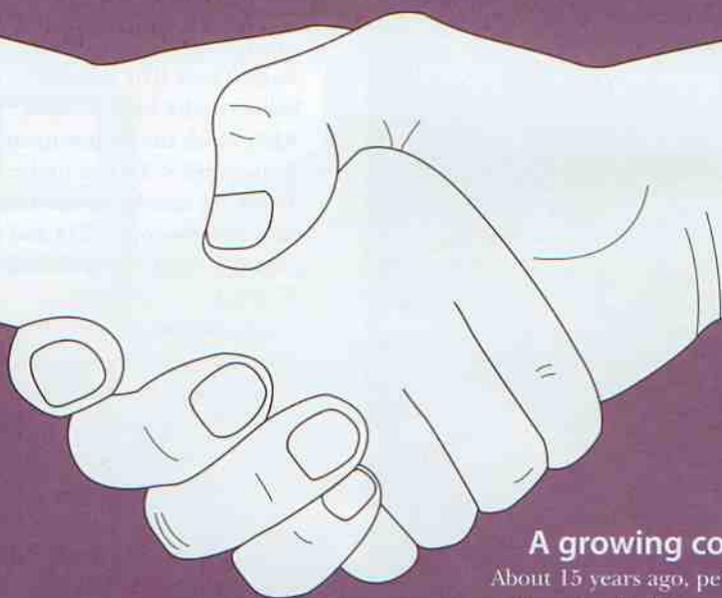


One Man's Waste is Another's Commodity



Dirk Lechtenberg,
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illustrates the growth of
trading refuse-derived fuels
across Europe.

A growing commodity

About 15 years ago, petcoke was recognised as an alternative fuel. Nowadays, cement plants in countries all over the world use petcoke as their standard fuel. However, the use of other alternative fuels, such as refuse-derived fuels (RDF) in the cement and lime industry is still under development in many countries. In this regard, some European countries are a step ahead. RDF has become a commodity, which is now traded like petcoke.

In Germany, for example, the average substitution rate of alternative fuels was approximately 60% in 2010. This means that 60% of the total heat demand in the German cement industry was provided by alternative fuels such as RDF, tyres, meat and bone meal, solvents and other types of defined waste materials. The substitution rate has been increasing for the last 20 years, facilitated by the infrastructure for waste collection and waste treatment. Most of the RDF are produced by specialised waste management companies that have invested in the necessary infrastructure, process equipment and knowhow. By now, RDF have become a common fuel source for the German cement and lime industry and the market is huge. In other European countries, RDF production capacity still needs to be extended; therefore, many plants have to import RDF from other countries.



Figure 1. RDF hard pellets for bulk transport.



Figure 2. Baling and wrapping of RDF.

For those who have not yet encountered this term, RDF should be defined at this point. The World Business Council for Sustainable Development describes alternative fuels as follows: "Selected waste and byproducts with recoverable calorific value can be used as fuels in a cement kiln, replacing a portion of conventional fossil fuels, like coal, if they meet strict specifications. Sometimes they can only be used after pre-processing to provide 'tailor-made' fuels for the cement process."

MVW Lechtenberg has been exporting RDF from Germany for almost 10 years, to various cement plants within Europe by truck and by vessel.

Types of traded RDF within Europe

In Europe different industries use RDF, with the largest consumer being the cement industry. Most of the traded RDF that are used by the cement industry have a low calorific value (approximately 16 – 20 GJ/t) and often a higher moisture and/or chlorine content.

In addition to the cement and lime industry, steel mills also use dedicated, high calorific valuable RDF in a very small grain size (< 10 mm), in a pelletised or granulated form. These RDF need to be introduced into the steel boilers under high pressure. Therefore, only compressed RDF, which can be pneumatically fed in small pipes with a diameter of < 25 mm under high pressure, can be used. These are mostly derived from plastic and have a minimum calorific value of 25 GJ/t and very low moisture content (< 10%). Steel mills purchase them at high prices up to €2.5/GJ.

In the lime industry the price is different. There are high quality parameters for RDF needed in this industry, such as small grain size, low ash content, and high calorific value. Typical solid, fluffy RDF used in this industry is traded at prices of up to €2/GJ within Europe.

In addition to RDF from segregated and mixed plastics/paper and textile fractions, other types such as dried sewage sludge and biomass-derived fuels are traded. Dried sewage sludge from wastewater treatment plants is used in Germany, Switzerland, Greece and Spain.

Other traded RDF include wood products that are also used by energy producers. For example, RWE, the biggest coal and lignite power producer in Germany, just opened a 750 000 tpa capacity wood pelletising plant in Georgia, USA,

to export wood pellets to its German power plants.

Since in Germany the price for wood chips has increased from €1/GJ in 2005 to almost €4.5/GJ today, the quantities used in the cement and lime industry have decreased rapidly. This was caused by high competition in biomass-derived fuel usage in the power generating industry and dedicated biomass fired power plants, especially due to the high subsidies paid by the government for renewable energy and

Table 1. Wood products for energy production – price developments in Germany				
	Wood products for energy production	Index of production prices for wood products		Index production costs for forestry products
		Wood as chips	Pellets, briquettes, sawdust and others	Industrial wood
Weight %	1000	191.87	250.67	557.46
Average 2005	100	100	100	100
Average 2006	117	124	110	117
Average 2007	158	159	154	159
Average 2008	161	152	150	169
Average 2009	152	147	174	145
Average 2010	173	176	181	168
Average 2011/mid-2011	193	189	198	194

Source: Statistisches Bundesamt, Wiesbaden, 2011, Lange Reihen

Table 2. Volumes of imported and exported alternative fuels in Europe*

Exporting country	Volumes 2009 (t)	Volumes 2010 (t)
Germany	380 000	290 000
Ireland	60 000	150 000
Italy	56 000	n.a.
The Netherlands	175 000	130 000
Importing country	Volumes 2009 (t)	Volumes 2010 (t)
Cyprus	20 000	20 000
Poland	300 000	150 000
Sweden	250 000	250 000
Denmark	150 000	180 000
Norway	35 000	35 000
Finland	80 000	120 000
Portugal	20 000	60 000
Spain	10 000	65 000

* Approximate figures for RDF/AF



Figure 3. RDF unloading from 40 in. containers.



Figure 4. Loading vessel with RDF at MVW Lechtenberg's port facility in Germany.

the CO₂ emission reduction regulations. Table 1 illustrates the substantial (almost 100%) rise in prices for wood products designated for energy production from 2005 to mid-2011.

Furthermore, all industries use – if available – liquid alternative fuels, such as used oil or solvents. With a calorific value of up to 34 GJ/t, such materials are almost traded as usual fossil fuels. All in all, it is estimated that the price for all types of biomass-derived fuels will continue to increase within the next few years.

Volumes of traded RDF within Europe

MVW Lechtenberg has been observing the quantities of traded RDF for three years and gained a detailed overview of permissions for transfrontier shipment of alternative fuels applied for and actual volumes of alternative fuels transported. In many cases, permissions were granted for huge volumes of RDF, but only a few tonnes were eventually transported. Such discrepancies may occur for different reasons: for example, due to quality issues or changed market conditions. The approximate volumes of imported and exported RDF in Europe are shown in Table 2.

RDF are subject to a waste regime. This means even processed and defined segregated fractions of waste (industrial, commercial construction and demolition waste or municipal solid waste) have to meet waste regulations. Thus, various regulations, laws and control mechanisms have to be taken into consideration while purchasing RDF, having an effect on the total volume.

As all transfrontier shipments of waste have to be monitored by the relevant authorities (mainly the environment protection authorities or designated authorities), the increase of RDF shipments can be found in the official annual reports. To identify RDF, either the European waste code number (e.g. 191210 – fuel from waste) or the intended recycling utilisation code can be used. R1 is the recycling code for 'use as fuel', and is usually used for co-firing in a cement, lime or steel plant. As some mixed wastes are exported and processed into RDF in locally available RDF production plants, the final utilisation of the waste materials also has to be monitored.

To trade with RDF/alternative fuels, several conditions have to be fulfilled:

- Permission for transfrontier shipment of wastes according to the Basel Convention.
- Within Europe: the European regulations for transfrontier shipments of wastes according to the EU regulation 1013/2006.
- Relevant local permissions for waste export or import.

This means, when RDF are traded, the exporting country, the transit countries and the importing country have to give their permissions. Beside this, a bank guarantee for an eventual backhauling has to be given to the authorities.

As the notification process needs to be underlined with comprehensive documentation and certificates (e.g. insurance of the trucks, vessels, bank guarantees, IPPC licences for producer and user), the authorities need to charge for the permits. The costs depend on the respective country and quantities applied for. On average, the permitting costs and bank guarantees are calculated as approximately €1 – 2/t. Each truck (or vessel load) has to

be announced, at the latest, three working days before planned shipment to all involved authorities. The current shipment and receipt has to be announced, as well as the final recycling, at the latest 180 days after receipt. The permit for transfrontier shipments of waste is always granted for a period of one year, so a lot of administrative work is involved.

In many European countries, only recognised and registered traders are allowed to export or import wastes. Such licenses are only granted to individuals who have proven expertise, and they have to be renewed on a regular basis. MVW Lechtenberg has held this license for almost 15 years.

Logistics

Usually, RDF have a low density at an average of 250 kg/m^3 , with variations from 80 kg/m^3 up to 600 kg/m^3 . Therefore, it is reasonable to compress RDF materials in order to reduce the transportation costs. This is carried out by means of pelletising or baling. Due to higher costs for pelletising, MVW Lechtenberg usually uses bales and then wraps them with plastic film, as it is required for shipping. The bales are either steel or plastic wired, depending on the needs of the receiving facility. Wrapping with up to six sheets of stretch film is quite costly due to high PE-film prices, and amounts to €7/t of RDF.

For some destinations, transport in closed 40 in. containers is feasible. The containers are lined with plastic. This protects against odours and moisture. However, many shipping companies have reservations against shipping waste; therefore waste transports are often more costly than usual transports.

Currently, MVW Lechtenberg trades RDF as loose material in 40 in. containers and as wrapped bales in vessels. The overall traded quantity in 2011 will be approximately 210 000 t within Europe and this quantity is expected to double in 2012. Since a lot of experience and knowledge is needed for RDF use and trade, the company also offers a full package solution: supply of tailor-made RDF including delivery, mobile dosing and feeding system for start-up; trials and support for acquiring an IPPC license (environmental impact assessment, kiln and emission control and ongoing quality control). This is an optimum solution to begin with, especially for cement and lime plants that want to start the use of RDF without access to a local source. In many countries there is a lack of local sources for alternative fuels and RDF. Hence, a continuous supply from abroad is a reasonable alternative to consider.

MVW Lechtenberg trades high quality RDF with a calorific value of 30 GJ/t, as only such high quality RDF reaches prices that validate such efforts in logistics and administration. This allows even the transcontinental export of specially produced, high quality RDF (e.g. from Europe to Asia or North Africa). Due to low transportation costs of 40 in. containers from Europe to China, RDF is traded 'around the world'.

With increasing fossil fuel prices and the obligation to reduce production costs, it is predicted that the traded quantities of high quality RDF will increase significantly within the next years, cementing its status as a commodity. 

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