Open burning of solid waste is a global threat to human health and safety that requires urgent action

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A major global study of what happens to consumer goods and other engineered products at the end of their useful life has found widespread

use of unsafe management and disposal practices and calls for urgent action to address the risks posed to human life and health.

The Engineering X Global Review on Safer End of Engineered Life warns that the biggest threat is from the open burning of solid waste which is damaging the health of "tens of millions" of people worldwide but a lack of data means that the true scale of the problem is unknown and more research is urgently needed.

Half a billion tons (24%) of all the municipal solid waste generated on earth is not collected, and a further 27% is mismanaged following collection. Much of this is disposed of by open burning. Uncontrolled burning of waste is particularly widespread in low- and middle-income countries (LMICs) where collection and disposal systems are often poor or completely absent.

Waste is burned close to homes, within industrial or commercial premises, and in large uncontrolled dumpsites. The hazardous cocktail of emissions released into the atmosphere and onto land threatens the environment and the health of those who live and work nearby. The review found evidence of emissions from open burning that are classed as persistent organic pollutants, as well as those that are carcinogenic, mutagenic, cause immunological and developmental impairments, and may lead to reproductive abnormalities.

Thought to be the first study of its kind, the Global Review on Safer End of Engineered Life was commissioned by Engineering X, an international collaboration founded by the Royal Academy of Engineering and Lloyd's Register Foundation. The research was carried out by a team from the University of Leeds in partnership with specialist organizations, including the International Solid Waste Association (ISWA). The researchers examined the challenges to occupational and public safety by identifying the 'pathways' that resulted in people

becoming exposed to potential harm from plastic waste, medical waste, electronic waste, construction and demolition waste, and land disposal.

Open burning is one of three interconnected challenges that emerged from the research along with dumpsites and the hazards facing the world's 11 million 'waste pickers'. These are the men, women and children who make up the vast informal workforce the world relies on to collect more than 90 million metric tons of waste for recycling each year but who are often stigmatized or even criminalized for their activities while being exposed to huge risks, including from open burning.

The review found that there is little accurate data or empirical evidence on where, what and how much solid waste is currently burned, what is released during burning, and what impact burning has on people and the environment locally or on a wider scale. Simply banning open burning will not solve the current safety issues and a large-scale response is needed. Current estimates indicate that ending the practice of open burning could add up to a billion tons of solid waste to be treated and disposed of worldwide.

The authors also considered the complex motivations behind burning of waste that must be understood if interventions to improve safety are to be successful, sustainable and work for everyone. People, businesses and governments have come to rely on the burning of waste for a wide range of reasons and perceived benefits. For instance, medical waste containing both PVC and potentially fatal pathogens is often burned—this avoids the risk of infection from blood-borne viruses but also releases dioxins from the PVC.

The review makes recommendations for urgent action to mitigate harm and for further research and the Engineering X Safer End of Engineered Life program will develop activities to raise awareness of the global safety challenges associated with the burning of waste, the management

of dumpsites and ways to give protection to informal workers. It will convene a multidisciplinary community of practitioners, academics, policy makers and related stakeholders to develop holistic, strategic ways to address the impact on human health and safety.

Professor William Powrie FREng, Professor of Geotechnical Engineering at the University of Southampton and Chair of the Engineering X Safer End of Engineered Life program, said: "This global review contains a wealth of information that will help to inform our activity going forward. There is no doubt that the handling of humanity's waste and its impact on health and safety should be much higher up the global agenda. It beggars belief that we are still using crude and ancient methods of disposal to deal with our 21st century waste problem. This is not just a technical issue—economics and human requirements also play a part. We have been reminded time and again during the preparation of the report that we must work to create appropriate solutions that work in local contexts to reduce harm and not assume that we in higher-income countries have all the answers. We must listen to all voices and build diverse communities around these critical issues and I urge people to join us."

Dr. Ruth Boumphrey, Director of Research at Lloyd's Register Foundation said, "Now is the time for collective action. It is unacceptable that in today's world we do not have a proper understanding of how to safely and responsibly manage the waste from engineered items. We hope that this report will shine a spotlight on these long-neglected issues and help us build new partnerships that lead to action."

Dr. Costas Velis of the University of Leeds, who wrote the report with Ed Cook, said: "Over the past 200 years or so, affluent countries have developed waste management to a point where new research and potential improvements are directed at resource recovery and the

development of a circular economy rather than on safeguarding public and occupational health and safety. We need to remember that in other parts of the world the disposal of man-made materials, products and structures once they become 'waste' at the end of their engineered life can still be a dangerous and harmful business for those involved in the process but much more research and robust data is needed to fully understand the scale of the problem. In particular, open uncontrolled burning is a huge public health challenge we cannot afford to keep ignoring."

Alongside the publication of with the global review report, the full appendices on plastic waste, medical waste, electronic waste; construction and demolition waste; and land disposal are being made available in a pre-publication repository.

More information: Global Review on Safer End of Engineered Life: www.raeng.org.uk/publications/ … s/seel-global-review

Provided by University of Leeds

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