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Co-Processing Magazine of Alternative Fuels & Raw Materials

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Dear Readers,

The first half of 2019 has brought interesting changes and new developments regarding climate change awareness all around the world. 16-year-old Greta Thunberg has started a movement among the youth across the globe, which figuratively clarifies how aware we all should be with the decisions we make regarding the future of our environment.

This has also been mirrored in the European Parliament elections. In most of the bigger European cities, the Green parties won the most votes, spearheading a continent-wide change*. Again, especially young people incline towards the Green parties across countries where they did well. Climate emergency has been declared by Ireland, the UK, and many cities in the US, Europe and Australia.

The decisions we need to make are much more urgent than we might sometimes recognize. The cement industry alone accounts for 8 % of the world's CO_2 emissions**. So yes, every individual decision and contribution matters. It is a good start to make alternative fuels a mainstream solution together.

In this year's second edition of the Co-Processing Magazine we provide you with updates on programme highlights of the 6th Alternative Fuels Symposium, which will be taking place in Wyndham Hotel "Duisburger Hof", Duisburg on 24 – 25 September 2019. We are proud to have international speaker contributions from interdisciplinary professionals, presenting first-hand experience in the production and use of alternative fuels from Austria, Germany, India, Russia, Pakistan as well as country reports from, for example, Greece and the United Arab Emirates.

In this edition, we specifically give you more insights into the Alternative Fuels Workshop, which will be held on 26 September. This one-day intensive Alternative Fuels Workshop explores the progressive levels of alternative fuels production and use. An understanding of all steps and how they interact is necessary in order to control and optimise the use of alternative fuels.

We are happy to announce the winners of the Alternative Fuels Award in this edition of the Co-Processing Magazine. Furthermore, you'll be reading a short description of the second winning project from 2018; "Cimpor Souselas Plant". A respectable example of how to efficiently and sustainably incorporate RDF into co-processing.

This edition furthermore includes an abridged excerpt from the "Alternative Fuel and Raw Material Handbook" on the basic requirements and available technologies for the receipt and storage of refuse derived fuels. You will gain insights into advantages and disadvantages of various storage technologies, recommended fuel storage volumes dependent on alternative fuel consumption and the homogenisation process.

As in previous editions, we report on news about recent alternative fuel projects in various countries as well as technological innovations and industry relevant economic and environmental topics from all around the world.

Enjoy reading this booklet and I am looking forward to meeting you at the 6th Alternative Fuels Symposium in Duisburg!

Yours sincerely,

Dirk Lechtenberg

* Source: The Guardian, 2019. https://www.theguardian.com/politics/2019/jun/02/european-parliament-election-green-parties-success

** Source: BBC News, 17 December 2019. https://www.bbc.com/news/science-environment-46455844

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Reception and Storage of Refuse Derived Fuels (RDF)

Reception and Storage of Refuse Derived Fuels (RDF)

When using refuse derived fuels (RDF) in a cement or lime plant, usually, a new reception and storage system has to be built. In this abridged excerpt from the Alternative Fuels and Raw Materials Handbook for the Cement and Lime Industry (2012) by Dirk Lechtenberg and Dr. Hansjörg Diller, the basic requirements and available technologies for the receipt and storage of refuse derived fuels are described.

1 Truck reception

Widely varying reception systems are used for alternative fuels arriving at cement or lime plants via walking floor or tipper trucks. These systems include deep bunkers, flat bunkers and unloading conveyers, all with differing discharge systems. For short-term test application, mobile unloading stations (docking stations) are also used. The truck unloading capacity should be very rapid, irrespective of the storage and volumes in use, with a maximum of 30 – 45 min unloading time per truck. Truck unloading times are heavily influenced by the conveying capacities of the downstream conveying units (for example, discharge belts). When unloading into deep bunkers, unloading times depend on the unloading procedure of the tipper or walking floor truck. As a result, more rapid unloading is possible.

Such unloading systems, well-known in the raw material or coal sector, often have an unloading capacity of max. 2 trucks which is equivalent to max. 200m³/hr. The advantage is erection on even ground – with a need for foundation work. When erecting unloading conveyors, an enclosed building is often dispensed with. Therefore, considerable soiling of the surroundings by loose alternative fuels should be anticipated. Also, a matched unloading height must be configured, otherwise unloading of large containers is frequently problematic.

Choosing a flexible truck reception method is important. For example, when using tipper vehicles, vehicle heights of 6 meters must be expected with container vehicles, whilst this figure can reach 12 meters with tipping-trailers. For this reason, the initial cost advantage of such ‘on the ground’ unloading systems attracts further building measures (enclosed delivery) and subsequently higher investment in the long-term. Several companies offer a further unloading system. This concept means the vehicles are unloaded on even ground in a kind of unloading bay. An open chain conveyor, which is mounted on wires, lowers itself over the material and conveys it into a storage bunker.

Assuming such structures are possible, unloading in deep bunkers has significant advantages for a rapid unloading procedure and subsequently for the handling of larger volumes of alternative fuels. Especially with enclosed systems, where trucks are unloaded in an enclosed hall equipped with dedusting systems, the latter protect against dust emissions and possible contamination of the environs. The deep bunkers can be conceived so that they are only used for truck unloading or linked directly to a bunker storage. In the deep bunker screw conveyors, walking floors, scraper chain conveyors or a hall crane take care of onward conveying. Sampling can be performed by truck drivers during unloading without being exposed to the elements. The disadvantage of the deep bunker without a crane is that, when unloading, unsuitable alternative fuels or contaminated materials (e.g. foreign matter that

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was still on the truck, such as truck floorboards, wood and sticks) would have to be painstakingly removed from the deep bunker. This leads to considerable downtime and, as a result, higher costs. However, this can also happen with all other unloading systems if no visual monitoring is performed by the loader or producer of the alternative fuels.

Mobile unloading stations are often used to receive and dose alternative fuels on a test basis. The advantage of this technology is the comparatively economic and quick erection while also benefiting from a compact, enclosed construction method.

In many plants using small substitution volumes, long-term utilisation is possible, especially if two of these docking stations are coupled together in order that a continuous operating method is guaranteed. The downside is that the low storage capacity is limited by the truck's own load capacity as well as by the required 'just in time' delivery. The docking stations consist of an unloading hopper, which is coupled directly to a walking floor trailer. The trailer's walking floor is driven via a hydraulic unit and fills the unloading hopper automatically, controlled via a filling level indicator unit. The alternative fuel is fed to the weighing system from the unloading hopper by means of a trough chain or screw conveyor, which volumetrically or gravimetrically prepares the exact dosed amount of alternative fuels for the onward, largely pneumatic transport. Some of these systems are equipped with automatic volume measurement and indicator systems so that logistics companies are automatically informed about the filling level status and thus the necessary change of trailer.

Suppliers of such systems are, among others, Di Matteo Fördertechnik and Schenck Process. These simple "starter" systems have proven themselves many times and can sometimes be rented long-term from the suppliers for trial purposes. The disadvantage is the open configuration, which means that one should anticipate fuels flying around during bad weather. Furthermore, direct sampling during unloading is particularly difficult as it is only possible from above in the truck. This type of sampling, however, leads to false test results. As a result of dehomogenised alternative fuels during transport, the light, mainly (high in calorific value) film constituents lay on top and the heavier or wet constituents congregate below on the vehicle itself. Certain alternative fuels, such as animal meal, can be delivered in bulk tankers and be pneumatically conveyed into a storage silo. Care must be taken to use cooled conveying air, otherwise the fat contained in the animal meal liquifies, leading to adhesions and clogging.

2 Storage of alternative fuels

In spite of the economic trend not to maintain large stored volumes and to switch storage to "on the road" or to the producers and suppliers, it will not be possible to manage without storage of alternative fuels, irrespective of which type.

2.1. Basic requirements

One of the basic storage requirements for alternative fuels is to calculate the necessary storage volume. In the case of waste derived secondary fuels, a bulk weight of approximately 250 – 300 kg/m³ should be used as a basis for calculations. The decisive factor is the bridging period for storage. Again, this period depends on the method of delivery and distance to the supplier. This necessary gap-bridging period needs to be accommodated in case of unplanned kiln stoppages in order to be in a position to receive vehicles that are already en route and to offer intermediate storage for such materials.

Substitution volumes are also a critical aspect. Generally, a storage volume should be selected that can bridge the gap for at least two working days' requirements. This also has an effect on quality assurance as the alternative fuel volumes accepted on the previous day may still need to be analysed and cannot yet be released for consumption. Furthermore, a larger storage volume should be selected to bridge the gap on weekends, national holidays and on days when deliveries are not possible. In order to perform blending and homogenisation of the approved fuel volumes it is also important to check how regularly deliveries by different alternative fuel suppliers take place.

2.2. Homogenisation

Often cement and lime plants receive alternative fuels of various quality parameters or in various forms or methods of delivery. Receiving alternative fuels from different suppliers is also possible. One should strive to keep these various materials separate, until suitability has been confirmed by means of organoleptic, visual or analytical evaluation. After clearance has been given for usage, homogenisation should take place. This homogenisation is required in most cases to achieve, for example, consistent caloric or other combustion and product characteristics. The rule 'first in, first out' must be adhered to. This is critical for

Calculation of fuel storage volume (recommendations)		
Substitution volume	Storage volume	
[t/h]	[t]	[m³]
3	200	600
5	360	1,200
10	720	2,400

Table 1: Storage capacity dependent on AF consumption

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Figure 1. Unloading station with vehicle steering device. *Manufacturer: Schenck*

safety and fire protection reasons in order to avoid possible self-ignition of long-term stored alternative fuels. If contents include contaminants (like stones and metals) that are not ascertained on delivery, the 'first in, first out' technology is advantageous for quality assurance reasons, as otherwise the cause or supplier can no longer be identified.

The climatic conditions of alternative fuel storage should also be considered. For example, the moisture content of fluffy RDF is problematic during winter storage. During longer stoppages, alternative fuels stored in unheated silos or storage halls can turn into frozen blocks. For the removal and refeeding of off-specification batches that do not satisfy quality criteria, the appropriate mechanism should be available to manage the situation. Alternative fuels must also be protected from vermin (rats and insects) for contagion-prevention measures. Apart from the investment costs, fixed costs for operation and maintenance must be calculated and taken into account when deciding to invest. What appears to be an attractive offer often turns out to be considerably more expensive in the long run. In addition, the product characteristics of alternative fuels must be taken into account when designing storage capacities and characteristics.

The product characteristics, particularly relating to safety and storage designation, must be checked in the greatest of detail. These product characteristics are detailed individually in the fact sheets of the various alternative fuels. Storage depths, such as material densities of waste derived alternative fuels, should not exceed 4 – 5 m, as a danger of excessive compaction and agglomeration of the material exists. Finally, for fire protection reasons, a greater storage depth should not be reached as the danger of self-ignition increases. Product characteristics are also negatively influenced by compaction. Short-term storage with greater storage depths, such as in a silo, is feasible, but this is always accompanied by the risk of longer storage and subsequent compaction periods through unplanned stoppages. Generally, alternative fuels should be stored dry. Firstly, because product quality should not be reduced through additional moisture, and secondly because moisture contained in organic products can lead to decomposition processes (composting and aerobic or anaerobic fermentation) with dangerous decomposition products (methane gases). In order to evaluate the risk of self-ignition or development of an explosive air mixture, the alternative fuels need to be analysed. The risk assessment of the explosion measurements must contain a survey and an evaluation, including the following elements:

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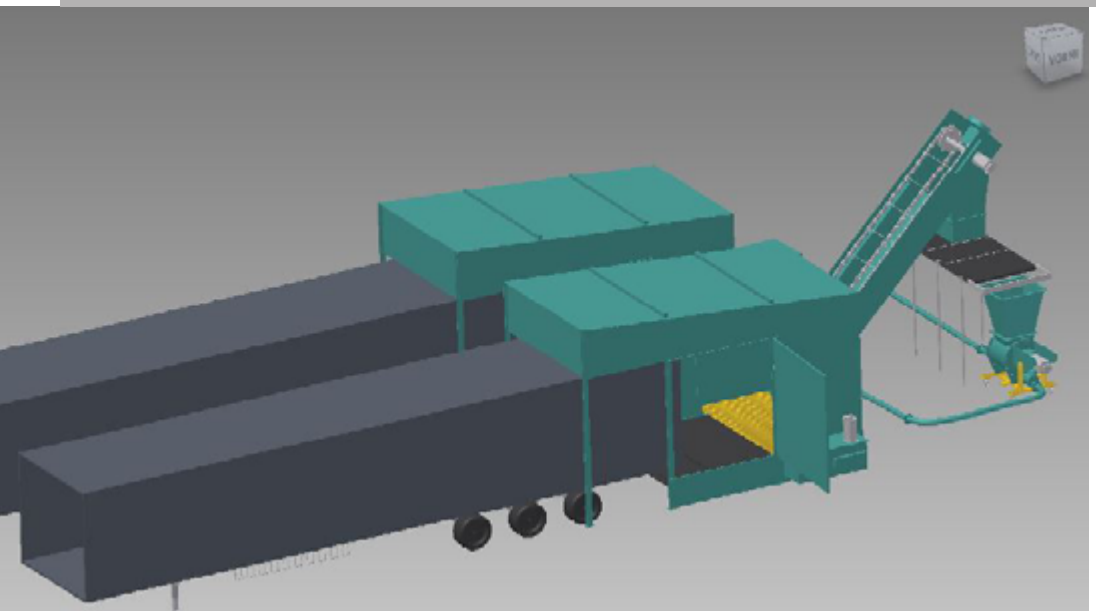

Figure 2. Double mobile docking station for walking floor trucks. *Manufacturer: Di Matteo Fördertechnik. (Source: Di Matteo Fördertechnik)*

- The plants, the substances used and the processes
- The probability of the existence of an explosive atmosphere and the duration (zone classification)
- The probability of equipment and electrostatic discharge being able to react as an ignition source
- The expected extent of the consequences
- Steps taken or to be observed on the basis of the above mentioned

If necessary, the following administrative steps are to be taken:

- Classification of the explosive areas
- Marking of the explosive areas
- Instruction, education and qualification of the employees
- Instructions in writing
- Special permissions to hot work (ignition sources)
- Procedure for cleaning, inspection, repair and maintenance
- Coordination (including visiting workers)
- Emergency, evacuation and exercise plans
- Control prior to start up

Each storage facility should be easily accessible for maintenance and repair work. Suppliers should be notified of planned shutdowns, during which no alternative fuels can be used in plenty of time so that no storage of contents needs to be maintained during the routine work.

For the storage size, it is the storage volume that is looked upon as it must be sufficient for maximum three days' requirement. For storage, various technologies are available:

- Storage in the form of bulk material in an enclosed hall (further conveying and feeding by means of wheel-loaders)
- Storage in one or more silos
- Storage in the walking floor system
- Storage in a deep bunker with discharge systems
- Storage in bunker systems (standing on the floor) with belt or chain discharge systems
- Storage in a bunker with crane discharge

3 Storage as bulk material in an enclosed facility

The simplest and most common storage system is open storage of alternative fuels in a hall. The alternative fuels delivered by truck are tipped into separated sections in an enclosed hall. Quality control can be performed here (organoleptic, visual, sampling). The accepted materials can then, if necessary, be homogenised using a wheel-loader. This is sensible if the alternative fuels are procured from different suppliers. The alternative fuels are subsequently loaded into a feed hopper assisted by a wheel-loader.

The low investment required for such fuel storage is a definite advantage. Also, it is possible to keep various materials separate.

On the other hand, disadvantageous effects are:

- *Workplace protection:* During unloading of alternative fuels as well as of further loading and homogenisation by means of wheel-loader, significant dust pollution can be expected. The wheel-loader must be equipped with an appropriate air filter unit complying with local regulations in order to protect the loader driver from excessive dust exposure.
- *Fire and explosion protection:* Significant dust pollution can lead to considerable risk of fire and explosion. Dust build-up on the loader (exhaust, motor) can self-ignite.
- *Homogenisation:* Alternative fuels in various qualities or from different

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suppliers cannot be homogenised adequately with a wheel-loader.

- *Costs:* Operational costs for this type of bulk storage of alternative fuels only consist of wheel-loader and driver costs. It must be taken into account that homogenisation and dosing of up to 10 t/h is possible. As the installation must be operated around the clock, workforce downtime must be taken into consideration.

3.1. Storage in one or several silos

Traditional and proven storage in the cement and lime sector is also state-of-the-art for alternative fuels. Free-flowing bulk materials such as olive kernels, grain, meat and bone meal, sunflower shells and dried sewage sludge are routinely stored in silos. Existing silos that are no longer required are frequently converted (for example raw meal, clinker and coal). This is open to criticism, as heavier-duty demands are frequently placed upon the extraction system as well as upon the fire and explosion protection system. This conversion is also problematic owing to guarantee obligations. Indeed, which supplier would assume responsibility for guarantees on an existing complete silo installation if only small parts, such as the extraction system, are supplied? The silo cross-section in existing silos is often too modestly proportioned at the material outlet and can lead to bridge-formations of the stored alternative fuels. Silos with flat bottoms and circulating unloading screws have also proven themselves for fluffy RDF. The discharge behaviour of alternative fuels in conjunction with moisture and particle size is often problematic, e.g. bridge formation as well as freezing in winter. Particle size specification for alternative fuels is also of significance with regard to storage properties. Long threads and magnetic strips often wind themselves tightly around discharge systems and lead to stoppages.

The advantages of silos are:

- Compact, enclosed structure (clean storage)
- Even large fuel volumes can be stored dry and safely
- Simple fire protection and monitoring (CO monitoring)
- Easy to convert for explosion protection
- Homogenisation of fuels possible from various silos
- ‘First in, first out’ principle
- Longevity

Still, there are disadvantages:

- High investment costs for large silos
- Risk of compaction if stoppages occur
- Agglomeration in higher silos in conjunction with longer storage periods
- Corrosion
- Freezing of moist alternative fuels
- Evaporation/thawing point (pay attention to climatic conditions!)

What is important when dealing with silos is the exact compliance with alternative fuel specifications. Foreign matter, such as long fibres and stones, as well as higher water contents, can particularly lead to problems in silos. Flat-bottomed silos with circulating screw unloading are the recommended discharge method. Too narrow cross-sections on the discharge system can lead to undesired bridge formations. Furthermore, the silos must be furnished with appropriate explosion protection devices.

3.2. Walking floor storage

In addition to the already described reception technology for alternative fuels by means of mobile walking floor docking stations, walking floors are employed more frequently for alternative fuels even as high-capacity storage. Walking floor installations are now available in dimensions of up to 6m in width and 40m in length whereby a storage volume of up to 1200m³ per walking floor is achievable at a recommended storage height of no more than 4 to max. 5m. The compact construction method also permits erection on even ground without any significant structural measures. The open construction method also facilitates access by means of wheel-loader or crane in order to remove out–of-specification deliveries or foreign matter.

Often such moving floor systems are offered as a combination i.e. as an unloading bunker and simultaneous storage bunker, reducing the proportion of required mechanisation and lowering costs. From the moving floors the material is conveyed to a discharge belt, or chain or screw conveyor. A counter-rotating roller at the walking floor’s discharge makes even unloading possible.

Figure 3. Open storage and wheel-loader feeding. *(Source: FLSmidth Pfister GmbH, Germany)*

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Figure 4. Mobile docking station and walking floor truck. *Manufacturer: Schenck Process GmbH, Germany*

Advantages of the moving floor storage technology:

- Medium investment costs compared to other storage systems
- Larger storage volume possible
- Modular construction method, extendable as required
- Open construction method (maintenance, removal of out-of-specification loads)
- Fire and explosion protection simple to implement
- Simple maintenance
- Longevity

Disadvantages of the moving floor – as long as the discharge system is correctly installed and the fuel complies with the specifications – are not known so far.

3.3. Storage in a deep bunker with discharge systems

As a rule, these systems feature an enlarged reception bunker. The trucks unload directly into a deep bunker which has a volume of approximately 1–3 truckloads (100–300m³). This is adequate for low substitution rates.

The discharge from the bunker takes place via screws or other discharge systems such as chain conveyors, which must be robustly constructed.

The susceptibility to disruption of such bunkers is clearly a decisive factor if out-of-specification loads or foreign matter are unloaded into the bunker and need to be painstakingly removed by hand. Also unloading on screw systems is problematic as, depending on the method of construction, the entire weight of the alternative fuels falls with its full might onto the screws from a height of several metres. Under some circumstances this ongoing stress can lead to damage. Disruptive materials (such as wooden beams, truck planks and similar objects) which reach the deep bunker owing to lack of monitoring prior to truck loading lead to immediate screw damage. As long as the waste-derived alternative fuels comply with specifications this does not need to happen. Nevertheless, while dealing with waste and fuels, human actions and as a result, human errors, have to be anticipated.

Due to these issues, only such deep bunker combinations (reception and discharge) are considered as appropriate if a device for extraction of disruptive materials is fitted or if the materials are not directly unloaded onto screw conveyor systems.

Combinations of deep bunkers with walking floor discharge systems have proven themselves many times over. Apart from deep bunkers with discharge systems (such as walking floor, screws or robust chain conveyor systems) floor mounted flat bunkers with the above-mentioned discharge systems have also proven themselves. But with the latter only a modest storage volume is possible owing to the limited depth available (approx. 100–300m³).

3.4. Storage in a bunker with crane unloading

Crane and bunker systems have proven themselves many times in the cement and lime industry for all types of raw materials, fuels and additives. In the sphere of alternative fuels, especially waste-derived fuels, bunker systems have proven themselves many times over in combination with loading and unloading cranes. High investment costs are the disadvantage which, on closer inspection, actually prove to be acceptable.

Such bunker systems, whose costs mainly comprise the tax deductable outlay for long-term hall and bunker construction, have a long lifespan and the fixed running costs are relatively low. As a rule bunker systems with unloading cranes are installed deep in the ground or are adapted to the geographic average ground

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slope. Trucks unload directly into the enclosed deep bunkers. A crane extracts the delivered material from the unloading area and blends it with the alternative fuels located in the bunker. In a further step the fuels are fed to a receiving bunker (generally with a walking floor or in a screw bunker). The advantages of the bunker system with crane unloading are manifold:

- Aeration of the hall is easy to achieve (low dust pollution)
- 'First in, first out' is easy to achieve
- Fully-automatic control and homogenisation of alternative fuels
- Large storage volume possible
- Fire detection devices possible (CO and temperature)
- No odour nuisance
- Various alternative fuels can be stored separately or homogenised
- Crane maintenance work can be easily performed without disrupting alternative fuel dosing (as long as the receival bunker is adequately sized).

As mentioned, the high investment costs are a disadvantage. Various crane manufacturers (such as Demag, Danish Cranes and Kone) have developed fully-automatic crane systems that permit exact blending of materials as well as storage. If larger volumes of alternative fuels are to be used, such deep bunkers with the crane system are always the right choice. As the crane cables and hydraulics need regular maintenance, it is important that a maintenance area for the crane can be installed. Using oversized guide and hoisting ropes, as they are subjected to considerable stress by their continuous employment, is strongly recommended.

Figure 5: Automatic overhead crane handling RDF in a fully enclosed storage hall with deep bunker.
Source: MVW Lechtenberg. This storage system will be visited on the field trip to HeidelbergCement plant Ennigerloh during our 6th Alternative Fuels Symposium on 23 September.

From various projects with large RDF substitution volumes, operational costs of around €0.3/t RDF have been observed (based on German wage and energy costs).

3.5. Storage in special storage boxes

Meanwhile, storage technology has evolved from the wood sector and is also frequently offered for storage of RDF.

Indeed, often it is already in use. The basic principle is simple and, according to producers, this system offers the option of mixing different fuel types. It is a modular system where material delivered by truck is conveyed mechanically to a bunker system via a trough chain conveyor. Trough chain conveyors feature various lockable apertures from which fuel is conveyed into the bunker. In this manner separation of the fuels is possible.

In these simple systems, fuel is conveyed through the open scraper chain conveyors, which subsequently scrape the material out of the bunkers.

Advantages of this box technology include:

- Low investment costs with wood construction method (but disadvantages regarding fire protection)
- Reception and blending of various alternative fuels
- Large storage volume with adequate number of boxes
- If the storage volume per box is limited to one truck load the 'first in, first out' principle is possible
- Rapid unloading and conveying is possible

These storage systems are available in a wide variety of sizes. Also, storage heights of up to 15 m and lengths of up to 30 m are offered. This would correspond to a storage volume of up to 2000 m³ per bunker at the maximum available conveying width of 4.5 m. It is highly advisable to avoid storage of fluffy RDF at a material depth of up to 15 m owing to both fire protection and material compaction reasons. Possible disadvantages of this storage system are:

- Maximum storage height is often exceeded
- Fire protection problematic with wood construction method
- High construction costs when employing concrete construction method
- Maintenance of the open discharge systems generally only possible when bunkers are empty
- Moving parts (chains, conveyors) in the material lead to high levels of impurity and wear
- Hanging systems (wires) are individually hung – maintenance more problematic

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Reception and Storage of Refuse Derived Fuels (RDF)

Figure 6. RDF storage system.
Manufacturer: Vecoplan.

- High compaction when using too great material thicknesses (construction method only recommended to max. 5m)
- Bunker clearing often problematic if no loading vehicles can be driven into the boxes

Employing such systems makes sense when handling smaller conveying volumes. However, the construction costs are frequently very high when using the concrete construction method. The expected lifespan while operating continuously with RDF is yet to be determined. Whichever storage system is used, it is critical to adhere to both the basic requirements, such as the possible inherent characteristics relating to the type and procurement of the alternative fuels, as well as to the health and safety, environmental and pertinent safety conditions and the legal requirements. Often, owing to the characteristics of these alternative fuel products, greater demands are placed upon the storage and conveying technology than is the case for uniform raw materials and fossil fuels. This should be taken into account when designing the overall storage technology. It can also be assumed that desired higher substitution rates can only be achieved with reliable technology.

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6th Alternative Fuels Symposium – Update

23 – 26 September, 2019 in Duisburg, Germany

We are looking forward to welcoming you to the **6th Alternative Fuels Symposium**, which will be taking place in Duisburger Hof Hotel, Duisburg on **24 – 25 September 2019**. Time until then is limited and with over 100 participants registered so far, very few places are left. If you wish to guarantee your participation in one of the leading conferences for the production and use of alternative fuels, make sure register here.

Among others, the 6th Alternative Fuels Symposium will focus on the following topics: control and reduction of CO_2 emissions, globalization and sustainability, RDF and sewage sludge utilization as well as various reports on alternative fuels market development in different countries. We are proud to have international speaker contributions from interdisciplinary professionals, presenting first-hand experience in the production and use of alternative fuels from Austria, Germany, India, Russia, Pakistan as well as country reports from e.g. Greece and the United Arab Emirates.

Furthermore, this year's Symposium offers some special highlights in the programme, which we would like to share with you in advance.

Alternative Fuel Award

The Alternative Fuel Award has been first presented by MVW Lechtenberg & Partner in 2018 to encourage the acceptance of the ecological responsibility on both social and individual levels, and to identify role models in the field of alternative fuels, a field which, aside from its contribution to the economic development, has the greatest contribution to the protection of our environment.

This year, we gladly announce the following projects as award winners:

1st Prize: Arabian Cement Company, Egypt: "Alternative Fuel Case Study"

2nd Prize: Simuma Cement, Part of Intercement Group, South Africa: "Co-Processing in Simuma Plant: 5 Years Evolution for a Sustainable Waste Disposal"

3rd Prize: Process Solution, Canada: "Waste Fuels Information Management System (WFIMS) for Geocycle"

The "Alternative Fuel Award" award ceremony will take place during the Symposium and the gala dinner on **24 September 2019** on board the ship "MS RheinPoesie", to which the winners will be invited. Representatives of the three winners will present their projects at the Alternative Fuels Symposium.

Field Trip to HeidelbergCement

We are very honoured to announce that we will have the opportunity to carry out our field trip to the cement plant of HeidelbergCement in Ennigerloh this year. The plant replaces more than 75% of fossil fuels with alternative fuels such as RDF, tyres and liquid fuels in compliance with the highest emission protection regulations and is one of the most efficient German cement plants. The field trip will take place on **23 September 2019**.

Alternative Fuels Workshop

Additionally, a one-day intensive Alternative Fuels Workshop will take place on 26 September 2019, upon requests from various cement companies worldwide. For more information, have a look at

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the article “Alternative Fuels Workshop” in this edition.

Exhibition

You will also have the chance to receive information regarding waste treatment machineries directly from their manufacturers during the symposium’s exhibition, which will take place on **24 – 25 September 2019** as well.

As you can see, there is a lot to look forward to. The symposium is already recognized by the industry as the leading forum for meeting peers and decision makers, for information exchange and making business. We draw a limited number of 150 professionals every year and have been doing this for the past 5 years. If you want quality over quantity information exchange, great education and fantastic networking with interdisciplinary decision makers, then come and join us in Duisburg. So far, more than 100 participants from the worldwide cement, lime and waste management industry have registered. Click here to secure one of the last spots and to see who is already participating.

We look forward to welcoming you at the **6th Alternative Fuels Symposium**.

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The confirmed speakers so far are:

Dimitrios Bakoulis, CEO at Antipollution S.A., Greece, presenting: "Alternative Fuels Market in Greece".

He studied Chemical Engineering in the Polytechnic School of the University of Patras. After two years in the refining industry, he began his career in Antipollution SA in 2009 as Waste Management Officer where he climbed company's ranks to become its Waste Operations Manager. He held the CEO position of Greek Environmental & Energy Network S.A. (2012-2017), one of the first private energy trading companies, where he led the company's expansion to South Eastern Europe. He holds his current position since 2017, with essential duties and responsibilities in environmental protection services and waste management activities.

Dr. Arif Bashir, General Manager at DG Khan Cement, Pakistan, presenting: "Overview of the Cement Industry in Pakistan & DG Khan's RDF Activities".

During a career of 36 years in the cement sector, Dr. Bashir gained vast experience in the fields of chemical engineering, energy conservation, environmental studies, alternative fuels, renewable energy (biomass, solar and wind), project planning, execution, monitoring, plant operations and maintenance. He has represented Pakistan on various international conferences and is among top professionals focusing on innovative technologies.

Konstantin Bojinov, Head of Geocycle Russia, Russia, presenting: "RDF Market in Russia".

As a graduate from New Bulgarian University with a Master's degree in Business Administration and Management in 2015 and an additional Master from IMD Business School one year later, he gained more than 15 years of experience in the cement industry. After working as Sales and Marketing Manager for Ecorec Bulgaria, a daughter company of Holcim, he joined Geocycle in 2015. His goal is to increase and diversify the company's waste portfolio through industrial symbiosis in Russia and to promote co-processing and the Geocycle brand by communicating internally and externally on their activities as powerful and relevant applications of the circular economy principles.

Dr. Luigi Di Matteo, CEO, DI MATTEO Förderanlagen GmbH & Co. KG, Germany, presenting: "Closing the Loop – Best Practices in Efficient Alternative Fuels Utilization".

He holds a Mechanical Engineering's degree from the University of Paderborn – Soest, a degree from the IHK in Münster in Technical Business Economy (IHK) and a doctorate degree "Dr.-Ing." from the University of Braunschweig. As the CEO of DI MATTEO Förderanlagen GmbH & Co. KG, he is responsible for the strategic development and technological strategies. In the last 20 years he has developed the family owned company in many divisions, especially in the field of alternative fuels, powder technologies and processing. He was honored with the Professor-Adalbert-Seifriz-Price in 2005 for his studies on biomass and alternative fuels. In 2011 he was honored with the "Innovationspreis Münsterland" for the new innovative dosing system WeighTUBE®.

Fritz Driessler, Sales Manager at Lindner-Recyclingtech GmbH, Austria, presenting: tbc.

He has started his career in 2012 as a sales engineer for shredders and fuel waste processing plants all over the world. He will provide a complete view of the participation of LINDNER-RECYCLINGTECH in the RDF preparation business, and also share his view about the present and future of this activity in the cement industry.

Jan Gressmann, Product Manager at Eggersmann Anlagenbau GmbH, Germany, presenting: "The Cilacap Experience; RDF Quality Produced from MSW in a Developing Country".

He graduated as a Civil Engineer from the University of Stuttgart in 1997, and started his career at Biodegma GmbH in Stuttgart, Germany. From 2003 until 2017 he worked as the Head of R&D and Proxy at CONVAERO GmbH, and later as a Technical Director. During this time he held postings in Singapore, Kula Lumpur (Malaysia) and Istanbul (Turkey). In 2017 he became a Product Manager for the CONVAERO system at Eggersmann Anlagenbau GmbH.

Tim Hamer, Area Sales & Key Account Manager, Vecoplan AG, Germany, presenting: "Case Study: Alternative Fuel Preparation & Handling (Germany & Turkey)".

After completing his education as a Mechatronic Technician and a Certified PLC Programmer, he started his career at Vecoplan AG in 2004 as a Junior Engineer for shredders for waste, wood and recycling processing plants all over the world. During this time, he worked in various applications and many different processes. After several years in the field, he led the electrical development team with the main focus on high efficient drive concepts and controls for all types of Vecoplan shredders. In 2013, he became the Area Sales Manager and Key Account manager for Cement Applications.

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Prof. Dr. Estelle Herlyn, Head of the Competence Centre for Sustainable Development at FOM University of Applied Science in Düsseldorf, presenting: "Globalization, Development, Climate – Navigation Through Stormy Water".

Next to her work at the FOM University of Applied Science, she works as a freelancer for the Research Institute for Applied Knowledge Processing (FAW/n). The focus of her work, e.g. with the Federal Ministry for Economic Cooperation and Development (BMZ), is development and climate protection in a global perspective. She is the vice-chairwoman of the Board of Trustees of the Senate Institute (Senate of Economy). Estelle Herlyn has many years of experience in the management and consulting of miscellaneous companies (e.g. PwC, Ford Motor Company, HSBC). She holds a sustainability related PhD from RWTH Aachen University and a degree in economics and mathematics from TU Dortmund University.

Dr. Georgios Koufodimos, Mechanical Engineer at Helector SA, Greece, presenting: "Power Plant Post-Combustion Carbon Dioxide Capture".

He holds an MSc in Technical Change and Industrial Strategy (University of Manchester, UK) and a PhD in thermal process design with specialization in biomass gasification and hot gas filtration (Aristotle University of Thessaloniki, Greece). He started his carrier as a construction engineer for biomass combustion systems emphasizing in the equipment design, construction and the implementation and commissioning of turn-key biomass energy utilization units. He continued as a thermochemical process expert in the Research and Development department of HELECTOR SA – HERHOF GmbH focusing on the process design of RDF gasification systems dealing with RDF production and standardization, thermal process design and equipment design and certification. He holds the position of energy process supervisor for five years now, focusing on waste derived solid fuel production and utilization in both Cement plants and Waste-to-Energy units.

Jordan Mandandalov, COO at GRIFFIN, UAE, presenting: "The United Arab Emirates Decree for the Use of Alternative Fuels – the First RDF Production in UAE".

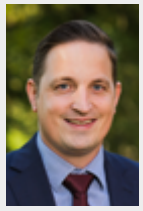
The Slovakian Landscape and Waste Management Engineer was in charge of recycling and alternative fuels projects in several central and eastern European countries and signed responsible for substituting more than 50% of thermal energy with RDF from household waste in two cement plants of former Holcim Group. He is now responsible for operation and maintenance of the Griffin RDF plant in Umm al Quwain, UAE.

Arian Middleton, Supply Chain Engineer at EEW Energy from Waste GmbH, Germany, presenting: "Waste Incineration in the European Context Between Risks and Opportunities".

He holds a Business degree as well as Master's degree, subjects being Logistics, Corporate Governance, Sales and Marketing. As a consultant he worked for E.ON Best Service in 2009, joining the company a year later as Specialist for Grid-Data-Processing. In 2012 he joined E.ON Energy from Waste as Project Manager for new build Waste to Energy plants in UK. Since 2014, he steers and monitors EEW's international waste streams into Germany.

Andreas Nitzsche, Sales and Partner Management at Günther envirotecht GmbH, Germany, presenting: tbc.

After graduating as a Mechanical Engineer from Giessen University of Applied Sciences in 2004, he started his career at FSM Frankenberger GmbH & Co. KG in construction and project handling. He continued to gain over 20 years of experience in water purification, sewage treatment and waste recycling at FSM Frankenberger GmbH & Co. KG and Biwater IBO. Mr. Nitzsche holds his current position at Günther envirotecht GmbH since 2017.



Florian Salzer, Plant Manager at Wietersdorfer & Peggauer Zement GmbH, Austria, presenting: "State-of-the-Art Technology in Emission Reduction – Experience Report from Wietersdorfer Cement Plant".

He started working at Wietersdorfer & Peggauer during his studies and before graduating as a Production Technology Engineer from the university of applied sciences Graz in 2010. In 2013, he became Head of the Technology and Project Development department for Cement and Lime and amongst others was in charge of the completion of a regenerative thermal oxidation plant and the development of the Xmercury emission reduction system. As Plant Manager since 2017, his goal is to make the plant at Wietersdorf a best-case example for safety, efficiency and sustainability.

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RBM Tripathi, Unit Head at JK Cement Works, India, presenting: "AFR Journey up to 10% TSR without Affecting the Quality and Production of Clinker".

Tripathi started his career as a graduate Mechanical Engineer at JK Cement Works Nimbahera over 30 years ago. In 2002, he became in charge of the cement mill & packing plant in JK Cement Works, Mangrol, before he took over his current position at JK Cement Muddapur. Over the past years he has gained a rich experience in erection, commissioning and operation of cement plants, in addition to his management skills, especially in the branch of delivery with optimization of resources. He has also been a part time trainer and a coordinator at the Regional Training Centre for 14 years on topics such as: Cement manufacturing, kiln-mill-fan operation & optimization and many others.

Leoš Voleský, Technical Engineer, Schenck Process s.r.o., Czech Republic, presenting: "Increasing Efficiency and Flexibility for the Alternative Fuels Co-Processing".

His professional carrier started as a designer of technologies for the production of liquid alternative fuels. He was active in this field for five years. During this period he was also a member of the team preparing the technical and legislation framework for using alternative fuel in the automotive industry. Afterwards, he stayed in the alternative fuels business, but his focus was changed from liquid to solid alternative fuels. He's been working in this field for more than ten years in various leading position. Leoš Voleský is currently the head of the application and proposals team at Schenck Process dedicated for the alternative fuels and mechanical conveying technology.

Dr. Hans-Joachim Walther, Waste Stream Management at Schwenk Zement KG, Germany, presenting: "Co-incineration of Sewage Sludge in a Cement Plant".

He holds his current position at Schwenk Zement KG since 2017, after gaining more than 25 years of experience in the waste stream management and recycling. He has been providing alternative fuels to cement plants in various European countries and is an expert for sewage sludge treatment.

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Alternative Fuels Workshop

Alternative Fuels Workshop

As “add on” to this year’s 6th Alternative Fuels Symposium, we offer an intensive one-day training course on alternative fuels in the cement and lime manufacturing for employees of alternative fuel users.

The workshop content is addressed to a wide range of personnel within a cement manufacturing company or responsible subsidiary for alternative fuel development, including junior and middle management, technicians, production and control room staff as well as to everyone who wishes to gain a comprehensive understanding of the alternative fuel supply chain, their production and use in the industry.

Divided into six different sessions on that day, the course includes all objectives of fundamental requirements and technologies for the evaluation, processing, storage, dosing and feeding of various types of alternative fuels. Waste evaluation, quality control as well as the influence on the clinker production process will round up this working course. Next to the six different workshop sessions, there will be plenty of opportunities to discuss specific topics of interest intensively and exchange information and knowledge in an intimate environment.

The Alternative Fuels Workshop will be held by Dr. Hansjörg Diller, Dirk Lechtenberg and Vladimir Dimitrov in an interactive environment on the 26th of September from 9:00 a.m. to 5:00 p.m., at the Hotel Wyndham Duisburger Hof. This will allow participants of the Alternative Fuels Symposium not only to widen their knowledge on the topic even more, but also to save travel costs to participate.

Training will be done on the basis of the “Alternative Fuels and Raw Materials Handbook for the Cement and Lime Industry” and a comprehensive training course book.

As a bonus, participants of the Alternative Fuels Workshop will have the opportunity to purchase the “Alternative Fuels and Raw Materials Handbook for the Cement and Lime Industry” at a special 40% discount.

If you wish to participate in the Alternative Fuels Workshop, please contact us at workshop@lechtenberg-partner.de.

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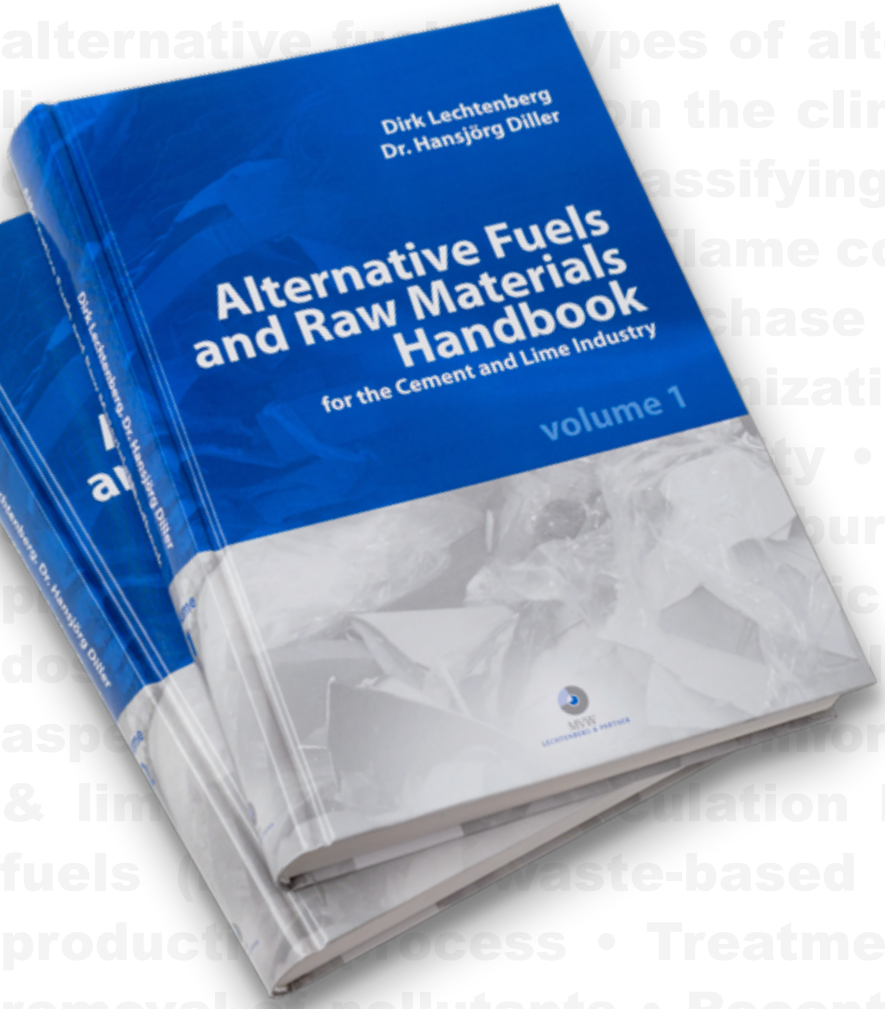

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*This offer applies to orders placed until the 30th of September 2019

VOLUME 1

Contents include among others:

- Background and key issues for investments in RDF production technologies and RDF usage
- Production of RDF & quality control
- Logistics and storage of RDF
- Dosing and feeding of technologies
- Influences on clinker & lime production
- Emission limits

VOLUME 2

Compilation of alternative fuels and raw materials fact sheets including among others:

- Information about origin, composition and availability
- Chemical and physical parameters
- Specific influences on the clinker production process
- Environmental aspects

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Figure 1. RDF installation (storage, transport and dryer). *(Source: Cimpor)*

A Solution for Waste Fuel Pre-Drying at Souselas Plant (Portugal)

A Solution for Waste Fuel Pre-Drying at Souselas Plant (Portugal)

The second Alternative Fuel Award winner from 2018 is Cimpor's Souselas plant in Portugal. Cimpor, as part of Intercement Group, is a global cement company with several locations in Europe, Africa and Latin America, where products such as clinker, cement, concrete, dry mortar and aggregate materials are made.

The company achieved sustainable changes in their production by optimising internal processes and establishing innovation research. Co-processing is one of the key-pillars of their strategy used to tackle challenges and achieve the corporate goals. Co-processing activity means using alternative fuels and raw materials instead of fossil fuels and primary commodities. It allows to reduce costs and has a beneficial influence on both social and environmental matters, since the CO_2 emissions associated to alternative fuels are lower compared to those from fossil fuels. Apart from this, co-processing represents a long-term solution for waste disposal, which has become a central issue and difficulty across the globe. The progression of using refuse derived fuels in the cement industry presents a few challenges that are possible to solve through the utilization and development of new technologies in order to improve waste quality and to guarantee constant process conditions within the plant.

Souselas cement plant

Located in the centre of Portugal, Cimpor Souselas began its production in 1973. Initially, it had one dry process production line, operating around 500,000 tonnes cement per year which increased to a production capacity of 2.4 million tonnes clinker and 3.4 million tonnes cement per year until today.

Co-processing at Souselas plant

After a long period of tests and trials, co-processing was implemented in the plant in 2010. The first alternative fuels processed at the plant were liquid hazardous wastes from petrochemical industry, which were fed through the kiln burner. In 2012, the co-processing of refuse derived fuel simultaneously started at the calciner and the main burner. For this purpose, an entire plant worth €4.8 million was established. The maximum thermal substitution rate amounts 33.9 %, which is restricted by chlorine and moisture from RDF. The entire fuel portfolio regarding thermal substitution is displayed in the following table:

Fuel	Heat contribution (%)
Hazardous liquids	5.8%
RDF	28.1%
Pet coke	66.2%

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A Solution for Waste Fuel Pre-Drying at Souselas Plant (Portugal)

In order to increase the quantity of waste co-processed in the cement kilns, several studies were conducted to find solutions for quality improvement that could allow the growth of the activity. With the aim of increasing the RDF feeding rate at the main burner of kiln number three, an RDF dryer was installed. The dryer uses the excess hot air from the clinker cooler to dry RDF. Drying air is diverted to the existing cooler chimney. After drying, the RDF can be fed into the kiln. This allows to co-process RDF, which was not possible before due to its high moisture levels.

With the new installation, the feeding of RDF to the kiln burner was increased from the previous 2.5 t/h (30 – 40 % average moisture) to a maximum of 7 t/h (15 % moisture content), to 40 % RDF thermal substitution.

Figure 2. Close-up of the Stela dryer. *(Source: Cimpor).*

The new dryer installation was designed for RDF with a maximum feed rate of 10 t/h (maximum of 40 % moisture) and an output of 7 t/h (15 % moisture), representing 3 t/h water evaporation.

Additionally, the reliability of the RDF transport system to the main burner was improved by replacing pneumatic conveying with a drag chain conveyor.

The RDF dryer project

German-based company Stela Lax Huber was contracted for the engineering, supervision, and equipment supply, commissioning and training. The Portuguese company Farmec was in charge of the installation.

The dryer is a low temperature belt dryer, type BT 1/6200-12. It has a length of 12 meters and width of 6.2 meters and is designed to dry all types of RDF. The belt is slightly porous in order to be crossed by a hot air stream from top to bottom.

This conveyor belt is fed by 2 screw feeders (parallel to the belt). The height between the screw and the belt is adjustable in order to create a steady RDF layer along the belt (material height adjustable between 70 mm and 140 mm).

In order to ensure that there is no leakage in the dryer, rotary valves were installed at the dryer entrance and exit. The dry material is discharged by a rotary screw and a valve.

Main equipment specifications

Dryer type:	BT 1/6200-12
Product:	RDF/MSW without foreign matter (loose, not frozen, dust-free, 10ºC);
Bulk weight:	ca. 100 - 250 kg/m³ (wet)
Average retention time for drying:	6 – 30 min in active zone, adjustable
Bed depth:	70 – 140 mm (commissioning adjusted to 130 mm);
Drying temperature:	approx. 90°C
Dryer input capacity:	10.0 t/h (40 % moisture)
Dryer output capacity:	7.0 t/h (15 % moisture)
Water evaporation:	3.0 t/h
Drying zone:	approx. 74.4 m² (active drying zone); belt dimensions: 12 m x 6.2 m;
Fresh air:	temperature 40°C, 30 – 70% relative humidity, no dust
Dust emission:	< 20 mg/Nm³ wet

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Material circuit

The gas circuit consists of a variable speed fan, two isolating air flap valves, at the inlet and outlet of the dryer and one adjustable valve (multi-louver) installed in the duct between the fan and the chimney bag filter.

The hot air comes from the cooler's bag filter fan exit and enters the dryer gas-mixing chamber, located in its upper part. Fresh air enters the dryer through two flap valves. In the mixing chamber, the hot air is mixed with fresh air with the aim to achieve an average temperature of 75°C to 85°C across the top of the belt. Two fresh air flap valves control the belt temperature (set point 85°C). Moist air that comes from the dryer returns to the cooler stack.

The RDF's moisture content is continuously controlled by a microwave sensor at the exit of the dryer. This sensor is located at the discharge screw and its operation is monitored in the Central Control Room (CCR). The final moisture percentage is adjusted by a PID, which controls the dryer fan speed (according to a predefined set point).

The dryer conveyor includes two cleaning systems. The dry cleaning system operates with a high-pressure radial fan in continuous operation. It is located inside the mixing chamber, which injects hot air to the belt's outlet. The "cleaned" material leaving the belt is sent to the discharge screw. The wet cleaning system operates discontinuously. Filtered fresh water is compressed in a high-pressure pump (150 – 180 bar). The water inlet is done by four injectors, CCR controlled, and operated at least once per week, for one hour.

Key milestones of the project

The completion of the installation took six months in total (26,000 working hours). It is important to highlight that this was a project with zero time loss, injury or accidents (erection and commissioning).

Start-up and the performance test

The start-up of the facility took place on 2 November 2016. The following operating conditions were considered and optimised:

- Air flow at dryer inlet = 119 400 Nm³/h (75% of the maximum gas flow)
- Air temperature at dryer inlet = 80–84°C *(in this situation, < 85°C, cold air dampers did not open)*
- Dryer fan was fixed at 90% speed
- Multi-louver damper opened at 15%

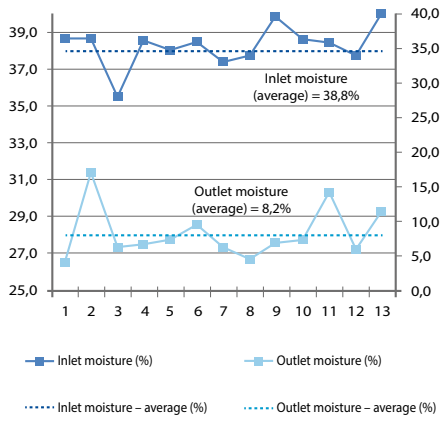

Figure 3: Moisture levels of RDF before and after drying. *(Source: Cimpor).*

RDF wet feed rate was 7.5 t/h and not 10 t/h, due to kiln input chlorine limitation, and the total water evaporation was 2.5 t/h. During all the commissioning, the dryer operation was quite stable. However, due to the RDF characteristics is was limited to 8 % moisture outlet content.

Following process conditions were considered:

- Dryer fan speed (avg) = 98 %;
- Multi-louver damper (avg) = 15 % open;
- All PID switched on;
- RDF moisture variation (every 2 hours sampling).

Conclusions

The equipment has been easily integrated into the existing process chain and installation was simple through modular structure. The process operates reliable and suitable for different types of RDF at low operating stress with a fully automated process control. Low maintenance effort is needed by using long-lasting components and negligible maintenance cost (2nd year operation). All EU environmental requirements (emissions, odours, noise) are fulfilled. Currently, it is possible to accept RDF with a high content of moisture, since the installed technology easily reduces this parameter to an acceptable value, using an internal resource from the process (the hot air from the clinker cooler). Consequently, it is possible to increase the co-processing rate and thus contribute with a substantial decrease of fossil CO_2 emissions.

Guarantees	Contract value (24h avg)	Acceptable value	Achieved value
RDF feed rate	7.5 t/h (H = 40.0 %)	≥ 5 t/h	5.0 t/h (H = 38.3 %)
RDF final moisture	15%	20%	8.2%
Dust emission	≤ 20 mg/Nm³	20 mg/Nm³	0.5 mg/Nm³

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- Geocycle opens alternative fuel facility in Ain Sokhna

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- HeidelbergCement's CO_2 reduction targets approved by Science Based Targets

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- Energy-from-waste to power UAE cement factories

USA

- MLMC to open $20 million enviro-fuelcubes factory

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Colombia

Cementos Argos increases co-processing capacity

In 2018, Argos used more than 75,000 tonnes of waste as alternative fuel, which equals waste generated by a city of 200,000 inhabitants. The company increased the co-processing capacity of Regional Colombia by 200 percent by using an alternative fuel management system at its Cartagena plant.

Argos has co-processed more than 1.5 million tyres with a potential capacity of up to 65,000 tpa since introducing alternative fuels to its process. In Colombia, co-processing is recognized as a sustainable alternative by the Ministry of Environment, Housing and Territorial Development in resolution 909 of 2008.

"At Argos, we bet on collaborative initiatives that leverage sustainable solutions that not only add value to the business, but also to the planet," says Tomás Restrepo, Vice President of Regional Colombia.

Source: World Cement (2019, May 10): "Cementos Argos increases waste co-processing capacity in Colombia"

Germany

Heidelberg Cement's CO_2 reduction targets approved by Science Based Targets

Following thorough validation, Heidelberg Cement's CO_2 reduction targets to 2030 have been successfully assessed against the Science Based Targets initiative's (SBTi) criteria. It says this makes it the first company in the cement sector, and one of currently only about 200 companies worldwide, to have approved science-based targets.

The SBTi independently assesses and validates corporate emissions reduction targets against the latest climate science: Targets adopted by companies to reduce greenhouse gas (GHG) emissions are considered "science-based" if they are in line with the goals of the Paris Agreement – to limit global warming to well-below 2°C above pre-industrial levels and pursue efforts to limit warming to 1.5°C.

"Our goal is to realise the vision of CO_2-neutral concrete by 2050 at the latest. In the coming years, we want to make significant progress in this direction, and the SBTi's approval is a clear proof of our strong commitment," says Bernd Scheifele, the chairman of the managing board of Heidelberg Cement.

Heidelberg Cement's CO_2 reduction strategy is based on concrete bottom-up measures on plant and product level. These include improving energy efficiency, and a steadily increasing use of alternative fuels and alternative raw materials. The company's SBTi-approved target is to reduce scope 1 GHG emissions 15 percent per tonne of cementitious materials by 2030 from a 2016 base year. Heidelberg Cement also commits to reduce scope 2 GHG emissions 65 percent per tonne of cementitious materials within the same timeframe. The SBTi-approved target is consistent with Heidelberg Cement's previously formulated goal of a 30 percent reduction in its specific net CO_2 emissions by 2030, compared with 1990. To date, Heidelberg Cement has already managed to achieve a reduction of 20 percent and is in a leading position when it comes to the development of new technologies for CO_2 sequestration and use, e.g. by returning the CO_2 into the material cycle of cement and concrete through recarbonation.

Source: The Financial (2019, May 14): "HeidelbergCement first cement company to receive approval for science-based CO_2 reduction targets"

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Egypt

Geocycle opens alternative fuel facility

A new waste management and alternative fuel production plant set up by Geocycle Egypt at Ain Sokhna in the Suez Governate has now been inaugurated by Egypt's Minister of Environment, Yasmeen Fouad.

Geocycle invested EGP200m (USD 11.65m) in the new factory, which is equipped with modern technology to produce 400,000 tonnes high-quality alternative fuel to replace diesel, mazut and gas currently consumed at the 8.9Mta Lafarge Cement factory near Ain Sokhna.

Geocycle, a subsidiary of LafargeHolcim, is a leading provider of industrial, agricultural and municipal waste management services worldwide. According to a recently published LafargeHolcim sustainability report, the company used more than 11 million tonnes of waste, an increase of 10 % over 2017, as a fuel for kilns or as alternative raw materials using co-processing technology.

Sources: CemNet (2019, April 22): "Geocycle opens alternative fuel facility in Ain Sokhna, Egypt". LafargeHolcim: "Sustainability Report 2018"

India

Central Pollution Control Board (CPCB) is recommending the use of co-processing technology

According to Hindu Business Line, paper mills in Gujarat state signed a memorandum of understanding with the Kodinar unit of Ambuja Cement and from then on, the plastic waste from the paper industry started being used in cement manufacture. From 2012 to 2016, around 154,018 tonnes of plastic waste were co-processed from the paper mills of Vapi, according to a May 2017 CPCB case study. Of the waste collected, the non-recyclable plastics and other materials under the non-recyclable Segregated Combustible Fraction (SCF) category are sent to the ACC cement kiln in the vicinity where they are co-processed as Alternative Fuels and Raw material (AFR) in the cement making process.

This has been a win-win for both Madukkarai panchayat and ACC. The company is able to reduce its coal consumption and greenhouse gas emissions from cement making, while the panchayat gets the much coveted clean and green status, with much less waste reaching the landfill.

More recently, Goa has experimented with co-processing, setting a trend that other municipalities are looking to emulate. When Panaji was selected for conversion into one of the country's Smart Cities, the State government was enthused to give it 'green' status. It planned to establish four Municipal Solid Waste (MSW) plants with a daily capacity of 100 tonnes based on the mechanical biological treatment process.

Source: thehindubusinessline.com (2019, May 7): "Where one sector's waste can be another's fuel"

Note: At the next Alternative Fuels Symposium, RBM Tripathi, Unit Head JK Cement Works Muddapur, India, will present a case study about the use of alternative fuels at his plant and will give background information on the regulations and guidelines for the use of alternative fuels in India.

Ambuja Cement's net profit grows 35% in Q4 FY19

The company reported a 35 percent growth in its net profit during the quarter ending March 2019. Its profit after tax (PAT) stood at Rs 695.30 crore in comparison to Rs 514.34 crore it registered in the corresponding quarter previous year. Aside from profit, Ambuja has also increased its capacity to repurpose and utilize waste which grew significantly compared to the last year.

"The quarter saw a significant increase in power and fuel costs year on year, however our continued focus on the use of alternative fuels helped to partly mitigate this impact. Capacity utilization improved during the quarter," it said in the BSE filing.

Source: India Times ETRealty (2019, April 30): "Ambuja Cement's net profit grows 35% in Q4 FY19"

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Malaysia

China plastic waste ban throws global recycling into chaos

After many years of receiving plastic waste from countries all over the world, China has banned all plastic imports in 2018 to protect the local environment and air quality. Now, many developed nations are still struggling to find places to send their waste.

Southeast Asia and especially Malaysia have become the make-shift solution, where the plastic waste has been redirected in huge quantities since Chinese recyclers have relocated their factories. In fact, plastic imports to Malaysia tripled from 2016 levels to 870,000 tonnes in 2018.

Foreseeably, Malaysian recyclers are struggling with the amount of influx of packaging and plastics from as far afield as Germany, the US or Brazil. As a consequence, local residents are exposed to toxic fumes, which are also believed to come from the incineration of plastic waste that was too low quality to be recycled.

Environmental campaigners and residents have investigated the issue and located about 40 suspected processing plants in the area of Jenjarom, a small town not far from Kuala Lumpur, partly operating secretly and without proper permits. After increasing pressure on authorities, the government has eventually begun to close down illegal factories in Jenjarom and announced a nationwide freeze on plastic import permits. Residents say the air quality has improved after thirty-three factories were closed down. Nevertheless, some plastic dumps remain and activists believe many factories have quietly moved elsewhere in the country.

In Australia, Europe and the US, many of those collecting plastic and other recyclables were left struggling to find new places to send it. Getting it processed by recyclers at home means increased costs, which led some to send their recyclables to landfills sites as the scrap has piled up too quickly.

A good example of handling the issue are some local authority-run centres that collect recyclables in Adelaide, Australia. Previously sending nearly all recyclables to China, 80 percent are now being processed by local companies, with most of the rest shipped to India.

Source: voanews.com (2019, April 25): "China Plastic Waste Ban Throws Global Recycling into Chaos"

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Pakistan moves green(er)

Several projects for the use of alternative fuels or refuse derived fuels have already been done a decade ago in Pakistan.

In the years 2006-2008, MVW Lechtenberg was proud to assist several cement companies in Pakistan to check the possibilities for the use of such refuse derived fuels. MVW Lechtenberg was advising eight cement plants with a clinker production capacity of 12 million tonnes, which was, at that time, 90 percent of Pakistan's clinker production capacity.

In MVW's studies for utilizing high caloric light fractions from household waste, the following re¬sults were ascertained: in total, the substitution potential at the named plants equates to 880,000t/y of high caloric light fractions from household waste. This means that, in the meantime, competition has evolved among Pakistan's cement plants to secure contracts with the cities to capture the waste.

As an example, Lahore – with a population of 6m – collects around 6,000 tonnes of household waste per day; as the organic part as well as the non-recyclable parts (stones, sand, metals) amounts to 80 percent, only 1,200t/d of high caloric fractions can be extracted. This corresponds to around 400,000 tonnes per year.

In July 2008, Fauji Cement started the production of RDF from municipal solid waste from the landfill in Rawalpindi, with the assistance of MVW Lechtenberg. Introduced fuels are tyres, bagasse, rice husks and mainly high caloric fractions from MSW.

"D.G. Khan Cement buys 1,000 tonnes of municipal waste from LWMC for making RDF to be burnt at the cement plant instead of coal. It emits less harmful emissions than coal which have a considerable impact on mitigating pollution level", according to Tribune Newspaper, Lahore.

The cement plant's team used to segregate ferrous and non-ferrous, non-degradable plastic, glass, stones, and other corrugated materials through different processing steps.

It was then reduced to shreds and pellets to be formed a homogeneous mixture for burning, he added. RDF, he said was ideal fuel to be used in cement plants, lime plants, coal-fired power plants and also as a reducing agent in steel furnaces.

Source: tribune.com.pk (2019, May 6): "Lahore stands tall by generating green fuel from waste"

Note: Dr. Arif Bashir, CEO of DG Khan Cement Pakistan will present DG Khan's activities for the production and use of RDF from municipal solid waste in Lahore at our next Alternative Fuels Symposium.

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South Africa

When the "black gold" loses its worth

The South African cement producer PPC introduces alternative fuels at its De Hoek plant in Western Cape in order to replace coal with more sustainable energy sources. "De Hoek was chosen as the first of our three mega plants to begin experimenting with substituting coal with AFs that are cheaper to co-process while reducing emissions.", says PPC's project leader, Craig Belstead. Previously, all coal supplies to the South African operations had to be delivered from the north of the country, which added considerably to the costs.

In the first step, tyres have been introduced to the fuel feed system in 2015. In two kilns, a maximum of 12,000-15,000 tpa of tyres are used, which reduced coal usage between 8-12 percent. Since the tyre share in the plant's fuel mix cannot be increased due to technical limits on kiln operation, refuse derived fuel is now the next source of AF to further reduce the dependence on coal.

MVW Lechtenberg is assisting PPC in this second phase with the sourcing of RDF and the implementation of RDF processing. After careful investigation, it emerged that municipal solid waste could be used to supplement the plant's fuel mix. PPC is currently looking forward to obtaining investment funding from PPC's capital allocation framework.

Source: Cemnet.com (2019, January 14): "Finding a different kind of gold"

USA

MLMC to open $20 million enviro-fuelcubes factory

Colorado-based company Materials Lifecycle Management Co. opened a $20 million factory in Plant City, Florida, in April. MLMC turns combustible waste such as paper, wooden pallets, cardboard, plastic wrap, foam, bubble wrap, film and assorted packaging into fuel cubes, selling it as an alternative fuel to coal.

At the new Plant City factory, MLMC will reduce huge piles of combustible waste to small, crumbly "enviro-fuelcubes." The EPA has recognized the cubes, which are about 85 percent paper, as an approved fuel for energy-intensive industrial operations.

By the time the 103,000-square-foot Plant City facility hits its capacity, which the company projects will take two years, it will divert 200,000 tonnes of waste a year from local landfills. As of now, Cemex will be the only customer of fuel cubes produced at the plant. At peak capacity, MLMC's plant is expected to produce more than Cemex is presumed to burn.

MLMC is in discussions to build two more plants in 2020, a second one in Florida to produce fuel for a cement plant near Miami, and the other in Louisville, Kentucky.

Source: Tampa Bay Times (2019, April 12): "Alternative fuel company opens $20 million Plant City factory"

UAE

Energy-from-waste to power UAE cement factories

Financial close has been reached for a UAE plant that will convert waste into a fuel for use instead of coal in cement factories.

The project will be carried out by Emirates RDF, a joint venture consisting of UAE-based contractors Besix and TG Eco Holding together with Finland-based Griffin Refineries. The build-operate-transfer scheme includes a 15-year post-construction operational phase.

Construction of the facility, which is being built in the Emirate of Umm Al Quwain, starts in May.

From September 2020, the facility will receive 1,000 tonnes of municipal waste per day from approximately 550,000 residents living in the Emirates of Umm Al Quwain and Ajman. The waste will be converted into an alternative energy source called refuse derived fuel (RDF). It will be used as a fuel in cement factories instead of coal and will simultaneously result in a diversion of at least 90 percent of household waste from landfill.

Source: theconstructionindex.co.uk (2019, May 7): "Energy-from-waste to power UAE cement factories"

Note: At the next Alternative Fuels Symposium, Jordan Mandalov, COO of Griffin Industries, will present their activities for RDF production in UAE and give some background on the ministerial decree for the use of refuse derived fuels in the United Arab Emirates (UAE).

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