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Dear Readers,

"It'll start getting cooler. You just—you just watch", replied US President Donald Trump to Wade Crowfoot, head of California's Natural Resources Agency, who indicated that the current record breaking wildwires in the state are a consequence of climate change [1].

Luckily most of us don't „just watch". We act.

Just a month before this issue will be published, the Global Cement and Concrete Association (GCCA) announced its 2050 Climate Ambition, a joint industry commitment to net-zero CO_2 emissions by 2050. The 2050 roadmap will take a circular economy approach by taking into account for example:

- emissions reduction in cement and concrete production
- savings delivered by concrete during its lifetime
- material and construction efficiencies and improved standards
- reuse of whole concrete structures
- design for disassembly and reuse of elements
- concrete recycling and enhanced recarbonation

Since 1990, the GCCA has achieved at 19.2% reduction in CO_2 emissions per tonne of cementitious material and delivered more than a ninefold increase in alternative fuel use replacing conventional fossil fuels [2].

Also just recently, LafargeHolcim pledged to achieve net zero emissions by 2030. The group joined the Science Based Targets initiative (SBTi) "Business Ambition for 1.5°C", becoming the first global building materials company to sign the pledge with intermediate targets for 2030, validated by SBTi.

"On our way to becoming a net zero company, we are not only part of the solution, we are committed to supporting our customers in their CO_2-reduction ambitions. No company can tackle today's climate challenge alone, that's why we are partnering for impact", says Magali Anderson, Chief Sustainability Officer at LafargeHolcim.

While any action plan is more helpful than to "just watch", not every good intention guarantees a sustainable outcome. As for alternative fuels, the kinds and sources of fuels used play an important part. Therefore, in this edition 03/20 of the Co-Processing Magazine, I provide insights into possible downsides of using biomass as alternative fuel in an article on page 12.

You will furthermore read an exclusive excerpt from the "Alternative Fuels and Raw Materials Handbook". To give an example of the different specifications of alternative fuels and the parameters that need to be considered when implementing those fuels at your cement plant, we have included a fact sheet about rice husk as alternative fuel on page 6.

Amongst other articles and industry news, we will also take a closer look at the current RDF market in South Africa, with a case study by Aeren Young from Interwaste on page 4.

Enjoy reading this edition!

Dirk Lechtenberg

References

[1] K. Breuninger, CNBC: "'I don't think science knows,' Trump responds when challenged on climate change at wildfire briefing ". Retrieved 22 September 2020 from https://www.cnbc.com/2020/09/14/trump-challenged-on-climate-change-during-wildfire-briefing.html

[2] Global Cement and Concrete Association: "Climate Ambition". Retrieved 22 September 2020 from https://gccassociation.org/climate-ambition/

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A Perspective on Power Consumption in the Cement Industry

Figure 1: Landfill Vissershoek in South Africa (Source: MVW).

A fresh approach to fuel

By Aeren Young, Technical Solutions Manager at Interwaste Environmental Solutions

The cement industry is one of the largest carbon emitting industrial sectors in the world, given that its manufacturing process is extremely energy intensive. Globally, coal comprises 85-90% of the fuel consumed by the cement industry.

In fact, according to research, cement kilns consume approximately 3.3 GJ of thermal energy for every tonne of clinker produced. This has resulted in the fact that the industry now accounts for about 70-80% of the energy use in the non-metallic minerals, consuming around 8.2 exajoules of energy each year – and using up some 7% of the available total industrial fuel use worldwide (Industry Report: ABB in Cement Manufacturing, 2018).

Given these facts, the industry is now required to seek alternative solutions to combat its large carbon footprint, worldwide.

Internationally, we see that cement producers are keeping up with innovation by producing, and using alternative fuels to combat their carbon footprint. However, the adoption of using a blend of alternative fuels (with conventional fossil fuels) within the industry in South Africa still remains low. This is largely due to the fact that legislation has not yet been implemented to incentivise or push the industry towards using alternative fuels – incentives such as landfill tax and carbon credits/carbon tax – which, if done correctly, will support a greener, more circular economy within the country.

Further to this, we also know that there are several effective measures which can be applied in the cement manufacturing process to achieve emission reduction targets. And when implemented, these measures can reduce the local environmental impacts and improve competitiveness within the cement industry as a whole.

RDF – a first for South Africa

Refuse derived fuel (RDF), is a solid fuel source, which is recovered through the shredding and bailing of pre-sorted dry industrial non-recyclable waste. Whilst RDF can also be recovered from municipal solid waste (MSW), the RDF produced by Interwaste requires no heat for drying, produces a cleaner RDF and produces a much higher heating value similar to that of A-grade coal. Its usage as a greener energy source is proving to be a cost and carbon-cutting tool for cement producers in the northern hemisphere.

In February 2016, Interwaste announced that this technology has arrived on South African shores with the commissioning of its first RDF plant in Germiston, where the plant is currently diverting approximately 300 tonnes per month of unrecyclable waste from landfill to produce 300 tonnes of RDF per month to cement kilns.

It is important to note that the RDF fuel source comprises of non-recyclable waste fractions such as paper-backed foil, aluminium, and multi-layered packaging.

As a result, to produce RDF, Interwaste accesses clients' sites and separates the non-recyclable waste streams from recyclable fractions,

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Figure 2: Manual Sorting at waste management plant in South Africa (Source: MVW).

such as glass, paper, and plastic. This is then transported to the Germiston facility where it feeds the dry industrial and suitable waste into the RDF production plant to produce 300 tonnes of RDF each month.

What the cement industry should consider – a South African perspective

The financial feasibility of RDF production using MSW for the cement industry in South Africa is largely dependent on numerous quality and economic drivers. And of course, with this, it must firstly be determined what the most feasible location for an RDF production facility locally would be, together with understanding the costs of producing the RDF and what municipal solid waste volumes and characteristics are available within the specific area - given this varies across different regions in the country.

However, according to recent case studies, the variables that contribute the most towards the feasibility of producing RDF from MSW within South Africa, are the competing prices of landfilling, the locations of cement kilns within the country, transporting the RDF to the cement kiln as well as the cost of fossil fuel (coal) per region. However, even given this, there is a case to be made.

If we consider that the RDF produced has an equivalent calorific value of A-grade coal, together with the fact that the cost benefits of using a waste derived fuel in the production of clinker, which are substantial, makes for a stronger argument. However, ultimately, what needs to be considered is that during clinker production, electricity costs amount to 30-40% of cement producers' operational overheads, whereas RDF can provide an energy saving of around 10%-20% saving, and on the 350 million tonnes of fuel the industry currently consumes per annum, the collective cost saving is vast.

Long-term financial gains

Despite standard new technology challenges, the economic and environmental benefits of using waste derived/alternative fuels to replace fossil fuels in cement plants is substantial. Considering global climate change discourse and how fast Europe is moving, it is not a case of 'if', but rather 'when' to convert to cleaner sources of fuel.

Financially, the impact is two-fold: firstly, RDF minimises the direct cost of energy through a cheaper fuel source. Secondly, carbon tax legislation provides massive economic gains.

Using a fuel that is less than the base price for coal automatically reduces the direct cost of energy. As a result, cement producers can claim for lower emissions, in fact, for every tonne of coal substituted with RDF, producers reduce their CO_2 emissions by 1.5 tonnes.

Pressure to cut emissions is mounting globally and locally, and the RDF facility presents an alternative for South African cement producers to scrutinise their current processes and adopt greener operational practice.

As with any innovation, supply and demand speaks volumes. In this case quite literally. To produce RDF at economically viable quantities, a plant requires high volumes of waste set off against stable demand from cement kilns. However, we know that external factors such as carbon tax and landfill legislation, coupled with cement producers' internal willingness to drive cement kiln alterations, will dictate the success of RDF uptake in South Africa.

However, there is no doubt that this presents the cement industry with a great opportunity to not only find a sustainable solution but build on the philosophy of reuse wherever possible. And, where reuse may not be possible, to adopt a more environmentally friendly approach to recycling and/or appropriate waste disposal.

This also means instilling a complete culture change and shift markets towards 'giving back to the system' in how we approach and treat resources versus waste, to not only avoid potential crisis but ensure we build towards a resilient and sustainable future in South Africa – as a collective industry.

https://www.interwaste.co.za/

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Fact sheet: “Rice Husk” as Alternative Fuel

Figure 1: From rice husk to powder (Source: APAC Commodities Pte Ltd, Singapore).

The following article is a revised excerpt from the “Alternative Fuels and Raw Materials Handbook for the Cement and Lime Industry.”

1. Introduction

Rice husks (or rice hulls) are constituents of rice grains. The hulls are the protective coverings of rice grains during the growing season. Rice husk is a typical agricultural residue generated in rice mills as loose material.

On average, 20% of the rice paddy is husk. Rice husk is a bulk material with grain sizes of around 2.5 to 5mm and low bulk densities of around 96 – 160kg/m³ [1].

Rice grows in many regions, in more than a hundred countries, and it is the second largest produced cereal in the world. Its total harvested area covers approximately 158 million hectares (2009 figure). About 90% of the rice in the world is grown in Asia; Sub-Saharan Africa accounts for nearly 3%, and Latin America for some 3.5%. In Asia and Sub-Saharan Africa, almost all rice is grown on small farms of 0.5 – 3 hectares [2].

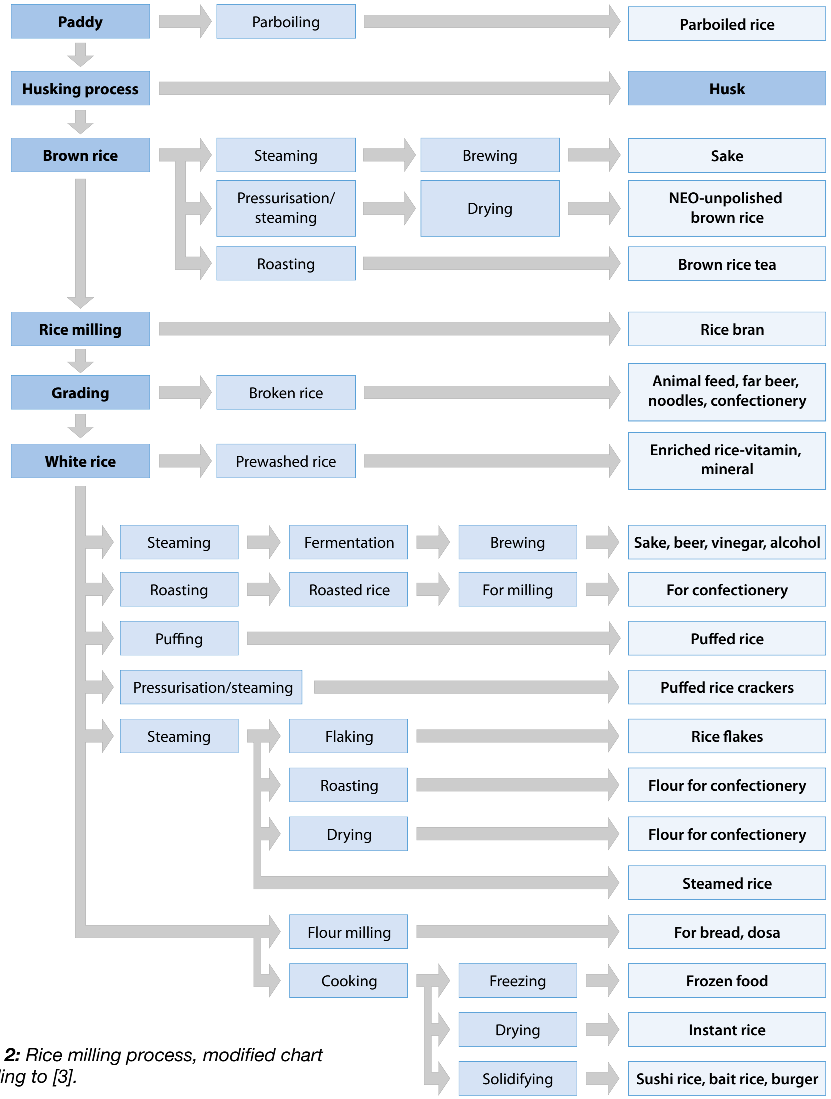

Figure 2: Rice milling process, modified chart according to [3].

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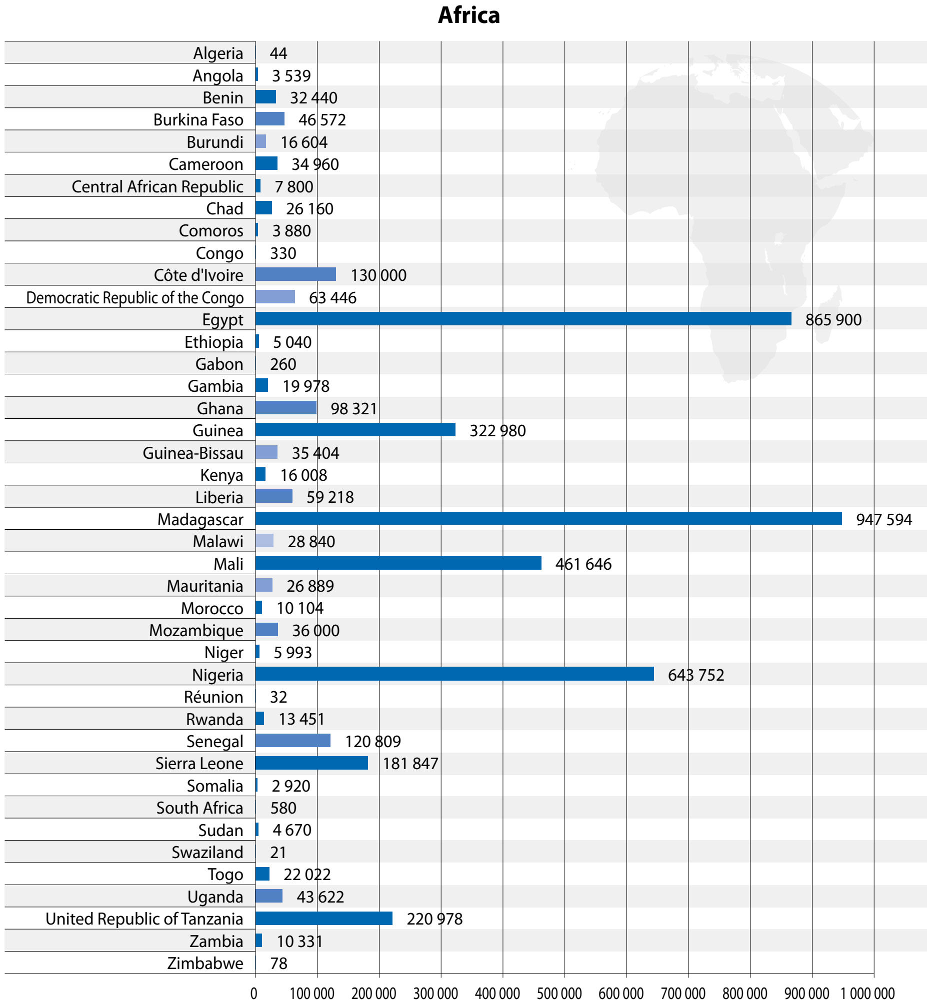

Figure 3: *Rice husk produced in Africa in 2010 [t] (20% of rice production assumed) (respective rice production data calculated on basis of data from [4]).*

Rice yields cover a range from one to ten tonnes of rice per hectare, i.e. less than one tonne per hectare under very poor rain-fed conditions to more than 10t/ha in intensive temperate irrigated systems [2].

Rice husk is one of the major by-products of the rice milling process. Rice milling is the process which helps removing husks (hulls) and brans from paddy grains in order to produce refined rice. Rice forms the basic primary product obtained from the paddy. This is processed further to gain various secondary and tertiary rice products [3]. The rice milling process is shown in figure 2.

2. Quantity and availability

According to the Food and Agriculture Organization of the United Nations [4] global rice paddy production will be approximately 500 million tonnes in 2020. On average, 20% of the rice paddy is husk, giving an annual total yield of some 100 million tonnes. Figures 3 and 4 show the regional distribution of global rice production in Africa and Asia (full list available in the Alternative Fuels and Raw Materials Handbook, Vol. 1) as well as the estimated production of rice husk, based on the previous assumption.

Rice husk is only available during the rice harvest season. Depending on the climatic conditions the periods differ from continent to continent [5].

Although the potential global estimate of rice husk production is some 100 million tonnes, the actual scope for utilisation is considerably lower. Small farm sizes account for the minor incomes of rice farm families. Particularly in developing countries the majority of rice mills are small and dispersed. Collection of rice husk from widespread facilities turns out to be problematic in terms of logistics and currently husks are dumped and burnt in open piles [1].

Several institutes and associations afford further, especially country-specific, information on rice and rice husk. A list can be found in the “Alternative Fuels and Raw Materials Handbook for the Cement and Lime Industry”.

3. Composition

During growth, rice plants absorb silica from the soil and accumulate it into their structures. This is the reason why the main constituent of rice husk is silica. Other components of rice husk comprise cellulose, hemicellulose, and lignin [6]. Figure 5 (page 8) provides respective ranges of composition.

Figure 6 (page 9) provides analyses results from some individual samples which give an impression of the potential of rice husk as an energy source. In the Alternative Fuels and Raw Materials Handbook, Vol. 1, an overview of the ash composition of rice husk can be found.

4. Collection and transport

Rice husks are normally available in large quantities at the rice mills. Due to its small grain size and its low density, either collection in trucks as bulk materials or collection in big bags is preferable.

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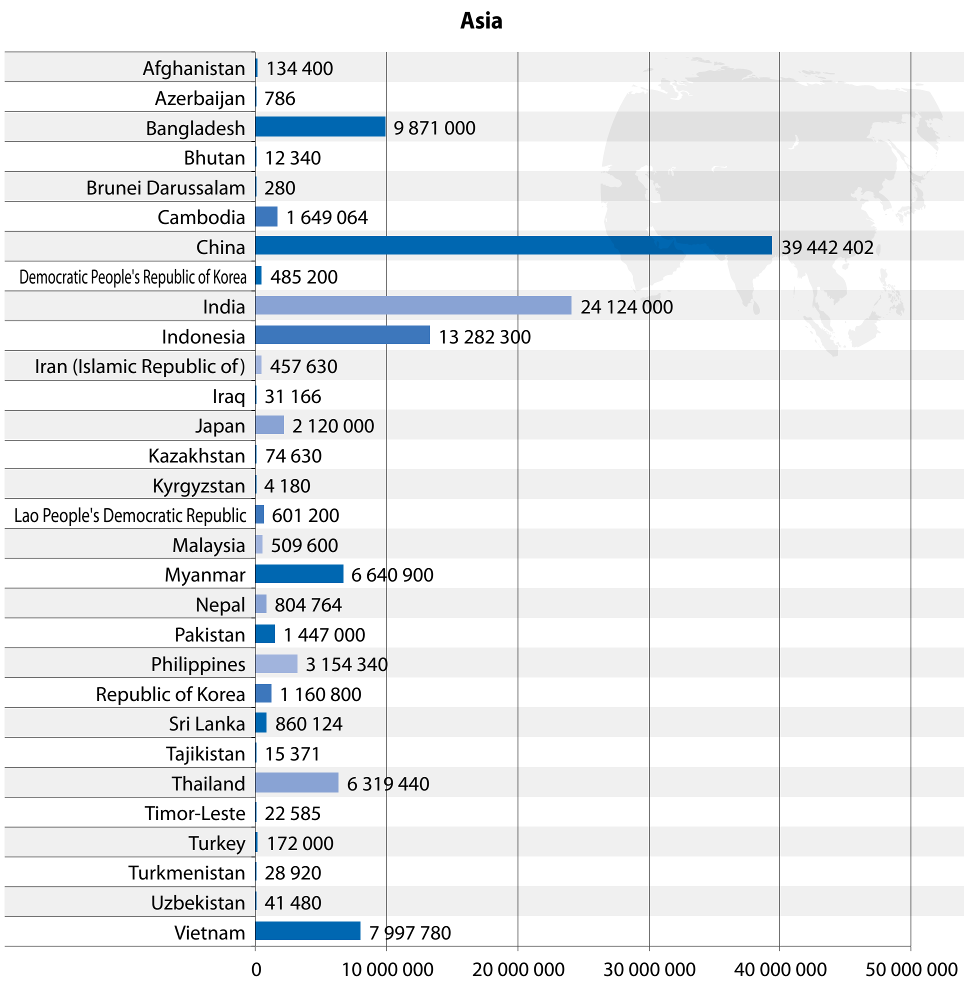

Figure 4: *Rice husk production in Asia in 2010 [t] (20% of rice production assumed) (respective rice production data calculated on basis of data from [4])*

Especially in developing countries where a high number of small rice farmers is spread over a wide area it is reasonable to build up so-called 'collection points'. As further support, big bags of approximately 0.5 – 1m³ can be supplied by the cement plant in question. It is worth mentioning that the bags are sold to the cement plant at the collection points by volume (not by weight!). Trucks which usually transport cement bags can additionally collect rice husk bags at collection points. This may even provide new jobs and a secondary income for farmers or traders. One aspect of prime importance is that the big bags are monitored and marked with names/charge number. The producer or supplier can thus be identified which is necessary in order to avoid big bags being filled with stones or sand.

This economic and environmentally-friendly procedure facilitates the use of rice husks in areas where the problem of transport and logistics still leads to the burning of unused rice husk at landfills. It furthermore includes the respective local community and may open up new revenues. In the Philippines, MVW Lechtenberg successfully developed such a collection system for rice husks some years ago.

Besides this collection point system, rice husk can also be transported in bulk form in trucks. As rice husk can very easily be dispersed by the wind, trucks should be covered in order to avoid loss and environmental stress.

Composition	Unit	Value
SiO_2	%	15 – 17
Lignin	%	6 – 31
Cellulose	%	28 – 35
Hemicellulose	%	18 – 21
Solubles	%	2 – 5
Moisture	%	7.5
Fat	%	0.30 – 0.80

Figure 5: *Composition of rice husk (Source: [6]).*

The very low bulk density of rice husk (around 96 – 160kg/m³ [1]) contributes to low truck loads by weight and hence to higher specific transport costs.

Collection of rice husk from widespread facilities turns out to be problematic in terms of logistics since collection point systems as previously described are not that common yet and currently husks are dumped and burnt in open piles [1].

5. Use as alternative fuel in a cement or lime plant

Owing to its high calorific value, rice husk has energy potential. Therefore, rice husks are a very cost-effective material for direct combustion. It can be used as fuel in power plants, in the cement industry and in cellulosic ethanol production [11]. Flatbed dryers are used to dry wet rice grains by forcing heated air through the grain bulk. This heat is produced in a furnace that burns rice husk [13].

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Parameter	Unit	Rice husk*	Rice hulls**	Rice husk***
Moisture	%	10	n/a	10
Ash	%	> 25	20.26	17.778
C	%	39	38.83	42.267
H	%	2.97	4.75	5.122
S	%	0.07	0.05	0.111
N	%	0.49	0.52	1.389
O	%	36.36	35.47	33.222
Cl	%	n/a	0.12	0.111
Net calorific value	kcal/kg	3,371	n/a	3,917
Volatile matter	%	61.4	n/a	69.8

Figure 6: *Analyses results of rice husk samples (Source: * = [7] , ** = [8] , *** = [9]*

Fuel substitution calculation			
	Calorific value [kcal/kg]	Substitution factor CV coal	Substitution factor CV petcoke
Rice husk	3,400	1.79	2.41
Coal	6,100	1	–
Petcoke	8,200	–	1

Figure 7: *Substitution factors for rice husks alternative fuel.*

Direct combustion of rice husk is the simplest way to exploit its high energy content. Several cement plants have been using rice husk as fuel for many years, particularly in Asian countries (e.g. Pakistan, Indonesia [14,15] or the Philippines), Northern Africa, and Central and South America.

The high ash content of rice husk at around 20% makes it less attractive for lime kilns because the predominant silica combines with lime which reduces its reactivity.

Figure 7 shows an economic calculation of rice husk based on the calorific value compared with petcoke and coal, without handling, operating costs and capital investment. 1.79 tonnes of rice husk are needed to substitute one tonne of coal and 2.41 tonnes of rice husk substitute one tonne of petcoke.

D. Lechtenberg [7] affords an example of the magnitude of potential savings while substituting around 25% of the heat requirement of a 3,300t/d kiln line. Having considered US$65 per tonne for coal and US$20 for rice husk, and a specific heat consumption of 850kcal/kg, potential savings sum up to more than US$1.1 million (around 12% of the original fuel costs).

6. Biomass-CO_2-value

Rice husks are one of the largest mill-generated sources of biomass in the world. The use of this material as alternative fuel in clinker production contributes to the emission reduction of fossil CO_2 as rice husk is 100% biogenic.

The CO_2 emissions resulting from rice husk combustion are equal to the amount of CO_2 that the rice crop absorbs from the atmosphere during the growing phase. Co-incineration of rice husk affords CO_2 neutral emissions, thus presenting itself as an attractive alternative to coal or gas.

In order to appraise the potential fossil-derived carbon dioxide reduction through rice husk co-incineration one can make a simple calculation:

Taking into consideration the IPCC default emission factor for coal (96kg CO_2/GJ [16]) one tonne of coal emits approximately 2.45t of CO_2. Hence, for each tonne of coal substituted by 1.79t of rice husk, around 2.45t of fossil-derived carbon dioxide is saved. Or, vice versa, one tonne of rice husk can save around 1.36t of fossil-derived CO_2 from coal.

7. Reception and storage

Figure 8 (page 10) shows a receiving area for bulk rice husk. Trucks are tipped above the screen, thereby avoiding feeding of large foreign particles which cannot be fed pneumatically. Where normal trucks are used, the material is either reloaded manually or by means of a wheel loader.

A wheel loader helps spread the material so that all rice husks fall through the screen. The tipping area is in a roofed building. A feeding screw is located underneath the 'security screen' which transports the rice husks to silos.

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Rice husks can be stored at cement plants in big bags or in a covered and wind-protected area (roofed area, silo).

The storage of bulk rice husk in covered sheds is advised, since this prevents dispersion of the lightweight husk and dust by wind to the environs. In rainy regions open storage causes soaking of the husk pile thus deteriorating its combustion properties.

8. Dosing and feeding systems

Rice husk is suitable either for a kiln burner or calciner feeding. Co-firing through a kiln burner can be achieved by pneumatically feeding rice husk into a dedicated burner channel. Metering can be performed by a rotary or belt weigher. However, metering of rice husk can be somewhat problematic. Owing to its very low bulk density, rice husk metering by belt weighers needs very high material thickness which can cause continuous feed problems onto the weighing belt. Such problems can be avoided by using larger rotary weigh feeders or screw weigh feeders.

Calciner feeding of rice husk can be found at several cement facilities. Very often big bags of rice husk are lifted from the ground to the feeding point near the calciner. The contents of the big bags are discharged into a hopper just above a double flap valve connected to the calciner.

Although popular, manually operated feeding presents several risks. Discontinuous feeding might happen on manual failure, thus affecting smooth calciner operation.

Furthermore, health and safety conditions on the preheater tower, in addition to an elevated ambient air temperature, are less favourable and not in compliance with best practice.

Figure 8: *Reception area for bulk rice husks which are tipped into this bunker (Source: MVW)*

Figure 9: *Storage of big bags of rice husk beside the tyre storage in a cement plant (Source: MVW)*

	Model Clinker composition	AFR ash composition	Ash input	Model clinker + ash	Model clinker + ash referred to 100%	Difference to original clinker
	[%]	[%]	[%]	[%]	[%]	
CaO	66.20	0.10	0	66.20	65.55	-0.65
SiO_2	21.45	95.40	0.95	22.40	22.18	0.73
Al_2O_3	6.00	0.10	0	6.00	5.94	-0.06
Fe_2O_3	2.50	0.10	0	2.50	2.48	-0.02
MgO	1.20	0.30	0	1.20	1.19	-0.01
K_2O	0.88	1.80	0.02	0.90	0.89	0.01
Rest	1.77	2.20	0.02	1.79	1.77	0
Total	100.00	100.00		100.99	100.00	0
Lime saturation factor	96.30	0			92.7	-3.60
Silica module	2.52	477			2.64	0.11
Alumina module	2.40	1			2.40	0.00

Figure 10: *Influence of rice husk ashes on a "model" clinker.*

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A sophisticated feeding system uses the method of mechanical feeding to the calciner by enclosed conveyors.

The material should be fed into a small buffer hopper where weighing and further mechanical feeding (by means of screw weigh feeders) can be performed. Alternatively, the material can be fed pneumatically directly into the calciner or kiln burner.

9. Quality influence on clinker

Owing to its high ash content the use of rice husks as an alternative fuel in clinker production will increase the silica module and decrease the lime saturation factor (LSF) of the clinker. Therefore, adjustments to the raw meal composition (higher grade limestone, iron ore) are indicated. A simple calculation on a "model" clinker affords an impression of the magnitude of impact.

Virtual production is 100t/h, rice husk dosage is assumed to be 5t/h which is equivalent to some 20% energy supply at a specific energy consumption of 850 kcal/kg clinker. The simplified calculation only considers the ash content of that portion of the fuel mix which consists of rice husk. For final evaluation the ashes from the other fuels which are utilised in the mix have to be considered on a case-by-case basis.

- Rice husk dosage: 5t/h
- Rice husk ash content: 20%
- Rice husk ash input: 1.0t/h

As already mentioned, rice husk is less favourable for lime burning. The high silica content deteriorates the lime reactivity because silica absorbs plenty of free lime to form calcium silicates.

The content of chlorine in rice husk is very low, so coating-related kiln problems are not anticipated.

10. Recommendations

- In most countries rice husk projects can qualify for CDM (Clean Development Mechanism) projects with respective funding.
- Be aware of dust generation while handling rice husk. Take care of personal protection equipment (e.g. respirator).
- It is advised to secure rice husks as a fuel resource with long-term contracts in order to avoid constant price negotiations.
- Development of a logistical concept is extremely important since it facilitates the collection of small quantities of rice husks directly by farmers or small rice mills employing cement delivery trucks.
- It is advised to design the feeding systems for rice husks in a configuration which also allows for handling other alternative fuels. This is important in order to avoid dependency on rice farmers and other suppliers of rice husks.
- Weather-protected storage is necessary.

References

[1] Bronzeoak Ltd: Rice Husk Ash Market Study. Limited Distribution – UK Companies only, 2003. Available here (checked in September 2020).

[2] International Rice Research Institute: Rice Production and Processing. Available here (checked in August 2020).

[3] Y. Katsuragi, T. Kimura, N. Shimizu: Status of Rice Milling and Use of By-products. In: Rice is Life – Scientific Perspectives for the 21st Century, Proceedings of the World Rice Research Conference, Tsukuba, Japan. International Rice Research Institute, 2005, p. 199.

[4] FAO – Food and Agriculture Organization of the United Nations: Statistical Database 2010. Available here (checked in August 2020).

[5] Medium Grain Rice – The first medium grain rice site of the world: Rice Harvest Seasons of Main Exporting Countries. Available here (checked in August 2020).

[6] L. Luduena, D. Fasce, V. A. Alvarez, P. M. Stefani: Nanocellulose from Rice Husk Following Alkaline Treatment to Remove Silica. BioResources, Vol. 6/No. 2, 2011, pp. 1440 – 1453.

[7] D. Lechtenberg: The Use of Alternative Fuels in the Cement Industry of Developing Countries – An Opportunity to Reduce Production Costs? Cement International, Vol. 7/No. 2, 2009, pp. 66 – 70.

[8] L. L. Baxter, B. M. Jenkins, T. R. Miles Jr., T. R. Miles: Combustion Properties of Biomass. Fuel Processing Technology, Vol. 54, 1998, pp. 17 – 46.

[9] M. Beckmann, S. Ncube: Charakterisierung von Ersatzbrennstoffen hinsichtlich brennstofftechnischer Eigenschaften. In: Wiemer, K.; Kern, M. (Hrsg.): Bio- und Sekundärrohstoffverwertung II – stofflich – energetisch. Witzenhausen, 2007, S. 232–263. ISBN 3-928673-50-5

[10] V. Barišić, M. Hiltunen, E. Coda Zabetta: Combustion of Different Types of Biomass in CFB Boilers. 16th European Biomass Conference Valencia (Spain), 2 – 6 June 2008.

[11] TropRice: Post Production. Available here (checked in September 2011).

[13] R. J. Flor: Increasing Number of Flatbed Dryers Benefits Myanmar Farmers. International Rice Research Institute. Available here (checked in August 2020).

[14] A. Munir: Pakistan: Alternative Fuels and the Cement Industry. World Cement, May 2010, pp. 113 – 119.

[15] J. Theulen: HeidelbergCement – Waste Processing Achievements in Asia. Global Cement Magazine, January 2012, pp. 14 – 16.

[16] IPCC – Intergovernmental Panel on Climate Change: Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 3: Reference Manual. 1996.

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Playing with Fire: Reducing CO_2 Emissions While Using Biomass?

Figure 1: *Wood pellet. (Source: Biomass Magazine).*

By Dirk Lechtenberg, MVW Lechtenberg & Partner

It is common knowledge that the cement industry needs to reduce its fossil CO_2 emissions. By now, most of the larger cement groups have implemented more or less ambitious targets to reach this goal. Cement giant LafargeHolcim, for example, just announced the "Business Ambition for 1.5°C" pledge in alignment with a net zero pathway to reduce the CO_2 emissions from currently 561 kg/tonne to 475 kg/tonne of cementitious material by 2030. Besides increased use of alterative raw materials such as clay or granulated blast furnace slag, the company aims to use 100 million tonnes of alternative fuels such as refuse derived fuels (RDF) or biomass [1].

100 million tonnes are an ambitious goal, considering that the group currently "only" uses 52 million tonnes of waste, from which merely 20 million tonnes are alternative fuels while the remaining 32 million tonnes are recycled aggregates and other raw materials.

While LafargeHolcim is on the right path, an industry wide switch to more biomass derived fuels will be key to reduce the fossil CO_2 emissions in a sustainable manner.

In the following, Dirk Lechtenberg describes a sustainable pathway for reducing the CO_2 emissions by using biomass derived fuels.

Current Alternative Fuel Usage

The substitution rate for alternative fuels is steadily increasing and reaches as high as almost 70% in some European countries, where an efficient waste management infrastructure is in place for the collection and processing of waste into specified alternative fuels.

But even when using alternative fuels such as refuse derived fuels, the "biogenic" share which includes the organic parts such as wood, cotton or paper accounts, especially in Europe, for merely 20-40% of the refuse derived fuels. As the kilns require a high calorific value, mainly non-recyclable mixed plastics are used to provide the necessary heating value, especially for the kiln burner.

When increasing the substitution rate, the calorific value needs to be increased accordingly in order to maintain stable process conditions. Therefore, the potential share of biogenic waste sources will remain limited. Modern pre-calciner kilns, however, can also operate on alternative fuels with a lower calorific value, provided that required storage dosing and feeding systems are available. Substituting, for example, coal (with a CV of 6,200 kcal/kg) with wood chips (with a CV of 3,500 kcal/kg) requires twice as much material to be fed. Other aspects to be considered are a higher moisture content, and the required higher fan capacities for a sufficient oxygen supply.

Looking at alternative fuels use in the German cement industry, it can be seen that the content of biomass derived fuels is increasing, though still on a lower level (see figure 2, page 13).

The main fuel sources are waste derived fuels containing plastics or packaging. It can be seen that both the substitution with plastic derived fuels as well as with sewage sludge, a biomass derived fuel, has almost doubled. This is mainly due to changes in the German environmental legislation, and high gate fees which are paid to the cement plants for offering a sustainable disposal for such sludges.

At the same time, the average substitution rate has increased from 57% to now 68%. While the share of plastic derived fuels is already relatively high, the share of biomass derived fuels needs to be increased significantly in order to further reduce the carbon footprint.

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Playing with Fire: Reducing CO_2 Emissions While Using Biomass?

Alternative fuel	2018 1,000 t	2018 MJ/kg	2012 1,000 t	2012 MJ/kg
Waste tyres	196	28	234	28
Waste oil	70	30	56	26
Fractions of industrial and commercial waste	-	-	-	-
Pulp, paper and cardboard	76	5	96	4
Plastics	758	23	474	23
Packaging	-	-	-	-
Wastes from the textile industrie	6	30	3	17
Others	1,136	22	1,246	21
Meat and bone meal and animal fat	164	18	176	18
Mixed fractions municipal waste	280	18	352	15
Waste wood	1	14	8	14
Solvents	135	25	96	22
Fuller's earth	-	-	-	-
Sewage sludge	633	2	310	4
Others, such as:	146	4	54	9
Oil sludge				
Organic destillation residues				

Figure 2: Comparison of used quantity and calorific value of alternative fuels used in the German cement industry in 2018 and 2012 (Source: VDZ)

Economic Influences

In the cement industry, the use of alternative fuels is mainly driven by economic considerations. Typically, gate fees for a safe utilization and disposal of waste derived fuels are paid to the cement plants. Due to the flexibility of using alternative fuels, the industry can switch to the most economical and available fuel types.

An exemplary case for this flexible switching was the use of meat and bone meal after the mad cow disease spread in Europe between 2001 and 2005. The use of meat and bone meal increased significantly from zero in 2000 to almost 439,000 tonnes in 2004 – in Germany alone [3]. At that time, we needed to stop the production of RDF in the RDF production plant I was working with to supply meat and bone meal to almost all cement plants and a lot of coal fired power plants.

The development of the CO_2 price will influence the use of alternative fuels in the cement industry in a similar way, especially in Europe.

The European emission allowance price increased significantly in the last 5 years (compare figure 3) to currently approx. 25€/tonne on average. In some European countries additional national CO_2 prices have to be paid by the emitter – in this case the cement industry. Therefore, to reduce related emission costs, the use of alternative fuels with a higher biogenic content has to increase.

Figure 3: European CO_2 emission allowances in Euro, development for the last five years. (Source: finanzen.net, retrieved 22.09.20)

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False Promise: Wood Pellets

Electricity companies in Europe are no exception and have to pay for their fossil CO_2 emissions as well.

Supported by EU legislation, biomass (mostly wood in the form of pellets or chips) is increasingly used as a fuel to generate electricity, including in a number of large former coal power plants. According to a report by the USDA Foreign Agricultural Service's Global Agriculture Information Network, the EU consumed approximately 29 million tonnes of wood pellets in 2018, making the EU the world's largest pellet market. The report predicts wood pellet demand will expand to 30.8 million tonnes in 2020. The U.K. is the top pellet consumer, with 9 million tonnes last year, followed by Italy at 3.3 million tonnes and Denmark at 2.5 million tonnes (figure 4).

This practice continues despite the scientific consensus that burning wood pellets instead of coal in power stations risks accelerating climate change:

Old (phased out) coal fired power plants with a low energy efficiency are recently switched to burn wood pellets. These wood pellets are produced preliminary in the US and Canada from round wood; the trees are shredded, dried with (fossil) energy, pelletized and shipped with handy size or even bigger vessels over the Atlantic to the biomass terminal [2] in the port of Rotterdam, from where small vessels transport the wood pellets to, for example, the old DRAX or other power plants in UK.

In sum, this practice produces, according to several scientific reports, higher CO_2 emissions than the use of coal. And it is unfortunately also driven by high subsidies: In the UK with the "Renewables Obligation (RO)" which is one of the main support mechanisms for large-scale renewable electricity projects, but also in the Netherlands, where, in total, 628 biomass installations will get some €11.4bn in subsidies, of which €2.6bn is going to the RWE power plants in Geertruidenberg and Eemshaven.

Earlier this month, the European Academies Science Advisory Council (EASAC) demanded governments to stop wasting billions of Euros in subsidising biomass power plants as it is proven to be unsustainable. Additionally, burning wood does not produce a lot of energy and the net amount of CO_2 which is released is greater than when burning coal or gas, the researchers said [4]. The report points out that CO_2 released by burning the wood pellets in Europe is registered in the US, calling it a misleading "book-keeping trick".

However, until clear guidelines on sustainable sourcing of biomass are available, the electricity generating industry moves forward in developing wood pellet incineration projects (compare figure 5, page 15).

Main Pellet Consumers (1,000 MT)

Calendar Year	2013	2014	2015	2016	2017	2018	2019
United Kingdom	3,700	4,900	6,700	6,900	7,470	8,540	9,000
Italy	2,500	3,400	3,300	3,200	3,400	3,300	3,300
Denmark	2,400	2,450	2,500	2,570	3,160	3,075	2,500
Germany	2,080	1,840	1,760	2,000	2,100	2,190	2,300
Sweden	1,860	1,650	1,650	1,605	1,530	1,765	1,850
France	691	1,088	908	1,207	1,335	1,430	1,684
Belgium	1,500	1,200	1,600	1,340	1,375	1,490	1,550
Netherlands	1,200	500	120	190	360	610	1,200
Austria	880	815	850	895	960	950	950
Spain	380	425	450	475	530	570	675
Poland	500	490	350	300	345	450	500
Total	**18,300**	**19,100**	**20,800**	**21,850**	**24,100**	**26,800**	**29,100**

Figure 4: *Main pellet consumers by countries in 2019. Source: AEBIOM and Member State sector organisations. e = estimate EU FAS Posts*

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Playing with Fire: Reducing CO_2 Emissions While Using Biomass?

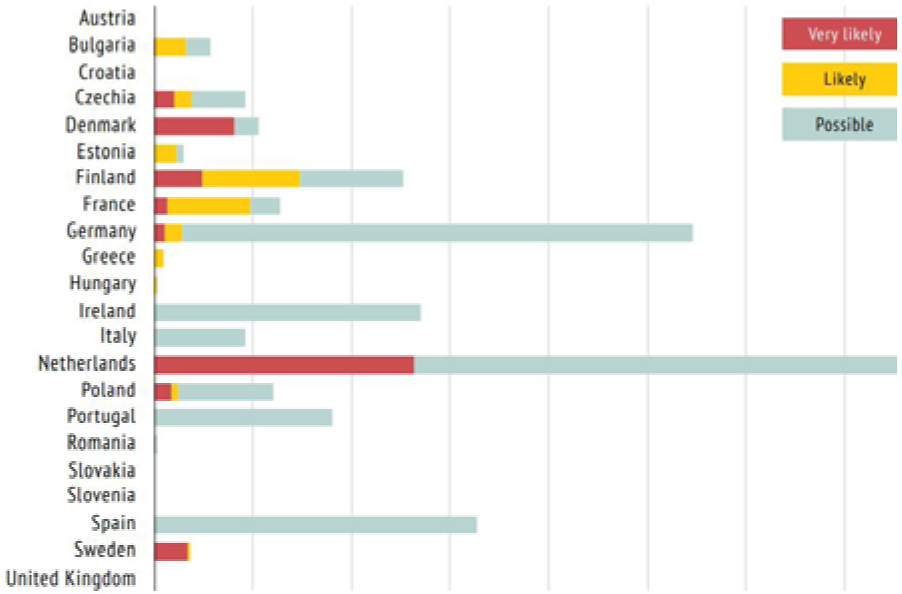

***Figure 5:** Potential growth in EU member state biomass consumption in coal power stations split by risk. (Source: Sandbag research and calculations).*

Currently, the wood pellet price stays at around 80-95€ per tonne that is delivered to the power plants. In some EU member countries, these are fully subsidised.

The Renewable Energy Directive II (RED II) by the European Union, which comes into force on the 1st of January 2021, will not establish mandatory sustainability criteria for wood pellets and other forms of solid biomass. In the absence of EU-wide binding criteria for solid biomass, several Member States (including Belgium, Denmark, and the Netherlands) developed their own rules in response to the growing use of imported wood pellets, particularly for use in industrial power plants.

Sustainable Alternatives

At such wood pellet prices, their use is not worthwhile for the cement industry, as only the calorific value and the CO_2 price are taken into consideration. But the CO_2 taxes are increasing: in Germany, a CO_2 tax will be introduced in 2022 with 30€ per tonne, increasing to 45€ in 2024 and to 55€ per tonne of CO_2 in 2025. From 2026, the CO_2 certificates will be traded on an exchange, where a price corridor of 55-65€ per tonne of CO_2 is mandatory.

With increasing CO_2 prices, the use of wood pellets might become economically viable for cement plants. This could elicit a trend similar to what we now see in electricity generation.

Subsidising the use of "biomass derived" fuels like wood pellets is not sustainable. It is important that the Governments set clear restrictions and policies on the use of biomass in coal fired power plants as well as in the cement and lime industry. Using locally available, sustainable biomass sources such as industrial wastes (like saw dust or paper manufacturing sludges) and others as fuel in the cement industry is a more sustainable pathway.

The RED II Sustainability Criteria for Biofuels includes several alternatives such as:

- Algae if cultivated on land in ponds or photobioreactors
- Biomass fraction of mixed municipal waste
- Biowaste from private households subject to separate collection
- Biomass fraction of industrial waste not fit for use in the food or feed chain
- Straw
- Animal manure and sewage sludge
- Palm oil mill effluent and empty palm fruit bunches
- Crude glycerin
- Bagasse
- Grape marcs and wine lees
- Nut shells
- Husks
- Cobs cleaned of kernels of corn
- Biomass fraction of wastes and residues from forestry and forest-based industries
- Other non-food cellulosic material
- Other ligno-cellulosic material except saw logs and veneer logs

Conclusion

The cement industry needs to reduce its fossil CO_2 emissions. The use of alternative fuels with a biogenic content is a suitable way and best practice. But, especially with biomass, the industry needs to carefully select the sources of its fuels. While wood pellets seem to be a solution in other industries, a closer look reveals the opposite. Greenwashing is not an option in stopping climate change. For the cement industry, sustainable sourcing of locally available biomass derived fuels will be one main criteria in reducing its carbon footprint.

References

[1] J. Revill, REUTERS: "LafargeHolcim raises its target for reducing carbon emissions". Retrieved 21 September 2020 from here.

[2] Port of Rotterdam: "Biomass handling, storage and distribution". Retrieved 16 September 2020 from here.

[3] Verein Deutscher Zementwerke e.V.: „Umweltdaten der deutschen Zementindustrie 2004" und „Umweltdaten der deutschen Zementindustrie 2000".

[4] Dutch News: „Biomass not sustainable, subsidies must stop, say European scientists". Retrieved 16 September from here.

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Brazil

Votorantim Cimentos Creates Own Waste Management Service

To support its drive to become part of a circular economy, Votorantim Cimentos has created Verdera, a nationwide provider of waste management services. The company enables the cement producer to reduce industrial and urban waste for landfilling through co-processing in Votorantim's cement kilns.

Votorantim Cimentos announced an investment plan of BRL400m (US$98m) to develop the unit over the next four years. The goal of Verdera is to offer waste disposal services to different companies and industries.

Verdera will also support Votorantim Cimentos to increase its petcoke substitution rate from 25 % to 80 %.

Source: CemNet: "A new destination for waste". Retrieved 10 August from https://www.cemnet.com/Articles/story/169339/a-new-destination-for-waste.html

Germany

HeidelbergCement Upgrades Tyre Feeding Unit in Lengfurt Plant

About 20,000 tonnes of hard coal is used in HeidelbergCement's Lengfurt plant annually to produce approximately 20% of the overall required heat, which corresponds to 20 million tyres according to plant director Michael Becker.

The tyres that are used are production waste coming from the manufacturers as well as waste tyres from trucks and cars. Their diameters vary greatly between 300 and 1,600 mm, their widths between 100 and 400 mm. The average weight is at 8 kg for the car tyres and around 60 kg for the truck tyres.

To feed the different tyre material to the rotary kiln inlet, HeidelbergCement previously used to operate two systems: Small tyres were hung individually by hand into the hook lift and then transported into the kiln inlet. The heavy truck tyres were handled by an excavator before they were fed into the transport stream.

In 2016, BEUMER Group began to supply a new, fully-automated system that sorts, separates, and regulates the tyres of different sizes and weights and feeds them to the rotary kiln inlet. The equipment supplier also took over the installation and provided the steel structure.

Installation and commissioning were completed within the preset period. The conveying capacity can reach a maximum of three tonnes per hour.

Source: EHS Today: "Fueling Your Business: Using Waste for Production". Retrieved 10 August from https://www.ehstoday.com/environment/article/21138722/using-waste-to-produce-fuel-for-production .

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India

Hindalco to Supply UltraTech with Bauxite Residue for Cement Manufacture

The flagship Aditya Birla Group companies Hindalco Industries and UltraTech Ltd have entered into a memorandum of understanding to deliver 1.2 million tonnes of red mud (also known as bauxite residue) annually to UltraTech's 14 cement plants located across 7 states.

With this, Hindalco will become the world's first company to achieve 100% red mud utilisation across three of its refineries.

Red mud generated in the alumina manufacturing process is rich in iron oxides, along with alumina, silica and alkali. The cement industry has developed the capability to process red mud as a replacement for mined minerals such as laterite and lithomarge in its process. This way, the waste of one industry will be used as an input material in another to strengthen a circular economy.

K.C. Jhanwar, Managing Director, UltraTech Cement, said, "UltraTech has been among the early adopters in India on the use of alternative raw materials and fuels in manufacturing and invested to build storage, handling and processing facilities. Use of waste like red mud as an alternative raw material for manufacturing cement requires infrastructure and process modification to ensure a win-win for both business and the environment."

Last year, UltraTech consumed about 15.73 million tonnes of industrial waste as alternate raw material and about 300,000 tonnes as alternative fuel in its kilns.

Source: The Rahnuma Daily: "Hindalco in pact with UltraTech to supply bauxite residue for cement manufacture". Retrieved 10 September from https://www.therahnuma.com/hindalco-in-pact-with-ultratech-to-supply-bauxite-residue-for-cement-manufacture/ .

Japan

Taiheiyo Cement Corp Starts New Biomass and Coal Power Plant

For a new biomass and coal power plant, Taiheiyo Engineering Corp. ordered three bucket elevators and a drag chain conveyor from German equipment supplier Aumund, all with capacities of up to 150tph. The machines transport palm kernel shells (PKS) and palm empty fruit bunches (EFB), which are used as alternative fuels in the Ofunato power plant.

The conveying concept is designed so that the different materials are kept apart and enter the silo buffer tanks separately.

Source: CemNet: "Taiheiyo Cement Corp oders Aumund equipment for new power plant". Retrieved 31 July from: https://www.cemnet.com/News/story/169287/taiheiyo-cement-corp-orders-aumund-equipment-for-new-power-plant.html .

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Morocco

Waste Import Debate in Morocco

A decision published on August 3, 2020 by Aziz Rabbah, Morocco's Minister of Energy, Mines and Environment, authorizing the import of combustible waste, is at the origin of a recent controversy in the country.

The Moroccan government has since emphasized that it will not import toxic waste or waste that does not comply with its national standards.

Morocco has been importing non-toxic and environmentally friendly waste that can be used in manufacturing industries for several years, said the Ministry of Energy, Mines and Environment, in a press release published 17 August. According to the statement, Morocco receives only a small amount of such waste which is subject to strong competitiveness among international companies, especially with the development of recycling and the reuse of waste as part of a green and circular economy.

Between 2016 and 2019, the North African Kingdom imported nearly 1.6 million tonnes of non-toxic waste such as fabric, plastic, paper and minerals.

Source: The North Africa Post: "Morro's Govt. shall not import toxic waste". Retrieved 20 August from https://northafricapost.com/43237-moroccos-govt-shall-not-import-toxic-waste.html .

Mexico

Cemex Decarbonisation Roadmap Validated by Carbon Trust

Cemex announces that the Carbon Trust has validated its roadmap to decarbonise global operations in line with the Sectoral Decarbonisation Approach (SDA) 2-degree scenario developed by the International Energy Agency (IEA). The validated roadmap would enable the company to achieve a 35 % reduction of net carbon emissions by 2030.

The validation scope included Cemex's worldwide cement operations, with a detailed analysis of plants expected to contribute at least 80 % of the direct and indirect organisational CO_2 emission reductions needed to achieve the 2030 target. The Carbon Trust assessed the technical feasibility of key technology and decarbonisation levers based on guidelines defined by international institutions such as the IEA, the Cement Sustainability Initiative and the European Climate Research Alliance.

The CO_2 reduction levers included alternative fuels, decarbonated raw materials, renewable power projects and novel cements, among others. The validation also included a thorough review of Cemex's commitment to implement these levers based on governance mechanisms and business planning.

Source: CemNet: "Cemex has decarbonisation roadmap validated by Carbon Trust". Retrieved 30 September from https://www.cemnet.com/News/story/169605/cemex-has-decarbonisation-roadmap-validated-by-carbon-trust.html .

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South Africa

EMA Orders Lafarge Cement Zimbabwe to Close Plant

Lafarge Cement Zimbabwe was ordered to cease operations at its 0.45Mta Manresa plant by the Environmental Management Agency (EMA) on charges of discharging abnormal dust emissions to the environment.

Lafarge Cement Zimbabwe said it experienced an unexpected surge in dust emissions during a trial of alternative fuel in the plant between July 30 and 1 August, adding that immediate action was taken to control and contain the emissions and the incident was reported to EMA in line with regulatory requirements. It is understood that the plant tried to do a trial of incorporating saw dust in its process and was trying to determine the optimum consumption rate when the dust discharges occurred.

Source: Boulawayo 24 News: "EMA shuts Lafarge Cement plant". Retrieved 17 August from https://bulawayo24.com/index-id-news-sc-national-byo-190601.html.

UAE

Emirates RDF to Produce Alternative Fuels for Cement Factories

Emirates RDF, a partnership between water treatment expert Besix, Finnish group Griffin Refineries and Ajman-based Tech Group Eco, has announced that is set to start production of alternative fuel at the company's facility in Umm Al Quwain.

In a statement, it explained that the household waste collected will be converted into an alternative energy source called Refuse Derived Fuel (RDF), which will be used as a fuel in cement factories instead of coal. This is part of Emirates RDF's strategy to generate green energy, it said.

Once operational from October 1, Emirates RDF, the first RDF facility in the region, will be able to handle over 1,000 tonnes of waste from the emirates of Ajman and Umm Al Quwain.

A delegation drawn from the municipality of Ajman and the Ministry of Climate Change and Environment visited the Emirates RDF plant ahead of its start of operations early next month.

"Emirates RDF is delighted that after intensive cooperation with the Ministry of Climate Change and Environment and the President's Initiatives Committee (Ministry of Presidential Affairs), the RDF facility is ready for the production of high-quality alternative fuel for factories in the region, said Nicolaas de Koning, general manager, Emirates RDF.

"The Emirates RDF plant will have enhanced capacity that will enable us to divert over 80 % of household waste from the landfill. This will be a huge boost to our environment conservation efforts," he added.

Source: ME Construction News: "Emirates RDF to start production of alternative fuel for cement factories". Retrieved 28 August from https://meconstructionnews.com/43564/emirates-rdf-to-start-production-of-alternative-fuel-for-cement-factories.

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GCCA Announces 2050 Climate Ambition

The Global Cement and Concrete Association (GCCA) has published its 2050 Climate Ambition, a joint industry commitment to net-zero carbon dioxide (CO_2) emissions by 2050. The association's 40 members have committed to:

- eliminating direct energy-related emissions and maximizing the co-processing of waste from other industries,
- reducing and eliminating indirect energy emissions through renewable electricity sources,
- reducing process emissions through new technologies and deployment of carbon capture at scale,
- reducing the content of both clinker in cement and cement in concrete,
- more efficient use of concrete in buildings and infrastructure,
- reprocessing concrete from construction and demolition waste to produce recycled aggregates to be used in concrete manufacturing and quantifying.
- enhancing the level of CO_2 uptake of concrete through re-carbonation and enhanced re-carbonation in a circular economy, whole-life context.

Albert Manifold, GCCA President and Chief Executive of CRH plc, said: "The 2050 Climate Ambition represents our industry's commitment to further reducing emissions and ensuring that the vital product we provide can be delivered on a carbon neutral basis by 2050. There is a significant challenge involved in doing so and achieving alignment across our industry on a sustainable way forward is an important first step. We cannot however succeed alone and in launching our ambition statement we are also highlighting the need for our industry to work collaboratively with other stakeholders in support of our ambition for a more sustainable future."

GCCA member companies are currently developing a 2050 concrete roadmap that will set out the detailed actions and milestones that the industry will enact to achieve its ambition. This will include working across the built environment value chain to deliver the vision of carbon neutral concrete in a circular economy, whole life context. The 2050 concrete roadmap is due to be published in the second half of 2021.

Source: CemNet: "GCCA launches 2050 Climate Ambition programme". Retrieved 8 September from https://www.cemnet.com/News/story/169454/gcca-launches-2050-climate-ambition-programme.html .

New Alternative Fuel Pellet Plant

Waste Knot Energy (Waste Knot) has secured funding from Gresham House's British Strategic Investment Fund (BSIF) to build its first fuel pelleting plant in Middlesbrough, UK. The site of the new plant will be at AV Dawson's port facility on Teeside.

The plant will produce Waste Knot's Green Knot branded pellets using non-recyclable waste - otherwise destined for landfill or for another country's waste facilities. The high-calorific value of the pellets makes them a reliable, low-emission bulk alternative to coal and petcoke for energy-intensive industries such as cement. It is estimated the plant will manufacture in excess of 240,000 tonnes of fuel pellets each year, which will be transported within the UK by rail or exported by ship.

Source: CemNet: „Waste Knot Energy to operate new alternative fuel pellet plant in the UK". Retrieved 18 August from https://www.cemnet.com/News/story/169383/waste-knot-energy-to-operate-new-alternative-fuel-pellet-plant-in-the-uk.html.

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Blue River Recycling Ems: UPDATE

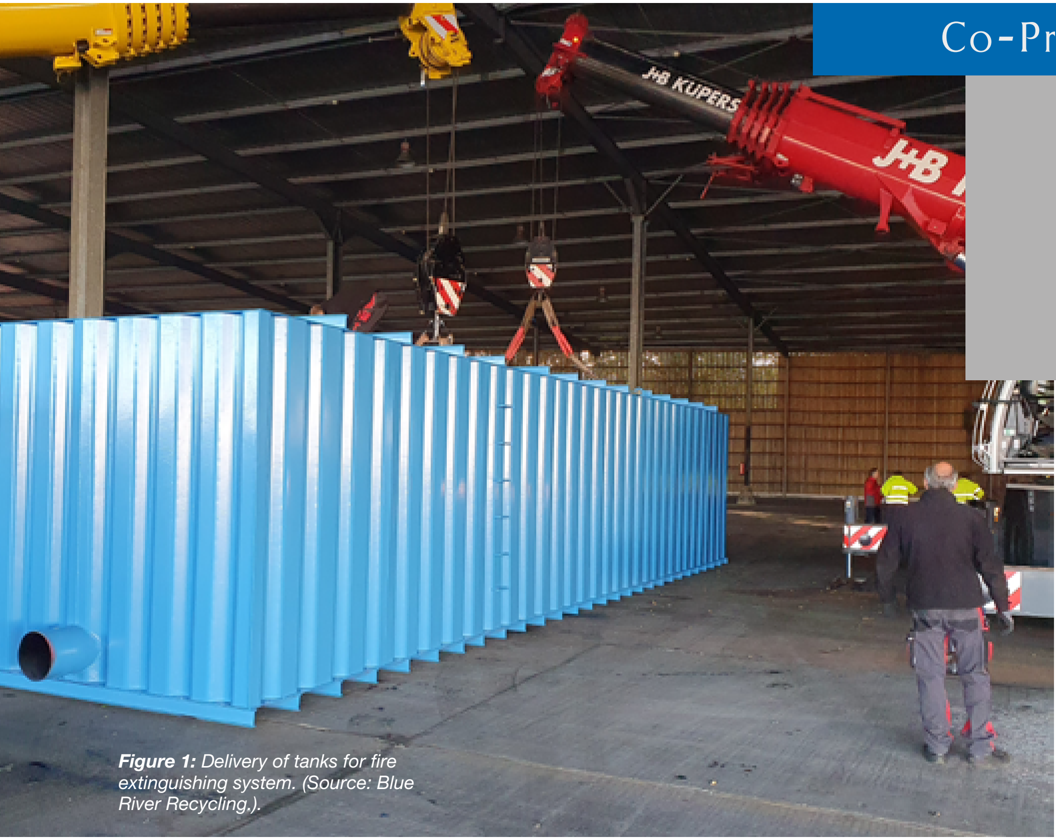

Figure 1: *Delivery of tanks for fire extinguishing system. (Source: Blue River Recycling.).*

On 24 September, the 400m³ water tanks for the fire extinguishing system at the Blue River Recycling Ems plant got delivered. The plant will be equipped with the most sophisticated fire fighting system: Infrared cameras by Orglmeister Infrarot-Systeme will scan the whole facility and each conveyor belt, and fire fighting turbines from EmiControls (similar to aircraft fire fighting systems) will be installed.

The official ground-breaking ceremony will take place on 16 October.

In cooperation with Nehlsen AG as local partner, one of the five leading waste management companies in Germany, non-recyclable mixed plastics will be used for the production of environmentally responsible alternative fuel pellets.

The new facility will achieve a production capacity of up to 100,000 tonnes of pellets annually. Production is scheduled to start in January 2021.

www.blueriver-recycling.com

Figure 2: *Example of pellets to be produced at Blue River Recycling Ems. (Source: Blue River Recycling.).*

Figure 23 New Blue River Recycling Ems location at BERA port terminal in Papenburg, Germany. (Source: *Blue River Recycling.).*

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