

Reuse, Recycle, Repurpose

Figure 1. The quest for sustainable solutions.



Cover story

Andrea Pitto, Salvadori Srl, Italy,
outlines the importance of mining
tyre recycling.

Huge stockpiles of waste tyres pose both health and environmental concerns. Tyre fire risk is very high in terms of both the environmental impact and safety to the nearby population of people and animals.

During a tyre blaze, toxic emissions can include oil, polycyclic aromatic hydrocarbons (PAHs), and benzene with potential carcinogens. These substances are capable of contaminating the atmosphere, soil, and water table.

In warmer climates, a waste tyre will also store rain and become an ideal incubator for mosquito larvae, thus increasing the risk of spreading diseases such as dengue, malaria, and Zika.

If not properly processed, a waste tyre is there to stay for 100 years.

A few years ago, the only question people asked themselves when considering the environmental damage of a stockpile of end of life tyres was 'what if?' More recently, the issue of sustainability has gained momentum, and the question is becoming 'when?'. For many people across the globe, the world cannot afford to have 'environmental time bombs,' such as tyre stockpiles, ticking around the world.

Luckily, the need to recycle waste tyres has been recognised by regulators worldwide for decades. In the EU, for example, there has been a ban on the disposal of both whole and shredded tyres to landfill for many years.

The focus has initially been dedicated to passenger and truck tyres, but there should be a growing awareness of the need to address this problem in mining tyres.

Chile is at the forefront of this change, and, in January 2021, the extended producer responsibility scheme, known as 'Ley REP 20.920', was finally introduced to cover mining tyres as well.

Hopefully Peru will introduce a similar approach in the next few years, following the publication of Draft Supreme Decree on Management and Handling of End of Life Tires N° 210-2020-MINAM published in October 2020.

Why mining tyres?

The planet has over 6000 operating surface mines. These mines have been operating for an average of 23 years, and 20% have been working for more than 40 years.

To operate efficiently, these surface mines utilise a wide range of equipment, such as dumpers, loaders, and other wheeled vehicles. On average, there are around 29 mining trucks per operation, revealing a staggering total of 175 000 mining trucks in operation worldwide.

This massive fleet of trucks is equipped with extra-large tyres, with rims of up to 63 in., weighing up to 6 t, and with an outer dia. of 4.1 m.

A mining dumper is typically configured with six wheels to tackle the demanding operating conditions, and each of these tyres has an operating life of 5 – 10 months. Once these tyres can no longer be repaired or retreaded, they require disposal. This yields an estimated annual consumption of 1 million mining truck tyres, which equates to 5 million tpy of material to be managed.

When extending this analysis to the wide-ranging fleet of mining vehicles, the obvious consequence is that it results in a substantial eco-liability for current and future generations.

Eco-liability

Some features of this eco-liability include:

- It is concentrated in very specific places, so that it can be efficiently tackled without the hurdle of backtracking an incredible amount of waste streams, as happens with waste passenger car tyres.
- It has been created by super-high-quality rubber that has been engineered with countless technological efforts to withstand very demanding conditions.
- It is unacceptable to allow tons of waste tyre material to sit on a stockpile as a time bomb without putting it to a good use, such as for more sustainable mining.
- There are efficient technical means to convert waste to a value that can be shared with local communities and encourage a circular economy.

Waste to value: a three step approach towards the future

The first step in recycling a waste tyre is the downsizing process, whereby the tyre is cut into multiple sections that can be processed by a traditional shredding line.

Salvadori's MT-Rex® system is a fully automated downsizing system that is capable of managing tyres of

up to 63 in. rim dia. and provides a continuous flow of clean and standardised sized tyre chunks. MT-Rex can be operated by a single operator by means of a forklift, meaning no overhead crane is necessary. Whole off the road (OTR) tyres are loaded in the front-end, and pre-determined sized tyre chunks roll down a conveyor belt.

Following downsizing, the shredding process takes place. In the shredding step, the waste tyres are separated into components: steel, textiles, and granular rubber.

The third and final step is converting granular rubber into coloured and moulded products.

These three steps of downsizing, shredding, and conversion close the loop of the circular economy and enable the transformation of waste to value.

There are countless applications for products derived from recycled rubber crumb: from sound absorbing sheathing to flood barriers, and from sport surfaces to flooring systems and technical articles.

All these applications are 'future ready', as they can be recycled again to create and be used in new products when they reach the end of their useful life.

Moreover, they can be implemented very close to the source of the waste with obvious benefit to the local communities, both at the environmental and social level.

A circular future of business

As demand for resources has grown exponentially in recent years, leaders and businesses have discussed circularity as a new model to manage resource limits while pursuing economic growth, but this thinking has largely remained 'talk' and is yet to be put into practice.

Global leaders and businesses understand that the current 'take-make-dispose' model is pushing the environment closer to the breaking point; in fact, the world is still only 9% circular. The new circular economy is one in which resources are kept in use for as long as possible, extracting the maximum value from them while in use, and then recovering and regenerating products and materials at the end of each product's service life.

Developing a sustainable and circular economy is just part of a solution that can help address the challenges of rubber waste and improving environmental health.

The future generations

Everyone should be concerned about keeping the environment clean, and going the extra mile to preserve and improve what is left for future generations.

This aligns with the United Nations (UN) development goals for sustainable cities and communities, a responsible consumption and production chain, and a responsible climate action.

Waste to value solutions in tyre recycling can play a key role in reaching these goals for both the local communities and the world's ecosystem in general.

With this approach, a mining operation can convert a high-risk eco-liability into a valuable resource, becoming more sustainable and playing an important role in the circular economy. **GMR**



Figure 2. Companies should explore waste to value solutions for a green economy.