

# 10 Years of Sustainability at ScotAsh

## Authors

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## Introduction

Until 1999 Scotland's coal fired power stations produced up to 1mt of coal ash annually, the majority of which was disposed of to lagoons with consequent environmental and cost implications. The creation of a new business, ScotAsh Limited, sought to utilize the ash by-product in construction materials to maximize resource recovery and reduce environmental impacts.

## Background to ScotAsh

ScotAsh is a 50:50 joint venture between Lafarge Cement and ScottishPower. Lafarge Cement is the UK's largest cement manufacturer.

ScottishPower is part of the IBERDROLA Group of Spain, among the top five energy utilities in the world by market capitalization.

In the late 1990's both ScottishPower and Lafarge wanted to demonstrate to their various stakeholders that they were pro-active in terms of meeting UK Government objectives regarding:

- Reducing CO<sub>2</sub> emissions
- Greater recycling of materials
- Long-term sustainability

The two companies had previously worked together on a number of areas of mutual interest covering such aspects as benchmarking, health and safety, best practice for maintenance and use of alternative fuels. From an environmental perspective the companies faced a number of similar issues:

- A £2/tonne landfill tax had been introduced, which had a major impact on ash disposal costs.
- It was mooted that there would also be a minerals tax
- There was the threat of the introduction of a CO<sub>2</sub> tax

- Obtaining planning consents for new lagoons and quarries was becoming increasingly difficult, together with the escalating cost of managing such facilities to meet increasingly stringent legislation.

As a consequence of the above, Lafarge and ScottishPower formed a joint project team to identify ways in which the companies could work together with the specific objective of leveraging their respective areas of expertise to seek ways of creating value from PFA. The formation of the joint project team had a number of benefits:

- It allowed for the development of trust and understanding between the two companies
- It gave both organizations confidence that they had a similar outlook and culture, particularly in relation to:
  - health and safety
  - corporate governance
- By working on an “open book” basis, it was possible to identify value drivers:
  - ScottishPower had experience of developing non cementitious markets for ash for use in grouts, fill, land remediation
  - Lafarge had experience in cementitious markets together with materials handling, manufacturing and R&D expertise.

The study took place over a six-month period, which included many joint briefings and papers to the companies’ Boards, with the final recommendation being to form a Joint Venture. It cannot be over-emphasised that none of the above could have happened without a “shared vision” and “buy in” from the respective MDs and their Executive Boards.

### **Why a Joint Venture?**

A joint venture allows for long-term investment and strategic decision making, which is fundamental for capital-intensive businesses. The JV enabled a Total Ash Management Concept, seeking markets in cementitious and non-cementitious applications. It also helped to move away from a Win-Lose scenario, to a Win-Win position, with both companies sharing in the risks and rewards, often absent in supply or take or pay contracts.

However, to succeed, JVs require a considerable amount of effort. There needs to be clear and shared objectives, a good match of cultures, a high level of communication, a viable long term business plan and the ability to cope with new people coming into the respective organizations.

The ScotAsh JV Board was instrumental in developing trust and communication between the Shareholders and developed the ScotAsh Vision, to be an:

*“Integrated ash business offering a range of ash based products, backed up by professional management and marketing expertise, together with state of the art blending and storage facilities.”*

It should be noted that 10 years later, two of the members of the original project team still represent ScottishPower and Lafarge on the JV Board and it has been their job to ensure continuity and support for ScotAsh throughout all the organizational changes that have taken place over this period.

Like any marriage, a considerable amount of effort needs to go into “making it happen” and to avoid taking each other for granted. In this respect, the annual AGM has been an excellent vehicle for bringing together members of the executive teams of ScottishPower and Lafarge.

### **Investment and Innovation**

Today ScotAsh has achieved the beneficial re-use of up to 85 percent of ScottishPower’s ash production, compared with a UK average of 33 percent. Such high values are clearly dependent on the economy and related construction activity and – through the JV – both parents have complete transparency of the opportunities for PFA without all the issues that can arise with take or pay contracts.

For the development of high value cementitious markets it is critical to offer a good service and overcome customer concerns that tend to focus on ash quality and ash availability – particularly through the summer months. The key elements are then:

- Investment in storage
- Investment in ash processing technology to control the levels of carbon in the ash

In order to help meet customer demand, 10kt of storage facilities were built. Whilst this has helped with supply during periods of high demand, it is generally accepted that “one can never have enough storage when it comes to ash....” Justifying such storage through financial models, however, is never easy!

Storage is no good without ash quality and for PFA to be used in high quality CE marked cementitious products in the UK, the carbon content of the ash needs to be below seven percent. However, power stations are operated to produce electricity as required, not necessarily good quality ash and the carbon content of the ash direct from UK power stations can vary between five percent and 25 percent. ScotAsh overcame this challenge by investing in Separation Technologies LLC’s patented electrostatic separation technology, which removes carbon from the ash.

ScotAsh has experience of reducing carbon in ash from as much as 25 percent to less than four percent LOI and levels of less than two percent LOI have been achieved for certain high grade ash based products

Without the ability to be independent of the power station in terms of ash quality, the ScotAsh business model would have failed, as it would not have been able to gain the confidence of the market – traditionally Ground Granulated Boiler Slag has been the main additive – as a reliable supplier of cementitious products.

### **Environmental and Economic Benefits**

Because ScotAsh uses the ash by-product as a raw material, its products save natural aggregates, energy and CO<sub>2</sub> emissions. The re-use of ash in this way also avoids the need to landfill hundreds of thousands of tonnes of ash each year.

Over the past decade the company has sold more than six million tonnes of ash based products resulting in a saving of some:

- 6.6 million tonnes of virgin aggregates
- Nearly 400,000 tonnes of CO<sub>2</sub> through its use in cementitious products. (1 tonne of ash used in cementitious products can save in the region of 1 tonne of CO<sub>2</sub> and 1.6 tonnes of virgin aggregates)

In 2007 ScotAsh broke through the million tonne sales barrier for the first time selling 1.1 million tonnes of products, including cements, grouts and stabilization materials.

ScotAsh is currently in talks with the Scottish Environment Protection Agency (SEPA) with a view to achieving re-use of the high carbon fraction of the ash (collected via electrostatic separation) as a fuel. Indeed, the C2P2 partnership that has been developed in the USA has been suggested by ScotAsh as a model for use in the UK to bring industry and regulatory bodies closer together to address barriers to resource utilization and sustainable development

### **Case studies**

Working in partnership with others such as local Universities, Edinburgh City Council and the Lafarge Technical Centre, ScotAsh has brought new products to the market including hydraulic and pozzolanic binders. These allow road waste and contaminated sludges to be safely stabilized and re-used, conserving quarried aggregates such as high-grade stone. The Bowling Harbour project on the Forth and Clyde Canal in Scotland is an excellent example of the use of ash-based products to stabilize contaminated canal sludges. This has resulted in the treated material being used to create a walkway and towpath, rather than landfilled, with the added benefit of reducing the carbon footprint of the project.

Meanwhile, a project to repair the historic carriage drive at Finsbury Park in London using in-situ stabilization of excavated road planings, cut costs by two-thirds (compared with the conventional method of excavation, removing spoil to landfill and bringing in new materials) – and reduced heavy vehicle movements through the park.

ScotAsh products have been used in high profile projects across Scotland including Whitelee Windfarm near Glasgow (at 322MW, currently Europe's largest) the new Clackmannanshire Bridge, Scottish & Southern Energy's Glendoe Hydro-Electric project and a major project to extend the M74 motorway – the main road between Scotland and England.

The company's products are also being used in construction of the new Chris Hoy Velodrome and National Indoor Sports Arena for the Glasgow 2014 Commonwealth Games. In addition, we are exporting smaller quantities of specialist materials to Singapore, Holland and the Czech republic.

## **Recognition**

ScotAsh has received two Queen's Awards for Enterprise in the last three years – for Innovation in 2005 and Sustainable Development in 2008. These awards are conferred by Her Majesty The Queen on the recommendation of the British Prime Minister. The company was named National Example of Excellence in Business in the Community's Marketplace Innovation Award 2007, receiving the award from His Royal Highness, Prince Charles and former US Vice President Al Gore. ScotAsh subsequently received Business in the Community Big Tick Awards in the Eco Efficiency and Marketplace Innovation categories in 2008.

In September 2008 ScotAsh was one of just a handful of Scottish businesses to be included in the CleanTech 100, compiled by The Guardian newspaper and Library House, dubbed "the official list of Europe's hottest green companies." In December 2008 ScotAsh became the winner of a national VIBES (Vision in Business for the Environment of Scotland Award for the second time.

## **ScotAsh Today**

Over the past five years, turnover has doubled, profit has quadrupled and several million pounds in landfill tax charges have been avoided, whilst ScotAsh continues to reduce its environmental impacts in terms of energy use and waste generation. Indeed, the fact that ScotAsh is a viable business in its own right and not just a strategic vehicle for Lafarge Cement and ScottishPower to meet their own corporate objectives has certainly helped with shareholder confidence and willingness to invest further in the business.

In terms of the cementitious markets, by becoming a reliable supplier of high quality ash through investment in storage and beneficiation technology, ash based products now have much greater acceptance in an additions market that has traditionally been dominated by slag.

27 jobs have been created and many of the employees have more than eight years' experience with the company. Employee turnover and sickness absence is well below the national average. Staff are continually encouraged to improve their skills base and the original vision has been expanded to include:

*“the aim of becoming a World Class organization in terms of the health and safety culture, the environment and housekeeping”*

The ScotAsh business model has also led to further joint venture initiatives between Lafarge and other Utilities in the UK

- Celtic Ash: Lafarge Cement and RWE nPower joint investment project in Separation Technologies LLC carbon and ammonia removal at RWE's Aberthaw power station
- EDF Energy (which also includes ST LLC carbon removal) at West Burton Power Station, project managed by Lafarge
- Drax Power long-term supply contract, including assistance in design for ash storage and rail outloading.

Other Lafarge business units across the world are now working with utilities using the ScotAsh model as an example and ScotAsh is often used to train new staff that have been recruited to work in ash processing.

Visiting ScotAsh on 12<sup>th</sup> January 2009, Scottish Enterprise Chief Executive Jack Perry said: “You have put together a really exciting business proposition. Rarely have I visited a company that through innovation has created a better quality product, while realizing such substantial environmental benefits. What's more, future applications and commercial opportunities, both at home and abroad, look very attractive indeed.”

## **Summary**

The ScotAsh JV model has allowed for implementation of a vision and long-term investment and is seen as an outstanding success by both Lafarge and ScottishPower. The culture is very much one of a learning organization, continuously seeking ways to improve and to learn from others.

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