

**Local Materials Case Study**  
**Resource recovery and**  
**recycling waste**

*Transforming local waste materials into  
valuable resource*

Company: **Levenseat recycling and resource recovery**

## Waste not, want not

### **Scottish firm Levenseat is leading the way in resource recovery through recycling and managing waste**

If there's one local material that's guaranteed never to run out, it's waste. Unlike many of our natural resources, it's inexhaustible – as well as being a considerable ecological hazard. So as more countries attempt to find ways of dealing with their waste that doesn't involve piling it up in landfills, companies like Scottish resource management firm Levenseat are continually exploring new ways to put it to use.



*“ We are thrilled to be the first company in Scotland to receive End of Waste accreditation for APCR treatment and reuse. It's been a collaborative process involving the University of Strathclyde, Scottish Enterprise and the Construction Scotland Innovation Centre, to whom we are very grateful. It now means that we can make a significant contribution to the circular economy by manufacturing a much-needed product from an otherwise hazardous waste, in Scotland and for the benefit of Scottish companies. ”*

**Robert Green, MD, OIS Ltd**

## THE BACKGROUND

Levenseat is an independent family-owned waste and resource management business established in Central Scotland in 1986. With a long-standing commitment to developing new waste solutions, it's often the first to bring new waste treatment technologies to the market, leading the way to a more sustainable Scotland.

Offering solutions for a range of waste materials including separation of mixed wastes, organic waste recycling and aggregate recovery, the firm also repurposes some of the materials it treats into entirely new products like compost and innovative building material Lev-co blocks.

In 2016, following the announcement of the Scottish Landfill ban and in an effort to make better use of waste materials considered to be unrecyclable, Levenseat created Levenseat Renewable Energy Ltd (LREL) to construct an energy from waste (EfW) facility. The new facility uses a fluidised bed gasifier in which unrecyclable waste can be converted into a syngas to produce partially renewable energy.

At around the same time, Robert Green, Managing Director of Organic Innovative Solutions (OIS), a process engineering and environmental consultancy firm, was looking for a strategic partner to commercialise its patent for the treatment of air pollution control residues (APCR). With interest from national and international firms, OIS were impressed by the vision, innovation and values that Levenseat embraced. The companies teamed up to create a new joint venture: Innovative Ash Solutions (IAS).

“ Once all efforts have been made to recover recyclable material from the waste stream, the next best option is to recovery energy from the remaining waste. This not only means we are recovering value from resource, we are also diverting waste from landfill and helping to contribute to Scotland's renewable energy targets. ”

**Angus Hamilton, MD, Levenseat**





## RECYCLING WASTE FROM WASTE

Recent legislative and policy changes in both coal fired power stations and in the landfilling of biodegradable municipal waste have shifted the dynamics in power generation in the UK.

The ban on landfilling of biodegradable waste in Scotland has meant a substantial number of new Energy from Waste plants are being built and commissioned to meet the needs of the waste management industry and power transmission in the UK.

Energy from waste isn't a new concept. Instead of going to landfill, residual wastes can be combusted in purpose-built facilities to generate heat and electricity. The process can power innovations like district heating schemes, replacing the use of fossil fuels and providing locally generated power.

EfW has its challenges however. Like all other combustion plants, it creates by-product, including air pollution control residue (APCR), which is considered a hazardous waste. With the EfW industry maturing to meet the national demand, APCR production in Scotland alone is expected to exceed 60,000 tonnes per annum, all of which would have to be transported to England for treatment or landfill. At Levenseat, however, they've found a way to treat and recycle APCR as a replacement for low-strength cementitious products used in concrete and cement.

Cement and concrete production are among the worst man-made carbon emitters in the world. Some producers have, as a result, been using alternative products like ash from coal-fired power stations to help reduce their carbon footprints. With the closure of all coal-fired power stations in Scotland, however, cement and concrete producers now import ash by-products to ensure their products meet environmental and technical obligations.

In 2012, Robert Green designed a treatment process that would treat APCR residues and provide a like-for-like replacement ingredient for cementitious products like power station ash. During 2018/19, supported by a grant from the Construction Scotland Innovation Centre, Robert's company Organic Innovative Solutions Ltd teamed up with Levenseat and the University of Strathclyde, along with RWE. Together they began the formal laboratory and industrial scale work needed for SEPA certification of the ACPR product.

Organic Innovative Solutions Ltd and Levenseat finalised a joint venture partnership – Innovative Ash Solutions Ltd – in 2019. That would create the infrastructure and industrial scale plant needed to commercialise the ACPR treatment process.

Most recently, the partners have received formal validation from SEPA and End of Waste for their treatment and product process, and the UKIP office has formally granted the patent. The company is now pressing forward to find a location for and construct its first commercial plant to treat APCR and manufacture a 100% recycled product for the use in the cementitious industry.



## A CONCRETE USE FOR LOCAL WASTE

Levenseat's efforts to find ways of recycling even the waste products from waste treatment don't end there. They are also working on a carbon-neutral replacement for cement that can be used to create concrete.

Levenseat Renewable Energy Ltd (LREL) owns and operates a fluidised bed gasifier facility used in the creation of energy from waste. The facility produces about 8,000 tonnes of boiler ash every year – a substance that is potentially hazardous.

Employing the same approach as that used to achieve End of Waste for APCR, Levenseat and LREL, project managed by Robert Green, aim to make the ash safe to work with and use it to replace the cement traditionally used in a concrete mix.

The University of Dundee, known throughout the UK and Europe for their expertise in cement and concrete, were asked – and agreed – to be the academic partner. Levenseat were granted funding from Construction Scotland Innovation Centre (CSIC) to assist the project, now a joint team effort between CSIC, Levenseat Ltd, LREL, OIS Ltd, WRC and the University of Dundee.

The potential for this recycled alternative lies not only in reducing and managing local waste streams, but also in significantly reducing greenhouse gas emissions. What's more, because the alternative material is created from local waste streams, it has the potential to be reproduced easily anywhere in the world.

While the recycled cement replacement material is put through its paces, Levenseat are already producing concrete blocks made using recycled aggregates recovered through their aggregate recycling process.

Substances like sewer grit, street sweepings and gully waste are passed through the company's specialised wash plant, which produces sand and aggregate that can then be used for making Lev-co blocks. The durable, highly fire-resistant, sound-resistant blocks are designed to be interlocking, so they don't require mortar.

That means they can be used for temporary structures as well as permanent, taken down and stored when not in use, and assembled or re-assembled quickly and economically when required. And as you might expect, they can also be recycled when they reach the end of their life.

*"From the beginning we've been committed to tackling Scotland's waste problem, finding new and innovative ways to recycle waste materials and unlock the value in the materials we all throw away," says Levenseat MD Angus Hamilton. "Our circular economy approach helps us aim always for the highest recycling rates, and brings us closer all the time to achieving zero waste."*

## LEVENSEAT'S IMPACT ON LOCAL WASTE

- Recycling >2m cans every week
- >2m plastic containers recycled each week
- Materials recycled:
  - Glass
  - Plastic
  - Metals
  - Wood
  - Aggregates
  - Green waste
  - Food waste
  - Street sweepings & gully waste

Levenseat's EfW plant will:

- Contribute to Scotland's renewable energy targets
- Supply electricity equivalent to the needs of nearly 25,000 homes over a 25-year lifespan
- Save 1.4 million tonnes of waste from landfill
- Deliver a reduction in greenhouse gas emissions of around 1.3 million tonnes, equivalent to taking 23,000+ cars off the road every year it operates
- Supply electricity to the national grid, with the heat output assisting the operation of the MRF
- Create more than 70 jobs and apprenticeships