

THE CLIMATE SOLUTIONS FRAMEWORK

How can we know that a product or service genuinely offers a significantly smaller climate footprint than existing alternatives on the market?

The Climate Solutions Framework (CSF) has been developed by the Exponential Roadmap Initiative in collaboration with Oxford Net Zero and experts from business, NGOs, and finance. Its certification serves as a guide to financial institutions and corporations in making informed decisions leading to significant emission reductions while avoiding green washing. The framework sets out criteria anchored in science for defining climate solutions and climate solutions companies. A climate solution is defined as a product or service that contributes to emissions reductions at a global level by producing significantly lower emissions than current market options. Production and consumption of climate solutions are compatible with the global 1.5°C ambition and, when established options are replaced, will accelerate the transition towards a net zero carbon economy.

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Circularity, calculations and avoided emissions

According to the UN, the ever-increasing extraction and processing of virgin raw materials is responsible for more than half of all climate emissions, 90 per cent of biodiversity loss, and 90 per cent of water scarcity in the world.

The traditional linear economy, where we continuously extract new raw materials for nearly everything we produce and build, puts significant pressure on the planet. Transitioning to a circular economy is crucial to our ability to mitigate climate change, the depletion of our natural resources, and the overshooting of planetary boundaries.

Ragn-Sells aims to lead the shift from a linear to a circular economy by deploying new and scalable circular solutions, helping to reduce climate impact in value chains beyond our own operations. The core is a new view on waste throughout society, moving from 'waste management' to 'resource management'.

The avoided emissions concept estimates the potential amount of carbon emissions prevented by using a specific product or service, when compared to a reference scenario in which the product or service is not used. It provides a structured way to assess how different solutions may contribute to reducing greenhouse gas emissions across society.

Solvent Recycling: A Qualified Climate Solution

Ragn-Sells and Vilokan jointly operate the Solvent Recycling Solutions (SRS) facility at Högbytorp, Sweden, recovering high-quality industrial solvents from waste and returning them to the market as circular, low-carbon alternatives.

The Solvent Recycling Solutions operation addresses two issues at once. One, we make use of a waste resource that is generally incinerated. Two, we replace fossil-based, emissions-intensive solvents with circular alternatives on the regular market. The SRS facility focuses on the recovery of three common solvents: Acetone, industrial ethanol, and propylene glycol.

Life cycle assessments comparing the recycled solvents with a market-weighted average of the products they replace indicate massive potential reductions of carbon emissions. For acetone, the recycled product carries 81 per cent lower emissions than the equivalent virgin alternatives on the market, while the reduction for ethanol and propylene glycol is 74 per cent and 63 per cent respectively.

For this reason, the SRS operation has been confirmed and certified as a Climate Solution within the Climate Solutions Framework (CSF) established by the Exponential Roadmap Initiative.

The Högbytorp facility has the capacity to process more than 20,000 tonnes of waste solvents annually. The statement of qualification will be monitored and evaluated regularly.



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Flat glass: Giving windows new life

Flat glass is everywhere around us, from windows and car wind shields to computer screens and solar panels. Yet very little of it is used more than once, despite the fact that the world is actually running out of sand suitable for glass production.

In Sweden alone, 35,000 tonnes of flat glass are landfilled each year. A significant share of that glass can be remelted and used to produce new glass, decreasing the need for to extract and process virgin raw materials and saving energy.

Using careful methods to keep the valuable raw material clean, Ragn-Sells collects waste flat glass and separates it from other materials. We crush the glass and transport it to a specialised facility in Örebro, Sweden. Here, the glass is sorted, using advanced camera technology to identify and separate glass of different colour and quality.

The resulting material is no longer classified as a waste. It is then sold as shards, known in the industry as cullet – a secondary raw material suitable for a range of applications. For each tonne of recycled cullet used in glass production, approximately 1.2 tonnes of virgin raw materials are replaced. Higher recycled content in glass manufacturing also reduces energy demand. In total, recycling flat glass yields a climate impact reduction of over 70 per cent compared to traditional manufacturing.

With proper methods, flat glass is a fully recyclable material. Given the amount of glass in the world, the potential to avoid climate emissions is huge.



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Aquaculture: Closing the Fish Poop Loop

Fish farming, or aquaculture, is one of the world's fastest-growing food sectors, providing high-quality protein for a growing world population. However, scaling up the industry comes with several urgent challenges.

The fish consume feed which often has a significant climate impact. Even more significantly, feed residue and fish faeces form a sludge which sinks through the net pens into the sea. This pollution, with large quantities of nutrients like phosphorus and nitrogen, contribute to eutrophication in the local marine environment. As the sludge decomposes, it also releases methane – a powerful greenhouse gas – and carbon dioxide.

Together with partners in Norway, Ragn-Sells has developed a solution which mitigates the negative impact of fish farms as well as circulating valuable resources.

After collecting the sludge underneath the pens, it can be used to produce biogas. Phosphorus can then be extracted and used in the production of new feed where legislation permits, replacing mined phosphate.

This system prevents climate emissions, produces renewable energy, and enables circular use of finite resources like phosphorus. It is a suitable climate change mitigation strategy, while protecting the coastal environment and enabling global growth of sustainable aquaculture without adding eutrophication pressure.

Life cycle assessment studies show that collecting the sludge at a fish farm can avoid 1,000 tonnes of CO₂ emissions every year. This translates to up to 600,000 tonnes in Norway alone.



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Oil Shale Ash: Closing the Waste Loop

Oil shale has powered Estonia's electricity sector for over a century, but this legacy has come at a cost: nearly **600 million tonnes of oil shale ash** now sit deposited in Ida-Virumaa, making it one of Europe's largest industrial waste piles. Turning this waste mountain into an asset, however, comes with several technical and environmental challenges.

The ash occupies vast areas of land and represents an untapped resource that could otherwise replace materials currently produced through mining. At the same time, producing materials like calcium carbonate and lime through conventional methods is energy intensive and releases significant amounts of CO₂ into the atmosphere.

Together with researchers from TalTech and the University of Tartu, Ragn-Sells has developed OSA, a solution that transforms oil shale ash into ultra-pure calcium carbonate while binding large quantities of carbon dioxide in the process.

The technology uses CO₂ sourced from other industries and permanently locks it into the material during processing. The plant produces no emissions from combustion, recycles its water continuously, and reuses all by-products in the creation of new products such as climate-neutral calcium carbonate and lime fertiliser. This approach reduces the need to mine virgin raw materials, cuts industrial CO₂ emissions, and gives new value to a waste stream that would otherwise remain a growing environmental burden. It also brings new investment and jobs to Ida-Virumaa, strengthening local infrastructure such as roads, railways, and ports, while supporting Estonia's broader circular economy and climate goals. A demo-plant in Narva is set to open in 2026, with an industrial-scale facility planned for 2031.



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