

INTRODUCTION

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In the nineteenth and twentieth centuries where the majority of industrial development and advancements in science and technology took place, the emphasis had been by and large on meeting demands, reaching manufacturing efficiencies and competing for markets. The notion of pollution, waste and the state of the environment either did not enter this great drive for industrialisation or if it did it took a very low priority indeed. This rather simplistic and maybe convenient approach treated natural resources as if there would be infinite supply and assumed somewhat magical regeneration of resources with no detrimental consequences.

However, during the late 20th century, development in computer and related technologies have created communication networks, which coupled with faster and more economic international travel have played major roles in creating the concept of the “global village” where the general consuming public across the world are much better informed of the harm and the dire effects of what man is doing to himself. Global warming, melting of glaciers, increasing numbers and severity of floods and hurricanes, appearances of new diseases and associated viruses, despite medical advances, are all alarming signs of what is happening to our environment.

To be able to continue global economic development in the present century, issues of sustainability, renewability and recyclability must become central to all wealth-creating activities. The slogan of “polluter pays” must be engraved deep in any governmental and private activity to ensure full commitment to environmental concerns. A unified and all-inclusive set of actions need to be taken not only to clean up the environment but to develop new and novel methodologies to at best eliminate waste and at worst minimise their creation. For such actions to occur requires international cooperation and agreement at all levels of waste productions, its minimisation and not least its effect on trade.

The much talked about Kyoto Treaty, instigated in 1997, was the first serious attempt by industrialised nations to curb emission of greenhouse gases obliging them to reduce emissions by around 5.2% below their 1990 levels over the following decade. However, the USA responsible for at least 55% of world’s toxic gas emissions would not ratify the Treaty. The revised version made considerable compromises to satisfy all concerned and cut the 5.2% reduction requirement to 2% but still failed to win the support of the US before coming into force in February 2005.

Acting independently, the European Union over the past decade or so has tried to enforce a number of directives through its member states with the intention of monitoring and controlling harmful gases and hazardous waste feeding into the environment. The first of these has been the Packaging and Packaging Waste Directive (94/62/EC) implemented in the UK through the Producer Responsibility Obligations (Packaging Waste) Regulations in 1997. According to this directive, businesses with a turnover above £5 million and handling over 50 tonnes of packaging per year have to register with the Environment Agency or a compliance scheme. They also need to supply annual packaging flow information to prove they are meeting their recycling and recovery obligations.

The European Landfill Directive followed next and had to be implemented in

member countries by 2001. The Landfill Directive demands reduction in landfilling of biodegradable municipal waste to 75% of 1995 levels by 2006, 50% by 2009 and 35% by 2016. Countries with major reliance on landfill, such as the UK, will be allowed to claim exemption to delay meeting the targets till 2020. The directive also forbids co-disposal of hazardous and non-hazardous wastes and restricts landfilling of liquid wastes, clinical wastes and other similar materials. Under this directive landfilling of whole and shredded tyres are also banned from 2003 and 2006 respectively.

The proceeding directive (i.e. 2000/76/EC) deals with the issue of incineration and had to be implemented by December 2002. This directive aims to reduce emissions to air, water and land from the incineration of non-hazardous and hazardous wastes. The directive applies to a range of municipal waste, sewage sludge and clinical waste incinerators, as well as a variety of incinerators burning treated waste wood and waste oil. As a consequence, all incinerators in the UK have had to meet the tighter emission requirements of this directive by December 2002.

The waste from Electrical and Electronic Equipment (WEEE) Directive was proposed in June 2000 and, following long delays, it is to be implemented in summer of 2006. This directive provides guidelines for collection, disposal and recycle/re-use of large and small domestic appliances, electrical and electronic tools, toys, monitoring instruments, automatic dispensers as well as computers, lighting and medical equipment. The directive also calls for phasing out the use of heavy metals such as lead, cadmium, mercury and hexavalent chromium, and certain halogenated flame retardants—polybrominated biphenyls (PBBs) and certain (principally the penta- and octabromo-variants) polybrominated diphenyl ethers (PBDE) by 1st January 2008.

The End-of-Life Vehicles Directive (2000/53/EC), one of the latest Directives to be implemented, concerns cars, vans and certain three-wheeled vehicles. Its main requirements are to limit the use of certain hazardous materials in the manufacture of new vehicles and automotive components and to promote the recyclability of vehicles. End-of-life vehicles need to be de-polluted prior to dismantling, recycling or disposal. Producers will be required to pay full or substantial part of the cost of these recoveries by January 2015.

Policing implementation and ensuring full compliance with these directives is a huge and a daunting challenge and may take many years to take roots and become fully established. But given increasing public concern and the apparent readiness of communities around the globe to meet the associated costs and “inconveniences”, it will only be a matter of time before it becomes a universal culture and an ethical measure in that societies respect the environment in which we all live.

As yet there has not been a European directive specifically targeting textiles and textile-related material waste. However, given the volume of synthetic and organic polymers used for various applications, it will not be long before such directives are instigated and demand for their implementations is made. Some carpet manufacturers including Honeywell, BASF and Du Pont already run schemes whereby old carpets are exchanged for new carpets with some degree of success. This kind of marketing strategy could very well be preparing the grounds for imminent directives concerning all textile-related products.

It is in light of these inevitabilities that the textile manufacturers directly or indirectly are increasingly sensing the need to act and clean up their industry. This will only be achieved by serious investment and sustained commitment to new and novel technologies that would eliminate/minimise waste generation and reduce or de-toxify emitted gases and effluent by-products. While national and international regulations

will drive this waste minimisation need forward, we must not forget that challenges remain at technological, fashion and design levels to ensure that recycled textiles and waste products may appear once again in consumer products using processes that are also commercially viable and successful.

In order to play a part in informing world's industrial and academic communities of the scientific and technological advances made in the eco-friendly textile sector, the University of Bolton since 1995 has organised and hosted a series of international conferences on the ecological aspects of textile or "ecotextiles". The prime aims of these conferences have first and foremost been to bring together like-minded specialists across the textile manufacturing, fashion and design spectrum and from around the world and to provide an international platform for exchange of ideas and examination/assessment of innovative methodologies/approaches in tackling the menace of waste and pollution.

The first Ecotextile conference took place in April 1995 and adopted the title "Wealth from Waste in Textiles" as its theme. The conference attracted over eighty delegates from UK and many countries overseas. Over 25 papers and posters were presented and the proceedings were published by Woodhead Publishing. The second conference was held in April 1998 under the following title "Sustained Development"; this conference attracted an even bigger audience and received sponsorships from no less than six industrial and research organizations. Over 120 attended this conference and 36 papers and posters were presented by various delegates from around the world. The proceeding from this conference was also published in 2000 by Woodhead Publishing. This latest Ecotextile conference bearing the following theme "The Way forward for Sustainable Development in Textiles" was held in July 2004 and over 35 international speakers delivered many practical and futuristic solutions in their presentations. A selection of 23 papers presented at this conference have been carefully edited and categorised under different headings for publication in this book.

In editing the papers in this volume, we have tried to maintain the individuality of style of each presentation while assuring an overall requirement of uniform formatting. The validity of technical contents and discussions are the sole responsibilities of the respective authors and readers should focus their enquiries direct to them should the need arise.