The Institute of Materials, Minerals and Mining

The Institute of Materials, Minerals and Mining (IOM3) is a major UK science and engineering institution whose activities promote and develop all aspects of the materials cycle, from exploration and extraction, through characterisation, processing and application, to product recycling and reuse.

IOM3 has over 15,000 individual members and has drawn on this bank of knowledge and expertise to prepare this response, including through its Polymer Society, Mining Technology Division and Mineral Processing and Extractive Metallurgy Division.

CHALLENGE 5: PLASTICS POLLUTION

Question 16: What can be done to address plastics pollution in the water environment?

There is potential to address pollution at several stages in the plastic chain, from manufacturing, through use, to disposal. Preventing plastic from entering the environment should be prioritised over downstream measures.

Government policies and initiatives, such as those set out in the Resources and Waste Strategy, should underpin and inform collaborative action to address plastic pollution, in which the Environment Agency will play a key role.

The amount of plastic waste produced should be reduced, it should be kept at its highest value and in use for as long as possible, and leakage into the environment should be prevented. Extended producer responsibility, consistency in collections and developing UK reprocessing infrastructure, including chemical recycling which plays a useful role capturing difficult to recycle plastics, will help keep material in the system and contribute to these goals.

Preventing litter and improving the rate of recycling on the go is critical to achieving a reduction in plastic pollution. Momentum must be maintained on the actions set out in the Litter Strategy for England and litter infrastructure improved. Delivering behaviour change on litter requires sustained collaboration between relevant agencies and organisations and enforcement should be improved as a priority. Labelling and product design can also play a role in influencing the behaviour of the consumer.

Measurement of plastic including micro-plastics and nano-plastics in the environment and identifying the sources of pollution and its pathways will enable targeted action. Microplastics originating from tyres, for example, are estimated to be one of the largest contributors to microplastics pollution of aquatic environments[1]. Source prevention for tyre wear abrasion should be coupled with downstream measures to capture emitted microplastics.

Robust and standardised methods of wastewater sampling, identification and quantification of plastics should be implemented with transparent and available results.

[1] Eunomia (2018) Investigating options for reducing releases in the aquatic environment of microplastics emitted by (but not intentionally added in) products

Question 17: What actions should the Environment Agency take to reduce plastic pollution?

The Environment Agency should work in collaboration with other bodies and organisations to target and reduce plastic pollution. Areas where the Environment Agency plays a key regulatory role and is well placed to act, include the following:

- Identify hotspots and sources of plastic entering waterways to enable targeted and focussed action to be taken.
- In collaboration with other bodies, ensure coherence regarding anti-littering measures, including educational campaigns and community action. Better enforcement is needed to achieve the required systemic behaviour change.
- Further support of campaigns to reduce plastic entering the waterways such as Operation Clean Sweep (plastic raw material pellet loss protection) to raise its visibility amongst wider supply chains, including ports and logistics providers.
- Illegal waste crime continues to be a serious issue. More action, including working with enforcement partners, is required to ensure operators are taking proper responsibility for their waste. Action to address the issue of illegal waste sites and reduce the illegal export of waste will ensure more material stays within the regulated system and prevent plastic waste from escaping into the environment.
- The waste hierarchy should be better enforced to ensure waste is prevented where possible but when it is created it is managed in the best way possible for the environment. Breaches of the hierarchy should be investigated, and appropriate actions taken.
- Better enforcement of the duty of care legislation to ensure waste is managed correctly throughout its complete journey to disposal or recovery is required.
- Clear, comprehensive guidance and better enforcement of the TEEP test to ensure plastic is being captured for recycling rather than disposed of would assist in reducing the escape of plastic waste to the environment.
- Review and improve regulation of permitted facilities to ensure material is not leaking into the environment. All relevant permits should include permit conditions with direct actions to reduce plastic waste from escaping such as those preventing windblown litter from waste management facilities.
- Identify historic landfill sites that are at risk of coastal and flooding erosion. With the predicted changes in climate, a better understanding and prioritisation of sites that have eroded or are at risk of eroding is required. Robust plans and regular monitoring of sites that are identified as at risk is required.
- Recreational fishing regimes should be reviewed to prevent potential sources of plastic pollution. Discarded fishing gear is a significant contributor to plastic pollution and measures should be taken to prevent this behaviour.

CHALLENGE 6: POLLUTION FROM ABANDONED MINES

Question 18. What can be done to address pollution from abandoned mines?

Pollution from abandoned mines often includes both acid mine drainage from the mine and its spoil heaps but also pollution from poorly designed/closed/remediated slag heaps and tailing dams.

Prevent water from entering mines

- Water often enters mines from high rainfall or flood water that infiltrates the ground and seeps into the mines or through holes in riverbeds. Preventing water from entering the mines, for example through plugging riverbeds, reduces the amount of polluted water consequently leaving the mines.

Treatment technologies

- Treatment plants should be designed and built to effectively treat the discharges including precipitating, safely storing and reprocessing precipitated metals and salts. There are many such plants in the UK from old coal and metal mines – Wheal Jane in Cornwall is a good example of this.
- Planning and design of treatment solutions should take into consideration potential increases in the mobilisation of metals due to the changing climate.
- Siting the waste on flat land where possible, using hydrogeological surveys to determine the direction and flow of treatment ponds and strategic placement of treatment ponds can all assist in reducing pollution and should be considered at the planning stage.
- Parallel technologies, for example metal extraction, that already exist should be applied, as well as learning from other countries and case studies.

Waste prevention

- Process plants treating discharge water should ensure the materials extracted are recovered, for example lead, cadmium and copper.

Funding

- Proper funding is required to support the building and operating of treatment schemes.
- Winning budgets based on cost benefit analysis often favours other work in government such as investment to tackle flooding.
- The waste, water and heat produced should be used to generate revenue streams where possible.

Research and development

- Government, industry and academia should work together to lower whole life cycle costs for mine water treatment.
- Often the operational costs are more of a barrier than the capital build schemes. The scheme at Wheal Jane, for example, uses a chemical system to remove cadmium, copper, zinc, nickel, arsenic and iron but with significant yearly costs to operate. Research and development is required to improve the cost effectiveness of the processes and schemes.
- Further development of current lower cost methods should be invested in, for example Force Crag employs passive compost-based treatment ponds that remove zinc, cadmium and lead without using expensive chemical treatment and pumping.
- More efficient, cost effective measures are required to tackle the more difficult to capture diffuse pollution.