INFORMATION LETTER

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Dear customers and partners of NGO Rehviringlus!

You are reading our second newsletter. In this issue, we talk about the reasons why it is beneficial to be a customer of Rehviringlus, inform you about changes to our pricing policy, and give you a brief overview of tyre recovery in the first three quarters of this year. We will also take a look at the use of tyre chips in the global cement industry. We will introduce the nature of the pyrolysis process and provide an overview of the carbon footprint of tyre bales compared to the use of tyres in the pyrolysis process. NGO Rehviringlus aims to get an overview of the climate impact of all recovery methods used in Estonia.

Why you should continue to be a customer of NGO Rehviringlus or become one

1. As a producer responsibility organisation, Rehviringlus is a non-profit organisation whose aim is not to make a profit, but to treat and serve all tyre handlers equally for the purpose of environmental conservation.
2 It is the only producer responsibility organisation for waste tyres in Estonia that has consistently fulfilled its obligations since its establishment in 2010.
3 Rehviringlus has over 100 waste tyre collection points across the country for customer convenience.
4 Rehviringlus uses various methods of recycling waste tyres, finding the most suitable treatment methods for different types of waste tyres. Our solutions remain diverse and competitive, even amidst changing market dynamics.
5 Rehviringlus has offered its customers a stable pricing policy.
6 Rehviringlus communicates openly and regularly informs its customers.
7 Rehviringlus is ready to cooperate with everyone who contributes to the recycling of waste tyres.
8 Rehviringlus actively participates in drafting legislation and clarifying regulations, contributing to the sector's development. We are industry advocates for our partners and customers and are always open to new ideas and suggestions.

We have decided to lower our rates by €10 in all categories starting from 1 January 2024.

- NGO Rehviringlus has established a producer responsibility organization that has been in operation for 13 years.
- We have diversified recycling partners, whose competition with each other compels us to keep prices optimal and fair for the producers, both today and in the future.
- The logistics of transporting tyres have improved significantly – waiting times for tyres to be collected from collection points and customers have been reduced and transportation costs have decreased.
- We have collected sufficient funds to cover unexpected costs to mitigate the pressure of price increases related to collection, logistics, and tyre handling.
- We have used our financial resources wisely and ensured payment discipline for companies that have joined us.

New rates starting from 1 January 2024:

Passenger car, SUV and van tyres	110 €/t
Truck and bus tyres	110 €/t
Special service tyres (lifting equipment and tractor tyres, etc)	190 €/t
Other tyres (bicycle, motorcycle and ATV tyres, etc)	110 €/t

The climate law is coming

An ambitious target has been set for the completion of Estonia's climate law: The law is expected to come into force from 1 January 2025. Prior to this, it is necessary to hold a discussion in society about what kind of climate law we want for ourselves, while involving all target groups.
The private and non-profit sectors, along with the public sector including local authorities, mainly participate through working groups. The task of the working groups is to provide cross-sectoral and cross-company advice on the draft climate law. The results of the working groups' deliberations will be published on the website of the Ministry of Climate and to the Climate Council for validation.
The working groups focus on various sectors including energy, transport and mobility, spatial planning and buildings, biodiversity and land use, sustainable food systems, and resource use (this encompasses industry, the circular economy, waste management, minerals, etc).
To create a partnership between the private and public sectors, additional initiatives will be undertaken to develop roadmaps for reducing carbon emissions in industrial sectors. The aim is to thoughtfully consider the objectives, challenges, and needs of these sectors in achieving climate neutrality.

How does all this relate to the issue of producer responsibility for tyres? Indeed, it does, because the political choices in energy, transportation and mobility, as well as resource utilisation, will shape the future of waster tyre management. NGO Rehviringlus will definitely monitor the developments related to the climate law to contribute to discussions about the recycling of waste tyres.

The PRO's range of tyre producers will soon be extended to include car importers.

The draft Waste Act https://eelnoud.valitsus.ee/main/mount/docList/dc72b054-2248-401f-aeed-30418858ce91 concerning tyre manufacturers underwent another round of coordination.
This is a draft that also defines car importers as tyre manufacturers. Compared to the current definition, the definition of 'tyre manufacturer' is broadened and amended to add that a tyre manufacturer is also a person who places tyres on the market in Estonia as a stand-alone product 'tyre' or in combination with a trailer, towed machinery, off-road vehicle, or motor vehicle. The previous term only defined a tyre manufacturer as a person who places tyres on the market in Estonia as a stand-alone product 'tyre'. Stakeholder proposals for a single producer responsibility system have been taken into account. Extended producer responsibility is a measure to ensure the re-use, prevention, recycling, and other recovery of waste. Any natural or legal person who, in the course of his or her business or profession, develops, manufactures, processes, sells or imports products of concern, has an extended producer responsibility, ie the producer is obliged to ensure the collection and recovery or disposal of the waste generated by the product of concern he or she places on the market. The act is scheduled to enter into force by general procedure.

Is there any cheating in tyre import?

NGO Rehviringlus submitted a request for information to the Transport Board on the initial registrations of vehicles in 2021 and 2022.
The question we were interested in was how many of the imported vehicles are registered by natural persons and how many by legal persons. Why is this important? When the new amendment to the Waste Act enters into force, vehicle importers (legal persons) will have to join, but not private persons.
The data received shows that 50% of initial registrations are made by natural persons. This amounts to around 1,500 tonnes of tyres per year (€180,000) that will enter the country, but the recycling of which will have to be paid for by the joined companies. The majority are passenger cars.
Legal persons who have not listed the import of vehicles as their main activity and may therefore be excluded from the system, ie do not contribute to the recovery costs, are added to this.

Does the use of tyre chips have a future in the cement industry?

According to the Best Available Techniques (BAT) Reference Document for the Production of Cement, Lime and Magnesium Oxide https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/CLM_Published_def_0.pdf a wide variety of waste materials, including tyre waste, are used as fuel in the cement industry in the European Union.

IEA and CSI initiative
https://www.wbcsd.org/Sector-Projects/Cement-Sustainability-Initiative/Resources/Technology-Roadmap-Low-Carbon-Transition-in-the-Cement-Industry

According to a report by the International Energy Agency (IEA) and the Cement Sustainability Initiative (CSI), a combination of technology and policy solutions could create an opportunity to reduce the cement industry's direct carbon emissions by 24% by 2050 compared to 2018 levels.
The technology roadmap, called Low-Carbon Transition in the Cement Industry, updates the first global sectoral roadmap, which was drawn up back in 2009. It aims to identify and develop international collaborative efforts and provide evidence to public and private decision-makers so that they can move towards more sustainable cement production that can contribute to the achievement of long-term climate goals.
The cement sector is the world's third largest industrial consumer of energy, consuming 7% of industrial energy, and the second largest industrial emitter of CO_2, accounting for around 7% of global emissions.
The Cement Sustainability Initiative (CSI) is a global effort by 24 major cement producers, operating in more than
100 countries, who believe there is a business case for pursuing sustainable development. Switching to alternative fuels is seen as part of the solution.
Coal, historically oil shale in Estonia, is the most widely used fuel for cement production, accounting for 70% of global cement thermal energy consumption. Oil and natural gas together account for 24% of the thermal energy demand for cement production, and biomass and waste (alternative fuels) account for just over 5% of global thermal energy use in this sector. The shift to less carbon-intensive fuels will allow a 24% reduction in the share of fossil fuels in the 2° climate scenario by 2050.
The biogenic fractions of biomass and waste are considered neutral in terms of CO_2 emissions from combustion. Material efficiency strategies to reduce carbon emissions, such as the reuse of consumer goods and less material-intensive products in a low-carbon society, will influence the type and amount of waste materials available in the future. Typical types of waste that can be used as alternative fuels in cement kilns include: discarded or shredded tyres, waste oils and solvents, pre-treated or untreated industrial waste, including lime mud from paper and similar industries, non-reusable plastics, textile and paper residues, fuels from municipal solid waste, and clarified sewage sludge.
In the cement industry, the entirely biomass-based fuels are wood waste, sawdust, and sewage sludge. The use of other biomass-based substances from fast-growing cultivated species (eg certain woods, grasses, and algae) is technologically feasible, but is currently not globally economical for the cement industry. There are technical requirements that should be met, such as a high minimum average calorific value of 20–22 GJ/t of fuel during combustion compared to typical organic materials (10–18 GJ/t). Tyre chips have an average calorific value of 26 GJ/t.
In low-carbon contexts such as climate scenario 2°, where end-users increasingly compete for biomass energy sources to support decarbonisation strategies, the price of biomass is likely to rise as it will become scarce.

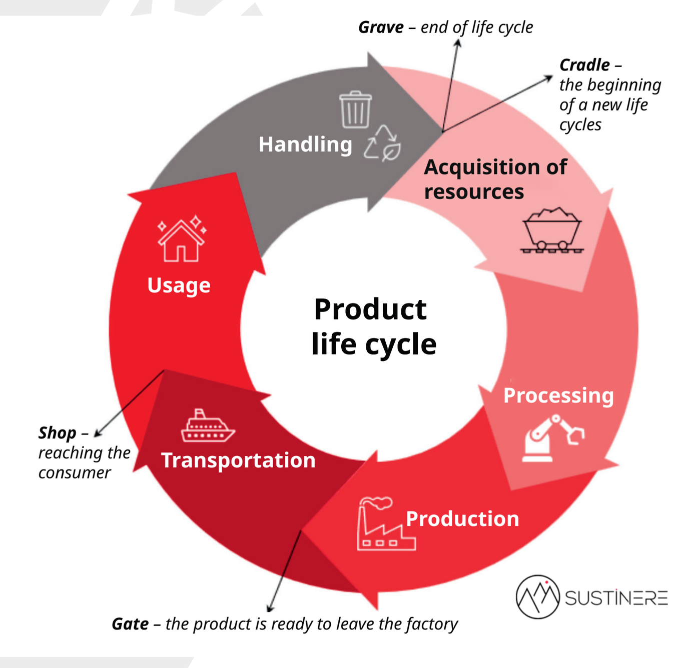
From global to regional
The use of alternative fuels, including tyre chips, is part of sustainable production policy in cement production.
https://schwenk.lv/en/sustainability/sustainable-manufacturing/
The SCHWENK cement plant in Brocēnis, Latvia, is one of the most modern industrial examples in Europe, with 85% of the fuel used being alternative fuel. Its use reduces emissions from the production process and ensures a more environmentally friendly approach. A temperature of 1500 °C – 2000 °C in the furnace prevents the release of waste and harmful emissions into the environment and air.

Pyrolysis of waste tyres for marine fuels

The summary is based on Andres Meesak´s article 'Vanarehvidest õli tootmisel on pahupool, millest ettevõtjad rääkida ei taha' ('There is a downside to producing oil from waste tyres that entrepreneurs avoid discussing'), published in Roheportaal on 6 October.
The production of oil from waste tyres is not part of an environmentally friendly circular economy, although it has been presented as such.
Over the past few months, a widely circulated perspective among the public, and among policymakers as well, is that utilising pyrolysis to produce oil from scrap tyres is viewed as a straightforward solution to completely resolving the issue of tyre waste management. The idea has been publicly supported by businesses – primarily the Eesti Energia group, but also the waste management company Ragn-Sells and interested researchers. The idea is presented in contrast to solutions that are currently in use today.
It is true that there have not been too many success stories in the management of waste tyres in Estonia. However, when presenting the benefits and great potential of scrap tyre pyrolysis, there is a tendency to quickly gloss over or smoothly "forget" the downside of this technology. Pyrolysis is by nature one of the processes of chemical decomposition of organic material, whereby the material is decomposed in an oxygen-depleted environment at high temperature. The pyrolysis process generally results in liquid fuels, carbon black, and gas. As a chemical process, pyrolysis is also the basis for Eesti Energia's shale oil production technology.
What is the less-discussed drawback of the pyrolysis process for recycling waste tyres? Depending on the equipment used for pyrolysis, scrap tyres need to be shredded into tyre chips in a rather energy-intensive process. For some equipment, the steel has to be separated from the rubber, which is not at all easy and is very energy intensive because of the fine steel strands vulcanised into the rubber. If the steel is not separated from the rubber, the steel strands in the downstream reactor will start to form wire bundles similar to balls of yarn, causing jams and equipment failures.
Problems in oil production stem from the composition of the rubber. After the steel has been extracted, what remains is tyre shreds consisting of rubber and a minimal quantity of textile. This material can be pyrolysed at about 500–550 °C, so that it would start decomposing. The pyrolysis process yields approximately 40–50% pyrolysis oil, 35–40% carbon black, and about 10% combustible gas from tyre chips. The gas is generally combusted to keep the process going. What is left is oil and carbon black. Problems in oil production stem from the composition of the rubber. The main component of rubber caoutchouc is an amorphous material, it is not malleable and over time it will disperse. In order for caoutchouc to become rubber, it must be vulcanised. Vulcanisation is again a chemical process that transforms raw rubber into malleable rubber, with sulphur playing an important role.
Sulphur does not evaporate in the course of pyrolysis, but goes predominantly into the oil. Unrefined pyrolysis oil contains approximately 1.4% sulphur.
It is of course possible to reduce sulphur content with various downstream processes, but this is again a very energy-intensive process and probably not economically viable any time soon, if ever, given the world oil price and the trend towards alternative transport and motor fuels. As regards the sulphur content of fuels, the environmental requirements are the least stringent for marine fuels and the most stringent for liquid fuels used in land transport.
The second pyrolysis process yields carbon black, which is in principle pure carbon and in theory has a very wide range of uses, but in reality, nobody needs it, for money or for free. A good example is the Hansa Biodiesel tyre pyrolysis plant, which operated in Kunda for a short period of time. The gas from the process was burned to keep the process going, the oil was illegally burned in an electric generator and the carbon remained.
The facility stopped functioning several years ago, yet the carbon black remained on the plant's premises, posing an environmental risk, waiting for the better times that never came. In theory, this carbon black could be used as a fuel in various furnaces – for example in cement kilns and cogeneration plants, but transporting the soot to the furnaces, recalibrating the combustion equipment, and so on, makes it economically unviable.
The economic aspect also comes into play in Eesti Energia's plans. In fact, the group has stated in various articles that it plans to recycle 70,000–100,000 tonnes of waste tyres annually together with oil shale in its new plant. Let's recall that Estonia generates approximately 13–15,000 tonnes of scrap tyres per year. Thus, in order for it to be economically viable for Eesti Energia to pyrolyse waste tyres, 4.5–6.5 times more waste tyres are needed than are produced in Estonia annually. This means that scrap tyres should be imported. There has been talk of Sweden being one option, but also of southern neighbours, who today burn most of their own and some of our scrap tyres as tyre chips in cement kilns.
Now, let's recall that pyrolysis produces around 34–40% of carbon black, which has no real application, especially if the rubber shreds from tyres are reprocessed together with oil shale. The resulting carbon black is therefore also mixed with shale ash and deposited in an ash heap. In simple terms, there is an active lobby to import more waste tyres into Estonia than we can produce ourselves, in order to annually pyrolyse 40–50,000 tonnes of high-sulphur oil, the marketing of which is ethically questionable. In addition, the process generates 35–40,000 tonnes of solid waste, which is deposited in ash heaps and left for future generations. The amount of waste that could be landfilled in the heaps would therefore be approximately three times more than the amount of scrap tyres we generate in Estonia.
The use of waste tyres in the pyrolysis of oil shale is one of the possible legal treatment options, but it is not an environmentally friendly treatment option. The question arises as to what the actual carbon footprint of such a treatment is. In any case, the planned scale of action is not necessary to solve the problem of waste tyres in Estonia. Preference should be given to treatment methods higher up the waste hierarchy – for example, recycling old tyres into new ones. Drawing a parallel with the transition to renewable energy, where different energy generation and storage technologies ensure an adequate, sustainable, and cost-effective energy supply, the key to solving the problem of waste tyres in a sustainable way and with the least possible environmental impact is also the diversity of treatment options.

The carbon footprint of waste tyre recovery technologies

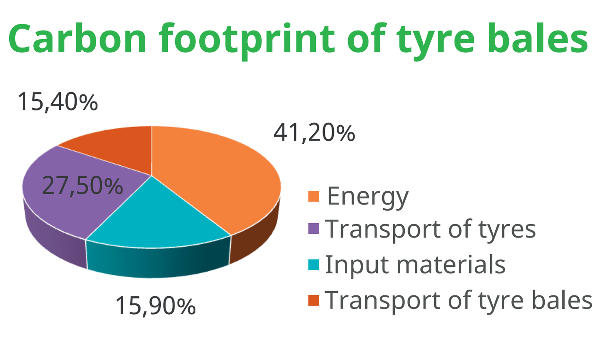
Life Cycle Assessment (LCA) was used to assess the carbon footprint of the product. Life Cycle Assessment of a product is a comprehensive method for assessing the environmental impacts of a product or service throughout its entire life cycle, regulated by ISO standards[1].



An LCA analyses and assesses the environmental impacts of a product or service throughout its life cycle, from cradle to grave.
In practice, the assessment does not always extend to the end of the cycle but may be limited to, for example, the gate of the company or another relevant stage. In any case, the assessment must take into account all the inputs and processes necessary for the functioning of the system under investigation.
For waste tyre bales, the carbon footprint was assessed in the cradle-to-shop stages, ie from raw material sourcing and processing to product manufacture and transport to the customer (steps 1–4 in the figure).
In the case of waste tyre pyrolysis, the carbon footprint was assessed at the cradle-to-gate stages, ie up to the production of pyrolysis products (pyrolysis oil, pyrolysis gas, electricity) (steps 1–3 in the figure).

[1] *International Organization for Standardization, ISO 14040, 14044 and 14067.*

Tyre bales
NGO Rehviringlus has started to assess the climate impact of waste tyre recovery methods used in Estonia. Since tyre bales and their use have been in the media spotlight, we started with them.
NGO Rehviringlus approached OÜ Sustinere to assess the environmental impact of one of the treatment methods used by NGO Rehviringlus, the production of tyre bales. One of the areas of activity of OÜ Sustinere is to calculate the climate impact of companies as well as of products and services by mapping the most important sources of greenhouse gases (GHG) (eg energy and material flows, purchased energy and products/services, etc) and finding the specific impact value for each input and output (eg waste). The analysis uses recognised databases, relevant scientific literature, and national inventory reports to produce results. The calculation of the carbon footprint of a product or service is based on relevant ISO standards (eg ISO 14040 and ISO 14044 for life cycle assessment).



For waste tyre bales, the carbon footprint was assessed in the cradle-to-shop stages, ie from raw material sourcing and processing to product manufacture and transport to the customer.
41.2% of the carbon footprint was related to the use of electricity and diesel in the manufacturing and loading process of tyre bales. Of this, diesel accounted for 72% and electricity 28%. For fuel, the indirect impacts associated with fuel (fuel procurement, processing, transport) are also taken into account. For electricity, network losses have been taken into account.
27.5% of the carbon footprint comes from the transport of waste tyres. The impact of the transport of tyre bales and the use of input materials is almost equal, at 15.4% and 15.9% respectively. The carbon footprint of tyre bales in the scope of the assessment described above is **30.1 kg of CO_2 eq** per tonne of tyre bale, ie the greenhouse gas emissions per tonne of production. The use of tyre bales in infrastructure construction has an additional climate impact associated with the construction process, but there are no further carbon emissions from the tyre bales once installed in the structure.

The carbon footprint of tyre bale production is 30.1 kg CO_2 eq per tonne of tyre bale

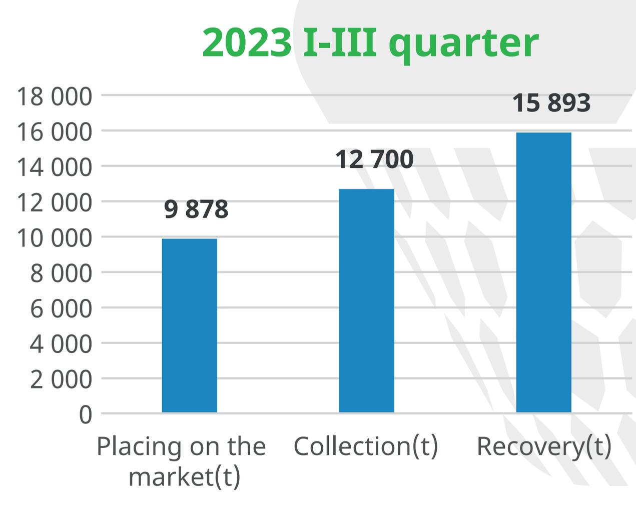
Pyrolysis of waste tyres

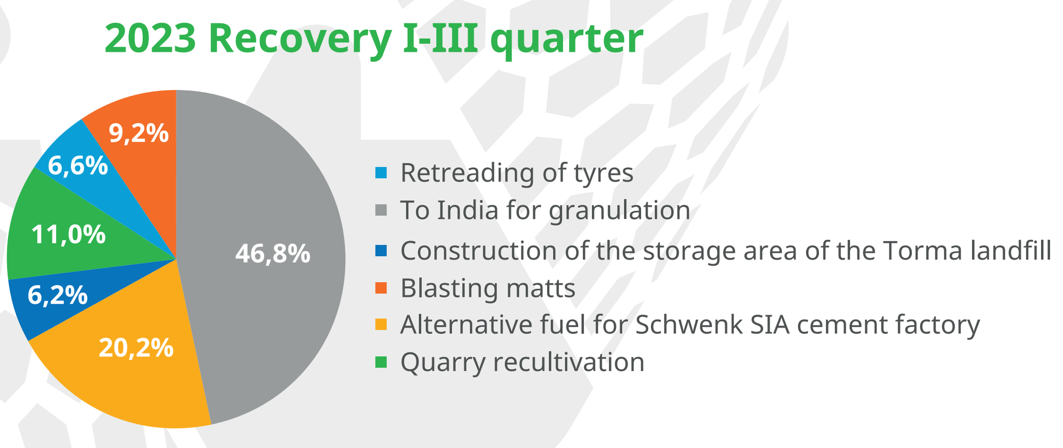
As Enefit Power has invested in the introduction of waste tyre pyrolysis in recent years, we also asked for an estimate of the GHG emissions from the pyrolysis of 1 tonne of waste tyres, which, based on publicly available information, is **230 kg CO_2 eq** in Estonia. For the calculations, the steps from cradle to gate have been used as the assessment boundaries. NGO Rehviringlus will contact Enefit Power to confirm the accuracy of the source data. The preliminary results obtained are quite good, as according to research, the production of pyrolysis oil from tyre chips can also result in GHG emissions of up to
400 kg CO_2 equivalent. This is only for pyrolysis oil, and burning it adds significant additional CO2 emissions. The pyrolysis of waste tyres is one of the possibilities for the treatment of waste tyres in Estonia and, if the conditions are suitable, NGO Rehviringlus is interested in diversifying its recovery options..

1 tonne of waste tyre pyrolysis produces 230–400 kg CO_2 eq of GHG emissions.

Tyre recovery

In the first three quarters of 2023, 9,880 tonnes of tyres were placed on the market in Estonia, of which 5,425 tonnes were tyres for passenger cars, SUVs, and light vans. However, we collected 12,700 tonnes of tyres. Such a large gap between market introduction and collection may have been caused by a drop in tyre sales, but on the collection side, by a certain amount of tyres that had previously not been disposed of reaching the recovery system. An even larger amount – 15,893 tonnes – was recovered, due to the stock of tyres collected last year being reduced and recovered. Today, all collected scrap tyres have been handled and recovered – with minimal stock left at collection points and handlers. 62% of the recovered tyres were recycled, 20.2% for energy production, 6.2% for use as construction materials and 11%, mainly special service tyres, for quarry backfilling. 87% of recovered tyres were exported.





If you have any questions or proposals on how to improve the work of Rehviringlus, please get in touch:
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Share your good ideas and observations with us!