

## THE FILTRATION SOCIETY TAKES THE ENVIRONMENT SERIOUSLY

*The Filtration Society was founded over 40 years ago with the objective of collating existing filtration and separation technologies, actively promoting new developments and providing an important resource centre for all filter related industries.*

*Although in the past the focus has been on novel filtration technologies driven by commercial considerations, the last few years have seen an exponential increase in environmental related issues.*

*Unfortunately, the mention of the environment to an industrialist often brings with it thoughts of a cost penalty but it is encouraging to see a distinct cultural shift towards environmentally friendly filtration technologies.*

*The Filtration Society is in a unique position to bring together the latest technologies and apply them to the serious issues threatening our planet, nearly all of which are related in some way to the process of filtration.*

### INCREASING LEGISLATION

There is little doubt that the environment could not sustain the rate of pollution initiated at the time of the industrial revolution and unless stringent measurements were taken, the world would very soon become poisoned by its own effluent. Legislation was therefore inevitable.

Scientific conferences sponsored by The Filtration Society such as Regulatory and Technical Issues in

One technology set to revolutionise wastewater treatment is Membrane Bioreactors.

Although MBRs have been available for over 25 years, it is only in the last 10 years that scale-up and reduced costs have made the technology commercially viable and only in the last few years that plants can handle the required volumes.

When coupled with an increased efficiency and a footprint up to 50% the size, it is not surprising that MBRs are increasingly replacing conventional water treatment facilities and can be found in over 300 locations around the world.

### SCIENCE OR MEDIA DRIVEN

It is well known that those with the loudest voices get heard, unfortunately very often above the scientific argument. We must be careful therefore that environmental hazards are not ranked according to media pressure.

For example, Dioxins are a very emotive group of pollutants from incineration, simply because they have received extensive press coverage. The air emission limit has therefore been set at 0.1 nano grams per cubic meter.

Heavy metals, on the other hand, do not sound nearly as dangerous and have received comparatively little press coverage. Consequently, the limit is 0.5 milligrams per cubic meter, a 5000 fold increase in concentration.

## Laboratory Products Focus

Environmental Control are now becoming very popular. Here it is possible to hear of the latest emission standards and the implication on industrial processing.

Contrary to popular belief, working alongside the legislators can have significant commercial advantages, not just in clarifying existing legislation, but in having an insight into proposed new legislations. Discussions with the scientists from the Environmental Agency are always lively for the most positive of reasons.

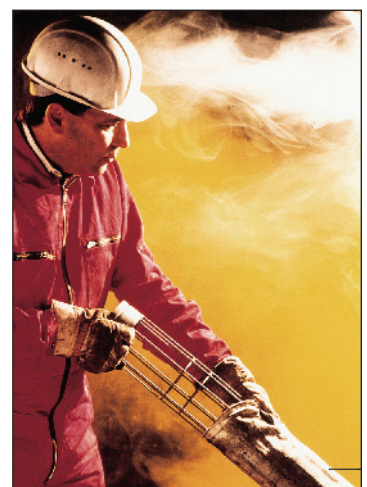
### THE INCENTIVE

Input from the Environmental Agency can be commercially very valuable on two counts. Firstly, their wealth of experience, often in similar industries can result in considerable savings both in equipment selection and running costs. Secondly, and rather paradoxically, the legislation itself can force industry to 'think out side the box' and turn a problem into a solution.

Take for example the cheese industry. Traditionally and quite naturally, the cheese was the primary product and the waste, the whey, was the problem because it could no longer be discharged into rivers. As incineration costs were too high, the solution was to use the latest ultrafiltration equipment to concentrate the whey and reprocess into yoghurts and the latest prebiotic drinks. What used to be the problematic waste suddenly became the most profitable line!

### WATER TREATMENT

Domestic wastewater has increased significantly in recent years, especially in developed countries where automatic clothes and dish washers are now common place. In addition there has been an increased commercial usage resulting in an enormous load being placed on conventional water treatment plants, very often with limited physical space to expand.



*High efficiency bag filters protect the environment*

It was reported recently that Alzheimer's disease is increasing at a frightening rate. As rational scientists, we would be foolish to exclude a link to heavy metal atmospheric pollution. But then the Curies saw no danger in radiation! Nevertheless, a pollution free environment demands the elevation of science above the media in setting our limits on the various pollutants.

### A WIN-WIN SITUATION

A combination of media attention and legislation can result in an acceleration in the development of novel filtration processes. A major problem in incineration has been in the filtration of the hot gases in excess of 4000C.

The Dioxin emission problem forced filter manufacturers to develop high efficiency, hot gas filters, which eliminated the costly stage of having to cool the gases before passing through traditional fabric bag filters.

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An additional advantage of filtering at high temperature is that the ceramic filters can be chemically profiled to remove harmful heavy metal vapours that would otherwise be released to atmosphere. In this example, everyone wins, because the spent cartridges can be sold to recover the expensive heavy metals trapped within the matrix.

### THE BIGGEST CHALLENGE

Without doubt the biggest challenge facing filtration technology, both in terms of scale and complexity, is in the treatment of flue gases from coal fired power stations. Enormous strides have been made in recent years in the desulphurisation process and it is now possible to remove up to 98% of sulphur dioxide from the flue gases. However, the real challenge is to remove the carbon dioxide as well.

It is a thought provoking statistic that a single power station in the UK can produce 750 kg of carbon dioxide a second! Multiply that by the number of coal fired power stations in existence and the two per week being built in China and we see the magnitude of the problem facing our environment in the future.

Filtration processes have reached such an advanced stage that carbon dioxide can be filtered out of air on a molecular level. Unfortunately the scale does not yet match that required for power stations but there are encouraging signs that the process will ultimately be scalable.

Even if the carbon dioxide could be collected, the next problem is what to do with it.

### CARBON DIOXIDE STORAGE

One possible solution, at least from the UK perspective, is to utilise the depleted oil field caverns deep below the North Sea, many of which had stored methane safely for millions of years. There is currently a 1 billion pound incentive from the government to make the technology work and applications for the grants are at an advance stage.

Unfortunately this can only ever be a temporary solution as these storage facilities are only of finite size and limited to the UK's carbon dioxide waste. Furthermore, the possibility of geological haemorrhaging can never be totally ruled out, which could leave an ominous legacy for our children.



New hot gas filtration system for incinerators (Courtesy of Caldo Engineering)



New filtration systems remove 98% of toxic flue gases. The real challenge is filtering out carbon dioxide. (Courtesy of EON, Radcliff-on-Soare)



Ultrafiltration plants can turn waste products into premium products (Courtesy of GEA Process Engineering)

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### CONCLUSION

As an independent, not for profit organisation, The Filtration Society is playing an increasing role in catalysing the development and application of new filter technologies specifically targeted at environmental issues. A really encouraging feature of the one day symposia is the extent to which leading companies are prepared to share their knowledge and so advance the development of new technologies.

Full details of all the technical meetings along with bound notes can be found on the web site [www.filtsoc.com](http://www.filtsoc.com).

- Symposia Organised by The Filtration Society
- Regulatory and Technical Issues in Environmental Control
  - Filter testing and ISO standards
  - Filter Testing, Validation and Monitoring
  - Innovative new filtration developments
  - Latest Advances in Filter Media
  - Automation of Filtration Technologies to increase efficiency

## Call for papers

PSA 2008 Conference and Exhibition, Stratford-upon-Avon, Warwickshire, UK.

This 10th PSA conference, organised by the Particle Characterisation Interest Group of the RSC, follows on from the successful conference and exhibition held in Stratford upon Avon in September 2005.

Papers are invited in the following thematic areas :

#### Process Analytical Technology.

Measuring techniques for particulate systems.

- Single particle and bulk powder characterisation
- Particle size, shape, and microstructure evaluation
- Flow Analysis, including non-invasive particle tracking
- Rheological analysis
- Acoustic measurement techniques, including ultrasound
- Electrical charge and cohesiveness evaluation
- Emerging characterisation techniques for nano systems

#### Particulate systems, products and processes

- Particulate chemistry and product design- Functionalisation across the length scales
- Solids handling and processing
- Multi-phase products and processes
- New theories and methods for nano-systems

#### Computer modelling of particulate systems and processes

The PSA2008 conference and exhibition will be relevant to a range of scientific, technological and engineering sectors, in particular, the pharmaceutical, nuclear, chemical, biomedical, mineral, food and household product industries.

For information on registration, conference and exhibition details contact Nicki Tonkinson, PCIG: Tel: +44 (0)1283 810091 or Email: [ron@psa2008.co.uk](mailto:ron@psa2008.co.uk)

