancy;
- Plant, process and production management;
- Process design and development;
- Technical process support, e.g. troubleshooting, debottlenecking;
- Environmental, safety and risk management.

Many businesses do not fully recognise the inefficiencies that are built into their production costs. They focus on meeting customers' needs for quality, quantity and delivery, and manage their performance against targets for production yields and costs. However, these often hide process inefficiencies and do not act as a driver for reducing costs.

Entec understands companies' processes, costs and health, safety and environmental impacts. Our approach ensures that the true costs are quantified and clearly presented. This enables businesses to make fully informed decisions about the human and financial resources needed to improve process efficiency and where it should be targeted.

We have the skills to identify, develop and deliver cost-effective solutions that reduce business costs and minimise environmental impacts, including:

- Process auditing;
- Risk assessment and analysis;
- Workforce involvement, awareness and training;
- Management system development;
- Conceptual, feasibility and detailed design.

Our process efficiency specialists have a successful track record of delivering projects for clients in a wide range of sectors including oil, gas and petrochemicals, fine chemicals, food and drink, water, textiles, engineering, paper and general manufacturing. Entec is also a retained consultancy for Envirowise and the Carbon Trust. They are funded by the UK Government to provide advice to business on waste minimisation, cleaner technology, energy efficiency and carbon management.

Expert help from start to finish

A process efficiency programme generally involves five key stages:

Initial review

Some clients ask Entec to start by reviewing the full cost of waste for a site or process operation. Others ask us to assess the true cost of manufacturing a product or providing a service. In either case our assessment is based on the recognition that waste streams are symptoms of an inherent inefficiency in the process. Waste disposal costs are usually much less than raw materials purchase costs, added value or the cost of plant downtime.

Targeted audit and investigation

This initial review identifies and prioritises the significant contributors to the total cost of inefficiency. The next stage is to investigate the key cost elements to understand why and where these costs are incurred. This provides a clear understanding of the specific site activities, plant items, control or management issues that must be improved if the total costs are to be significantly reduced.

Option generation

For each of these priority issues Entec identifies the range of improvement options. We assess technical feasibility, potential savings, cost of implementation and payback on investment. Sometimes it is more appropriate to use the workforce's knowledge and expertise to generate the options. Entec's role is then to facilitate workforce involvement through team building, awareness training, workshops and skills transfer.

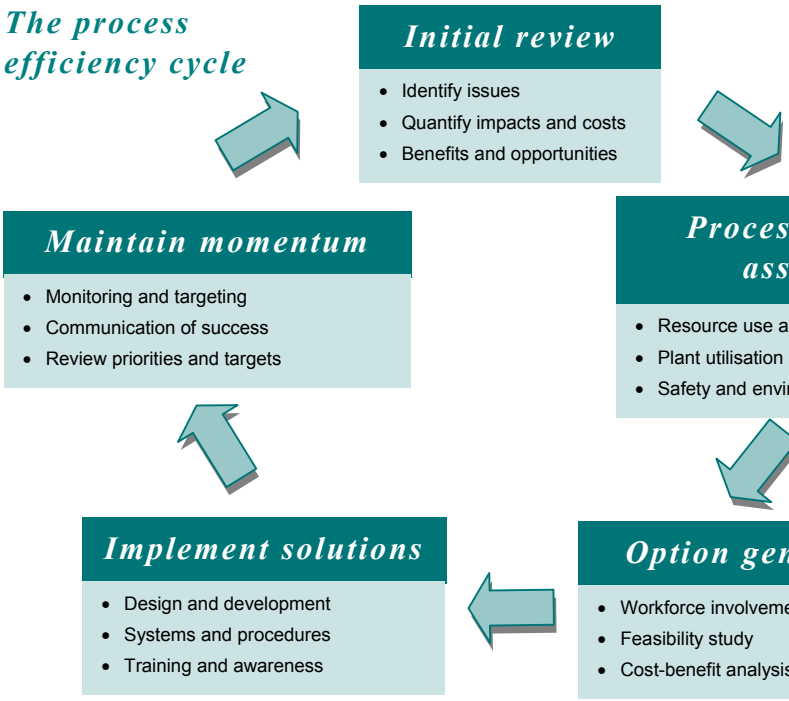
Solution implementation

Entec will develop an implementation strategy that prioritises no cost/low cost opportunities. The strategy will also recognise the importance of other drivers, such as regulatory compliance or licensing. It also phases the implementation of projects to ensure that the financial, human and technical resources required are available. Entec also helps implement solutions by providing training, developing management systems and procedures or by undertaking the design and management of capital projects.

Maintaining momentum

Monitoring and targeting systems, and communication strategies, can also be developed. This ensures that projected savings are achieved and then maintained in the longer term, and that any process efficiency improvements contribute to improving the sustainability of the operations. Effective communication is essential to demonstrate success to both the management team and the wider workforce to secure their ongoing commitment to process efficiency.

The process efficiency cycle



Case studies

The following pages demonstrate Entec's capabilities in the area of the process efficiency, using case study examples ▶

Entec

Creating the environment for business

Waste Minimisation in the Furniture Manufacturing Industry

Envirowise

Envirowise is a government programme assisting UK businesses to reduce waste at source and increase profit. An Envirowise review of the status of the furniture manufacturing industry identified cheaper imports, environmental legislative compliance and customer demands as key drivers for improving efficiency.

With 270 million tonnes of waste being sent to landfill by the industry each year, costing in excess of £600 million, an opportunity to improve efficiency through waste minimisation was identified.

Entec was commissioned to research the furniture manufacturing industry and to write a good practice guide for making savings through waste minimisation. Working with staff from within the manufacturing industries, Entec was able deliver a focused guide, aimed specifically at managers with environmental and process responsibilities. Extensive waste minimisation and environmental auditing experience across several industrial sectors enabled Entec to provide in-depth guidance on the key issues faced by furniture manufacturers.

The resulting guide can be used to help companies implement a waste minimisation programme, whether that be a small project, such as optimsing a single process, or a larger site-wide project as part of an environmental management system. The guide also provides many ideas for waste reduction and illustrates them with examples from manufacturers. Annual savings ranged from £17,500 through improved cutting technology, to £360,000 through implementation of a full environmental management system and cleaner design.

In producing Good Practice Guide GG290 ‘Savings from waste minimisation in furniture manufacturing’, Entec was able to apply its own experience, expertise and knowledge to deliver a highly focused guide. Through this work Entec was able to broaden its own experience of applying waste minimisation to the manufacturing industries.

Copies of GG290 can be obtained, free of charge, via the Envirowise Helpline on 0800 585 794, or downloaded from the website at www.envirowise.gov.uk.

Research and published guidance enables cost-saving benefits

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Creating the environment for business

Water Minimisation at a Major UK Refinery

Confidential Client

Entec was appointed to review site water consumption and identify potential cost savings for one of the UK's largest refinery processes. The refinery site used more than 4 million m^3 per annum of potable water at a cost of almost £2 million per annum.

The refinery used potable water in a number of processes including the production of de-mineralised water for boilers, various cooling duties, domestic uses around the site and for the cleaning of process areas. Based on historic data, the consumption for the site seemed high.

A comprehensive water audit was undertaken to identify and quantify the potable water users around the site. Portable ultrasonic flowmeters were used to enable an accurate water balance to be prepared for the refinery. Ultrasonic flow meters provide a non-intrusive measurement of water flow, allowing Entec to measure water use around the key junctions in the water supply network. At the end of the process, a simple mass balance can be produced, accounting for the water use in each area.

Entec's approach to water audits follows the waste management hierarchy, whereby opportunities for elimination and minimisation of water use are exploited before considering reuse before / after treatment.

The most significant find during the audit was that a 'closed loop' cooling system was actually being supplied with 110 m^3/hr of water. More detailed investigations revealed that there was a major tube leak in a shell-and-tube condensate cooler. When the equipment was isolated, the water flow dropped by 80 m^3/hr. This reduced the site water consumption by 675,000 m^3 per annum and reduced water costs by £300,000 per annum. Further savings would be achieved from the energy used by the pumps and the additional maintenance that may arise from increased pump usage.

Investigations and technical advice lead to potentially huge cost savings

The audit also identified additional potential opportunities to reduce potable water consumption by a further 500,000 m^3 per annum, saving a further £220,000 per annum in purchased water costs. These savings could be achieved by:

- substitution by seawater for potable water on some duties;
- optimisation of water flow to some process units; and
- improved control of boiler blow-down.

Each recommendation was supported by a basic assessment of the costs associated with the measure. Capital costs were estimated from approximate distances between plant items.

The savings will help the refinery to reduce operational costs as well as have greater control over the process. The water audit has also helped the site understand its potable water use, which is now monitored on a regular basis to identify any unexpected increases in use.

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Creating the environment for business

Best Practice in Waste Minimisation and Cleaner Technology

Envirowise

Envirowise is a government funded programme that provides free, independent, confidential advice to UK industry and commerce. It encourages UK companies to become more competitive and to improve their environmental performance by reducing waste at source. As part of this programme, Envirowise provides information on best practice in a range of formats including good practice guides, case studies and industry workshops.

Entec has carried out over 30 projects which typically involve technical, economic and market evaluation and extensive discussions with operating companies, equipment suppliers, trade associations and other relevant organisations. Entec's key strength is its ability to combine technical waste minimisation expertise with industry knowledge, and experience in preparing reports and delivering training.

Entec has conducted benchmarking exercises in several industries to determine the existing level of environmental performance. These studies identify areas for improvements and help industries demonstrate any future environmental improvements. To date Entec has produced benchmarks for the engineering, electronics, paper, packaging, printing and plastic processing industries.

Entec has identified and compiled information on environmental good practice in several sectors including engineering, chemicals, and food and drink, as well as for cross-sectoral issues such as cost-effective pollution control and solvents and VOCs. Entec has also developed and delivered a number of industry workshops on behalf of Envirowise addressing waste minimisation (including solvent management), energy efficiency and environmental management systems.

Entec delivers value to Envirowise by producing information for publications and training materials, which are relevant to and easily understood by the target audience.

Free environmental advice and guidance for UK businesses

Entec

Creating the environment for business

Comparison of Trade Effluent Tariffs with the Costs of Treatment

Northumbrian Water

Northumbrian Water provides water and sewerage services to domestic, commercial and industrial customers in the north-east of England. Due to a major investment programme, undertaken largely in response to EU legislation, biological treatment was introduced at all of its main coastal wastewater treatment works almost simultaneously. This represented a step change in Northumbrian Water's business and they wanted to assess whether or not future trade effluent charges would reflect the actual costs of trade effluent treatment.

Entec reviewed the flow and load data for all the sewage treatment works in the region and identified that <5% of the works received >95% of the trade effluent. A cost model was developed to analyse these 17 sewage treatment works in detail. Data was collated for:

- direct operating costs;
- indirect operating costs;
- capital charges; and
- return on investment.

The model developed by Entec then related these costs to the key cost drivers of flow, organic load and suspended solids load. The costs of trade effluent treatment depend on how much effluent is treated and how strong it is. The output from the model was the cost of treatment at each works and the average regional cost, calculated as the cost of:

- reception and conveyance (sewerage);
- volumetric (primary) treatment;
- biological (secondary) treatment; and
- sludge treatment and disposal.

Analysing the costs in this manner enabled a direct comparison to be made with trade effluent charges, which are calculated using the Mogden formula. As a result, Entec recommended that the Mogden formula applied by Northumbrian Water should be modified. The changes proposed were a reduction in the biological treatment charge element and the addition of an additional volumetric charge element.

Entec's work enabled Northumbrian Water to gain a better understanding of the relationship between the business costs and the provision of services to their customers. Entec also modelled the impact of the proposed tariffs on all trade effluent customers. Whilst most customers receiving secondary treatment for the first time were obviously faced with a significant increase in charges, the cost modelling work undertaken and the resulting tariff generally reduced the size of those increases and ensured cost reflectivity. For those customers (the minority) already receiving secondary treatment, the proposed tariffs generally either reduced bills or were cost neutral.

Cost modelling informs proposed effluent treatment tariffs

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Creating the environment for business

Project CLEVER - Water and Effluent Minimisation for SMEs

Northumbrian Water and Environment Agency

Project CLEVER (Coastal Liquid Effluent VolumE Reduction) was a collaborative project between Northumbrian Water, the Environment Agency and Entec. It was partially funded by the Government Office for the North East (GONE) through the European Regional Development Fund (ERDF). The aim was to work with 10 small to medium sized enterprises (SMEs) who were incurring additional trade effluent charges as a result of the Urban Waste Water Treatment Directive.

Entec provided waste minimisation expertise to the 10 SMEs who included food processors, abattoirs, soft drinks manufacturers and a specialist blender of detergent products. A structured approach was adopted for each site that involved the:

- preparation of a water balance;
- prioritisation of areas for closer study;
- development of minimisation opportunities;
- cost-benefit assessments; and
- preparation of case studies for dissemination.

The details of Entec's work varied from site to site but some common themes did emerge. There were numerous examples where we demonstrated that water use could be dramatically reduced by the installation of simple flow controls (at no or low cost). Ensuring that water is only supplied to machinery when it is in operation is very effective in optimising water use, again at no or low cost. We also demonstrated that there were substantial opportunities to minimise water use in cleaning operations in food and drink companies, without compromising hygiene standards. Historically, the need for a clean production environment and the relatively low costs of water supply and effluent discharge have led to some very inefficient practices.

At the end the project, case studies were prepared to publicise the achievements of the participating companies and spread the information on good practice to other water users. No cost and low cost savings worth £150,000 per annum were identified during the project. This was equivalent to a reduction in total water and effluent costs of almost 40% across the 10 sites.

Demonstrating how a good practice approach can result in real cost savings

Sample client list

Aroma & Fine Chemicals
Bairds Malt
BP Oil
Corus
Du Pont
Envirowise
Environment Agency
ExxonMobil
Ford
KP Foods
Nelson's of Aintree
Nissan
Northumbrian Water
Ondeo Industrial Solutions
Premier Brands
Rohm and Haas
Scottish Courage Brewing
Texaco

Entec

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