We have the technology, but where is the fuel?

Robert Shenk, sales director of Cement Projects and Products, and Sathish Krishnamoorthy, head of Sales Support and Services, FLSmidth, USA, share insights from a cross-industry discussion about alternative fuels use in the United States.

■ *by **FLSmidth**, Denmark*

Towards the end of March 2021, FLSmidth arranged a roundtable among cement producers, fuel suppliers and other interested parties to discuss alternative fuels (AFs) utilisation in the US. To put it bluntly, the company wanted to discuss why the US is behind when it comes to burning waste fuels in comparison to Europe and other parts of the world. The authors were fortunate to be joined by:

- Gina Lotito, vice president Sustainability and Energy, GCC
- Mike Saeger, plant manager, Argos USA
- Herb Case, founder and director, Parracombe Consulting LLC
- Mark J Riedy, partner, Kilpatrick Townsend & Stockton LLP.

The discussion was passionate and thought-provoking, providing a good picture of the obstacles to greater implementation of AFs and raising questions over the future of AF supply. FLSmidth is very grateful to the panel for giving permission to reproduce some of that discussion in this article.

Roughly 220Mt of municipal waste is landfilled each year in the US

Where is the fuel?

The panellists wasted no time getting to the heart of the issue – the US lacks an abundant stream of suitable AFs.

"Getting materials that meet our specifications is really the limiting factor here," explained Mr Saeger, Argos USA. "In general, the industry is keen. The technology is well proven. But finding suppliers who can consistently deliver AF with the requisite heat value, moisture content, chloride content and the required particle size – that is a real challenge."


A future beyond alternative fuels

One of the issues in the US specifically is that the waste management industry does not typically consider the cement industry as a possible end user of municipal waste. To do so, there would need to be a system in place that not only processes the waste into consistent, suitable fuels but also transports, stores and delivers those fuels. Instead, roughly 220Mt of municipal solid waste (MSW) is landfilled each year across 1500 MSW landfills in the US,[1] with a further ~25Mt being supplied to waste-to-energy plants.[2] The system lacks the synergy that is seen, for example, in Europe where co-firing is common and highly successful. In addition to the lack of cooperation between industries, there are also legal barriers: current regulations discourage the use of secondary materials as fuels.[3]

As such, cement producers looking to cut fossil fuel use have two choices: they can either find a reliable AF supplier, or they can source the feedstock and make the fuel themselves. As Mr Saeger

PCA supports greater AF use

A document[4] issued by the Portland Cement Association calls for greater support for the cement industry to enable increased use of AFs. "There is a tremendous opportunity to reuse the millions of tons of plastic and other secondary materials that can no longer be exported to China, India or other foreign nations, and are currently sent to landfill or incinerators. Using these materials as fuels could further reduce GHG and other air emissions, reduce waste, reduce unsafe vectors from landfilling, promote energy security, and ensure cleaner waters by preventing marine debris."

highlighted, finding a reliable supplier able to meet the required specifications can be really challenging, to the point that in some parts of the country it feels impossible. And on the other side, if cement producers decide to process their own fuel, there are a lot of regulatory hoops to jump through – but with the advantage of total control over their fuel characteristics.

The infrastructure costs involved in processing fuel are also significant and sometimes come with a limited opportunity for payback. Having made the investment and completed the permitting process, cement producers could find that a few years down the line their equipment is obsolete because the feedstock has changed or even disappeared completely. And that is something that is likely to become more of a challenge as the industries producing the feedstock for these fuels do more to reduce their own waste. It is very difficult for cement plants to commit to burning AFs when there is so much uncertainty.

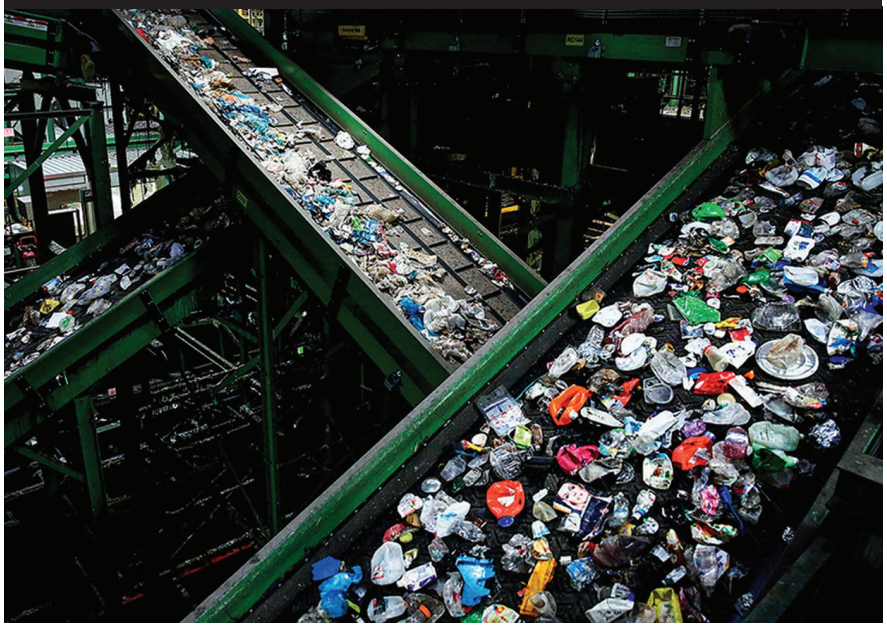
Will AF availability improve?

This was the natural next question and a tricky one to answer. Industries that have typically been seen as good sources for AF feedstocks, such as the automotive industry, have their own sustainability targets, which will inevitably reduce waste production and the availability of waste for fuels. Meanwhile, more industries will also be eliminating fossil fuels in favour of alternatives, increasing competition for supply. However, Mr Case, Parracombe Consulting LLC, was optimistic about the availability of AFs in the future – if the right mix can be achieved.

"If we are really serious about reducing our environmental impact – and I think we are – then we need to think in terms of carbon intensity. If we want to meet our industry-wide goals for 2030 and 2050, this is where our mindset needs to be."

Gina Lotito, vice president Sustainability and Energy GCC, USA

Sustainability targets of supplying industries are expected to lead to a reduced supply of waste available for use as AFs in the cement industry



"We are working on developing a feedstock with the right consistency and sufficient volumes to produce a fuel suitable for cement manufacturers, using a mix of recycling residuals, mixed with some commercial waste and some construction and demolition waste materials," he said. "The volumes are there, especially in urban areas. The hardest part is controlling contamination – and really that falls to the generators. We have to make sure they understand that the cement industry will buy their waste – but not if it is contaminated

and only after proper pre-processing to produce a consistent quality energy product. Going forward, we also have to consider how we drive waste generators towards the cement industry. That will likely come down to cost. Landfill will become more expensive. Recycling will be more expensive. We need to convince municipalities and government agencies that use in cement manufacture is a good alternative."

Mr Riedy, Kilpatrick Townsend & Stockton LLP, pointed out the value of tax credits in this regard: "We have seen tax credits be used effectively in the utilities industry as a regulatory incentive. The same could be applied for the cement industry, to encourage a move away from coal and towards cleaner fuels."

A future beyond AFs?

The trouble is, not all AFs are cleaner, as the panelists were quick to point out.

"My concern is that, as an industry, we are still talking about thermal substitution rate (TSR) as a basis for a more sustainable process, when some of these alternatives have the same carbon footprint as coal," said Ms Lotito, GCC. "If we are really serious about reducing our environmental impact – and I think we are – then we need to think in terms of carbon intensity. If we want to meet our industry-wide goals for 2030 and 2050, this is where our mindset needs to be."

So what kinds of fuels or processes would help us achieve these goals? The panel discussed the concept of a closed-loop system, whereby the emissions captured from combustion are used to create new fuels through a carbon capture and utilisation process. It was agreed that this would be the ideal, but at the moment it is cost-prohibitive.

However, with the current administration pushing for zero emissions from combustion by 2050, a closed-loop system or an alternative means of heating the kiln is something that needs to be in the cement industry's long-term plans. Technology is evolving all the time – the example was given of a process that can turn flue gas into jet fuel. However, there is not one process that is ready to transform the industry right now – not one that is economically viable, at least.

The worry is that while we wait for these technologies to become available, we resort to using more fossil fuels. The panel discussed the potential for a surge in the use of natural gas, even while coal firing is likely phased out. It is a fast, relatively simple way to cut carbon, so even though it is an expensive solution, it is more secure than AFs and more practical than carbon capture at this point. The cement industry's hand may be forced in this direction by regulatory requirements – a move that was met with little joy by any of the panelists.

"The US has plenty of waste but needs the right kind of co-processing plants to produce a consistent fuel product. This is the sticking point right now, which is preventing wider uptake of AFs in the cement industry."

The panel returned again to the topic of using preprocessed municipal waste as a readily available fuel source, which is clearly a solution that is working in other countries, driven by regulation and supported by the waste management industry. The US has plenty of waste but needs the right kind of co-processing plants to produce a consistent fuel product. This is the sticking point right now, which is preventing wider uptake of AFs in the cement industry.

So how do we change that?

Cooperating with local waste producers, municipalities and regulators, and education were the top two talking points when it came to discussions on how we can progress through this stalemate:

- education for cement producers to move away from a focus on TSR and towards prioritising carbon intensity
- education for waste generators on how they could partner with the cement industry
- education for local communities – the people who are actually using the cement we make – on how they can help to make the industry more sustainable by, for example, separating their waste and demanding better waste management by local government. There is a tremendous opportunity here for greater synergy between cement plants and the local population generating waste.

From the industry side, we discussed the ambitious targets held by the industry through the 2030 and 2050 Roadmaps and the gap between what is being targeted and what is practically achievable in cement plants right now. It was clear from the discussion that the cement industry has the ambition and the willingness to pilot new solutions when they are available.

There was some wariness over top-down directives, which always bring with them the threat of losing market share to importers who do not have to carry the same regulatory burden. It was also pointed out that during the time when the US left the Paris Agreement, the cement industry carried on working towards those goals, proving that regulation is not always the motivator for change.

So where does this drive come from? Our panellists are clearly driven – in the same way as FLSmidth – by the desire to reduce cement's environmental impact, and this desire is embedded in the structure of their organisations.

As concern about the future effects of climate change deepens among wider society, it is also a factor in how investors choose to spend their money, which makes it about more than just 'doing good' but also about cement manufacturers remaining commercially viable. Satisfying environmental, social and governance (ESG), the sustainability framework on which organisations are judged, is key to winning investment from organisations that are largely stepping away from fossil fuels.

Well, investors, if you are reading this, we'd invite you to put your money into practical, viable AF production capabilities for the US cement industry. They are ready and waiting to solve local waste management issues. ■

REFERENCES

[1] https://erefdn.org/product/analysis-msw-landfill-tipping-fees-2/

[2] https://www.eia.gov/energyexplained/biomass/waste-to-energy.php

[3] The PCA notes that the cement industry is also constrained by legal barriers that impose onerous and unnecessary permitting requirements, making it very difficult for cement manufacturers to utilise valuable secondary materials as cost-effective and sustainable alternatives to fossil fuels. https://www.cement.org/issues-advocacy/regulatory-priorities/energy-environment-regulatory-priorities

[4] https://portlandcement-my.sharepoint.com/:b:/g/personal/lbaer_cement_org/