

Metal, moisture & money

Supplying a consistent and high-quality product is the overriding goal in the production of alternative fuels (AFs) for cement plants. The presence of moisture and foreign objects are just some of the key issues to take into account during AF production. N+P Recycling looks at the challenge of balancing quality and price.

■ by **N+P Alternative Fuels, UK**

In terms of alternative fuel (AF) supply to cement plants, quality and consistency are important fuel performance and therefore, purchasing, criteria. Quality is mainly dependent on moisture, particle size, chlorine and foreign objects. However, as AF suppliers are not cement specialists, they are not always fully aware of the impact of AF quality on kiln chemistry or the issues it may present to feeding equipment.

Consistency of fuel is an additional issue as the seasonal variations in moisture due to increased rainfall can vary the quality of the fuel supply over time.

To ensure consistent and high-quality fuel a sound understanding of the cement-making process is the basis of successful AF production as the AF production team will be aware of potential issues and will try to prevent the occurrence at source. These experiences have been gathered over time and N+P is proud to produce a high-quality, consistent AF, marketed under the Subcoal® tradename.

Know your recipe

Managing incoming waste quality is key in AF production. Typically there are a lot of different waste sources coming into an AF production facility and the close monitoring of their quality is not straightforward. An adequate quality system should be in place and suppliers of input streams should be managed to avoid the delivery of sub-standard waste. It is important to gauge the (potential) AF supplier on how they are managing the incoming quality of waste, because producing the right quality fuel requires the right recipe.

Once it is known which waste streams are coming into the process, the recipe can be actively managed, enabling the production of a consistent quality fuel. While fuel quality can be improved via mechanical methods, they are not a



Overview of Subcoal® production plant during a revamp in 2016

panacea to produce the perfect fuel. Therefore, input streams are always measured at N+P so the company can tailor its fuel to the requirements of each customer.

To achieve the optimum particle size, as detailed in the AF specification, shredding is probably the most simple step in AF production, but it is also expensive. The smaller the particles required, the lower the throughput and the higher the cost and wear is on a shredder. This might explain why some AF supply companies prefer to supply large particle sizes, or why particle size could increase during a supply period. Keeping your shredder in good shape and undertaking regular maintenance ensures that particle size stays within the agreed specification.

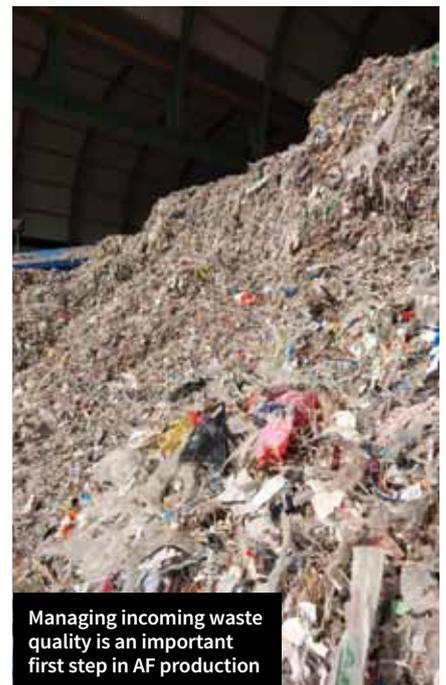
Removing metals

A common issue with AFs are foreign objects such as knives, forks and other materials, which can block feeding systems to the kiln or calciner.

Although it might seem logical to remove such objects, as they are often associated with high recycling prices, removing metals from AFs can be an expensive process. The metals are

frequently contaminated with paper, plastic or other objects which make them invaluable in such a way that high gate fees need to be paid to dispose of them.

The removal of non-ferrous metals such as aluminium or stainless steel is particularly challenging as they are non-



Managing incoming waste quality is an important first step in AF production

Drying incoming waste streams is an expensive option



magnetic so removing them is difficult. It is not impossible to remove non-ferrous metals, but this requires special equipment and knowledge of the process. Once removed these metals do not provide sufficient revenue to the AF producer so their removal can be hard to justify from a cost basis.

In some cases, the AF producer requires all ferrous and non-ferrous metals are removed as such contamination will cause issues in the final processing step. This approach applies to the N+P Subcoal concept, as pelletising the AF requires a very clean input stream. The presence of metals in this input stream results in severe issues such as wear and blockages in the dice of the pelletisers.

Moisture matters

Moisture is a well-known killer in terms of substitution rates. Not only does it have a negative impact on the kiln system, it also causes blockages in the feeding systems. Moreover, wet AF typically comes with the very familiar smell of 'garbage' and presents a considerable risk of self-ignition. As a result, there are several reasons to keep the AF dry.

Origin

Moisture often originates in paper and cardboard. The material easily absorbs the water and is very difficult to extract again. This is unlike plastics which are hydrophobic and any surface water is easily removed.

Choosing the right input streams

The easiest way to avoid moisture in AFs is to choose the right input streams. A well-known source for moisture is municipal waste, especially if no sorting is carried out prior to delivery to site. Therefore, it is very important to ensure the input streams are as dry as possible.

Taking out as much paper and cardboard as possible will have an effect on the moisture levels, and this even helps recycling companies because often paper is sold as a recycling product.

There are not many countries that have a high-quality feedstock available which is both dry and high in calorific value, so producing a high-grade fuel is not always easy.

Drying waste

Drying waste to produce an AF is a possible but expensive option. The perceived wisdom is that dry AFs are needed for burning in the main burner and the calciner. However, N+P has seen many kilns achieve high thermal substitution rates (TSRs) with wet fuel fed to the calciner. Therefore, before embarking on drying AF prior to feeding into the calciner, this step has to be considered very carefully. Alternative fuel for the main burner requires specific characteristics to achieve high levels of substitution. Three key characteristics are particle size, calorific value and moisture content. If any of these are compromised, burning

efficiency may be affected.

There are not many AF producers in the world that dry their input mix to create a very dry, stable fuel. The issue here is cost, as drying is expensive, especially without the presence of residual heat. N+P recommends that drying should only be done if really necessary. However, if the decision is made in favour of drying, a stable and high-quality AF is ensured.

To produce Subcoal®, a dryer is required because a good-quality pellet can only be produced with a moisture content well below 10 per cent. This gives the end user the guarantee that moisture is controlled, regardless of the weather conditions.

All about the money

There is always a delicate balance to be found between quality and price. An increase in processing steps will impact the price of the AF. Fuel for the calciner typically is 'easier' to produce and should give the most economic benefit. For the main burner, especially at high substitution levels, the process is more complex.

In practice there is always a discussion between procurement and operations, as getting the best value for the fuel does not necessarily mean that the company will obtain the best value. Poor-quality fuels lead to more issues and in the end, lower TSR rates, thus higher fuel prices and in some cases, even loss of production.

Therefore, N+P has a clear strategy. For the calciner the fuel producer aims to supply fuels for the best possible prices as it is technically achievable to burn poorer AF qualities. For the main burner the company stands for quality and consistency, which in the end offers higher TSRs. ■



Pelletising requires a moisture content well below 10 per cent