

COMPO *news*

I N T E R N A T I O N A L

IFAT 2018 edition

Time for Change



**COOPERATION
WITH R20**



REGIONS OF
CLIMATE ACTION



**LARGEST MBT FACILITY
IN ASIA OPENED**

**WASTE DISPOSAL IS COMPLICATED!
OR IS IT NOT?**



Aurel Lübke
Managing Director
Compost Systems GmbH

Editorial

Dear readers,

The world has been meeting on a yearly basis for almost 24 years now to pay lip service to climate change during numerous COPs. It goes without saying that it is important and right for the issue to receive attention.

But after 24 years, we can safely come to the conclusion that an element of indifference has set in. We could all do something to stop climate change, but we always want others to take the first step. We blame the US, which, in turn, points at China. The Chinese have good intentions for 2030 while India is still trying to alleviate its hunger for energy by expanding coal-fired power station capacity. Or is there really a lack of a hunger for change? Researchers tell us that climate change is accelerating much more quickly than earlier forecasts assumed. There is a need to galvanise and tackle the matter more seriously. There is certainly no help from the likes of Trump, who withdrew from the Paris Agreement, or from politicians in Europe who want to make political capital out of climate issues. However, what should really give us pause for thought is the fact that a small car manufacturer in California has managed to become the most coveted US automaker brand. Investors don't seem to mind if the company spends almost one billion dollars on the car's further development in a single quarter, if there is years' delay in delivering new cars or if the company postpones presenting its visions. This is conclusive proof that there are already a considerable number of investors who share visions and are prepared to invest in them. The automotive industry is forced to join in despite knowing that there are not sufficient raw materials to switch the world's transport systems to electricity. Some companies already dedicate more than half of their research budget to developing electric cars. We could optimistically venture to say that the industry has started to understand the market. A machine has been set in motion. A new phase in development has started. But what are the consequences of such development? What will change? One thing that it won't be possible to prevent is a whole host of opportunists sprouting up. Just like a gardener who needs to pluck out weeds from their flower bed from time to time, the industry will need to undergo a purging process sooner or later. Initially, companies which are unable to increase productivity during the growth stage will tend to drop out of the market before being swallowed up within their own sector (see biogas sector). But many COPs will take place while the sea rises even further and the poles continue to melt before any of this happens. We have no other choice but to decide how we intend to deal with climate change. Compost Systems does not currently concern itself with producing alternative energy. We are more concerned with the "careful handling of carbon as a resource." It dismays us to hear the proposals of many a company, politician or even a scientist. Cheap green electricity at any cost is the name of the game in some places. That's why we'll never stop trying to bring clarity and sense to the debate. We wish to present the true situation and make clear what is right and important but might not exactly be popular. Sometimes inconvenient, sometimes going against convention or tradition, but always truthful and based on fact. As we see it, our mission as an engineering consultancy is to close carbon circles, increase efficiency and give a fair chance to technologies which make a significant contribution to protecting the climate and environment, expose marketing gimmicks, lies and half-truths, and undertake our activities for the benefit of environmental and climate protection.

We hope you enjoy reading and learn a great deal from COMPOnews 2018.

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Eco-lies and other fake news

Electric cars are CO₂-neutral

Unlike with combustion engines, e-cars do not produce CO₂ when they move.

However, their production process does emit more CO₂ than the manufacturing process for combustion engine vehicles. What is much worse, though, is the fact that a great deal of electricity is still generated from coal. Brown coal, for example, produces about 1 kg CO₂ per kWh, making it 1.5 times worse than natural gas. If we also include grid and battery losses, e-cars are three times as bad as diesel, petrol or natural gas. There is also the fact that car heating is provided by waste heat from the engine in combustion engine vehicles whereas electricity is used to provide heating in electric cars. This doesn't even include heating for batteries.

On the other hand, an e-car produces no exhaust gases and, consequently, does not emit any harmful substances such as nitrogen oxide either. When it comes to noise emission, an e-car does not produce any sound until it reaches higher speeds and rolling motion and wind start to generate noise.

Different environmental protection organisations are thus absolutely right to call for an end to coal power, because e-cars do not improve the CO₂ balance while electricity is still being generated from coal.

Composting is better than fermentation, fermentation is better than composting

This is an issue which come up time and again. However, a large number of studies have now shown that composting and fermentation are on par when it comes to climate protection. The actual technology used to operate systems is far more crucial in this respect. For example, an inefficient composting facility will produce double the CO₂ emissions that an effectively operated system emits. The same applies to biogas plants. While carbon, in the broad sense of the word, changes into bioenergy, i.e. electricity or natural gas, in the case

of biogas, in compost, carbon is bound into a top soil and is added to the soil with nutrients as a complex, insoluble product. From a climate protection perspective, we can argue that good practical management makes more of a difference than the actual different technologies themselves. The Austrian Environment Agency has also pointed this out in its guideline on low-emission operation of composting plants.

Methane stinks

We consistently hear the misconception that methane produces an abnormal smell similar to the one caused by indigestion after savouring cabbage soup. Needless to say, this is completely false. The smell is caused by hydrogen sulphide and other compounds which produce the pungent smell. Methane itself is completely odourless and, above all, lighter than air. Unlike CO₂ which collects in the soil, methane will always seek to escape upwards.

Methane can be eliminated in a biofilter

Needless to say, this is again false. Methane cannot be eliminated in a biofilter, at least not to a significant, measurable extent. There are studies, specifically in the landfill sector, which report that methane degrades as it discharges from landfill sites, i.e. it oxidises. This will only happen with very small quantities and the biofilter would need to be 100 times bigger than a normal one to achieve a noticeable effect. Methane acts in the same way when it discharges from a compost heap. Very low concentrations of methane may very well oxidise before the methane escapes into the atmosphere. However, if the methane content increases throughout the windrow and the oxidation layer becomes too thin, the methane is completely unfiltered when released into the atmosphere. We have been able to observe this phenomenon directly ourselves during field studies when the methane-containing layer on the windrow

"flue" is just a few centimetres deep and the methane is able to escape upwards.

A landfill is the most efficient biogas plant

It is actually true that system engineering costs are limited to those for collecting and utilising the methane if the gas is collected perfectly from the landfill. However, landfilling is the biggest emitter of environmentally harmful non-CO₂ greenhouse gases produced by man. Its tonnage is multiplied by 25 to calculate its CO₂ equivalent in terms of its harmful effect. There is no other greater methane producer worldwide than landfill sites, apart from cows, which have been grazing in fields a long, long time before our industrial age dawned. It is also true that, depending on the climate and ambient temperature, around 50% of the gas escapes before it can be covered and captured for landfill gas collection. This means that an effectively managed landfill produces about 0.5–0.85 t CO₂ equivalent while one which does not collect landfill gas emits twice as much. Landfills worldwide continue to account for as much as 7% of a country's climate-relevant emissions.

Palm oil is harmful

Palm oil has been demonised, maligned and bad-mouthed ever since a host of NGOs also decided to blame it for ills. *What is the actual truth?* Palm oil is obtained from a fruit grown on plantations in warm climates, just like many other crops. Rainforest destruction largely has nothing to do with palm oil. It is often criminal organisations which sometimes work hand in hand with executive forces which are to blame for deforestation. Most plantation owners have nothing to do with acquisition of such tracts of land. Palm oil is also criticised for being harmful to health. Apart from possible processing residues, palm oil is a relatively neutral cooking oil. It undergoes minimal change during cooking due to its simple structure and also has a long shelf life. You could say that it's not a highly

beneficial oil, but it isn't a particularly unhealthy oil either. Incidentally, most palm oil is used as cooking oil in China and India. Only a small proportion has ended up in our fuels to date. Nutella has been criticised for using palm oil, but its problems stem more from the fact that it contains a high proportion of fat and not because the fat is obtained from palm oil. From a climate perspective, it does not matter whether coconut oil or palm oil is used in Nutella or not.

However, very high CO₂ emissions are produced by palm oil plantations in peatland, for example. If a litre of CPO (crude palm oil) produces about 1–2 kg CO₂, palm oil from peatland emits significantly more at 8 kg CO₂ per litre of CPO. Such levels are as bad as coal or far worse than petrol, diesel or natural gas. We should also be aware that palm oil plays a significant role in the economy of countries such as Indonesia and thus provides a great number of jobs. Many farmers derive a modest but sufficient income from palm oil, especially on small scale farmings. It should also be noted that many NGOs demonise the use of child labour. We don't wish to suggest that there are no criminal organisations in Malaysia or Indonesia doing it, but child labour is not an everyday occurrence there. Children only continue to help their parents with work occasionally on small scale farms as they did 40 years ago and still do today in some places in Europe.

Conclusion: the baby shouldn't been thrown out with the bathwater due to an arbitrary demonization of palm oil. It is obviously important to help agriculture to become efficient and sustainable. Of course, market-listed organisations which more or less think in terms of profit hold a dominant position in the sector. This is not specific to the palm industry but is a general problem caused by economic growth at the expense of nature and the climate.



Cooperation with R20

Arnold Schwarzenegger is no stranger to environmental issues, having addressed them during his governorship of California. California introduced highly stringent environmental laws, transforming California into a role model for a green, sustainable economy.

In the midst of an economic boom, it's not only numerous IT companies that have located to the region, but also leading enterprises in environmentally friendly industries, such as Tesla. Arnold Schwarzenegger may no longer be governor, but he's still passionate about the environment. This passion was what inspired him to become a co-founder of R20 – Regions of Climate Action. This NGO aims to help regions to achieve progress in the fields of ecology and climate protection. Contrary to the opinion of many, R20's main objective is not to "give away money", but to develop models for regions which bring a benefit for society, the region and the environment. Based in Geneva, R20 has already set up a few projects, including one in Algeria, where we at Compost Systems had the privilege of supplying composting technology. The CSC Container technology ensures that raw material is returned to its natural cycle using a controlled, sanitized approach. Traditional windrow composting is used for aeration and curing. The project

was implemented and put into operation in cooperation with R20. Compost Systems supervised and guided the trial operation for more than a year. Arnold Schwarzenegger wanted to see the successful project for himself as part of a visit to Oran in Algeria. As an engineering consultancy, we value our working relationship with R20. We are well aware that, in many cases, success does not depend on the technology, but, the available resources, the legal framework conditions and the will of regional operators and politicians on a communal, regional or state level. This is also the case in Algeria, a country where soils are poor with a low carbon or top soil content. Here, compost can show its masterly performance to true advantage with nutrients which are not leached and water which is retained in the soil. A country which will only be able to live off gas and oil for one or two more generations needs to prepare itself for a time when agricultural self-sufficiency takes priority. The project showed local stakeholders that

recycling carbon brings many advantages. There is also the obvious benefit that each ton of biodegradable waste which does not end up in a landfill ensures there is one less ton of CO₂ in the atmosphere. Compost Systems has been working with R20 in different countries for a number of years now, including India and other African countries. R20 started holding the Austrian World Summit on a yearly basis in 2017, in collaboration with its European representative Brainbows. Organised under the patronage of the President of Austria Alexander Van der Bellen and Chancellor of Austria Sebastian Kurz, this conference welcomes 1,400 participants and is dedicated exclusively to climate and environmental protection.

We thank R20 for its commitment and our successful cooperative partnership, particularly Arnold Schwarzenegger for his personal dedication to a healthier, more liveable environment.



Excursions frequently pay a visit to the plant in Oran, which serves as a model for sustainability in Algeria.



Demo plant



CSC container



Arnold Schwarzenegger, Abdelghani Zaalene (Governor of Oran Province) and Aurel Lübke, CEO of Compost Systems pay a visit to the demo plant.



REGIONS OF CLIMATE ACTION

COMPOST BRINGS CARBON BACK TO WHERE IT IS NEEDED MOST: IN SOILS.



Reaching the final destination after a long journey



Mechanical treatment plant



TracTurn compost turner



the rain and consumer behaviour. As a result, the organic part may already contain over 60% moisture. The system itself consists of a roofed aeration platform, which is powered by a compost turner. Compost is produced using intensive aeration for four weeks followed by another four to eight weeks of curing. This compost has high market value in India. Provided the limit values for contaminants are also met, the compost can be sold at a profit thanks to the promotion of fertiliser and a high demand for natural fertiliser. RDF is sold, recycling products are also sold on to the recycling industry.

The project was presented to the public for the first time

After almost 10 years, the largest MBT in South East Asia has finally gone into operation after overcoming numerous obstacles.

The project started back in 2008 and would create the largest waste treatment plant in South-East Asia to Western standards, for the city of Mumbai. Almost ten years later, the finished plant was presented to the public as part of the IFAT India 2017 trade fair. History tells us that Buddha sat meditating under a tree for a number of years to attain enlightenment. We have learnt that the tree was probably a waiting room in a government agency and enlightenment was an agency's permission.

It is not our intention at all to discredit our allies in the project in India at this point. It is the largest waste treatment centre with Western technology in all South-East Asia. You could also say that "Things could only get worse". About 1,000 tons of waste can be treated per day at the new plant. Unlike in Europe, waste is transported on relatively small trucks in India. This means that this volume of waste corresponds to some 300 to 500 truckloads a day. The waste is first sorted in a mechanical treatment plant. The throughput with a high organic content is fed into the biological treatment system, the part of the plant which Compost Systems designed. In India, waste is relatively wet when delivered due to

at IFAT India 2017 in Mumbai. Not even the aftermath of the fading monsoon was able to impede the presentation. Quite the opposite, it showed how the plant could be operated all year round, even in India. More than 2,000 mm of precipitation falls in Mumbai over about two months with volumes increasingly fluctuating because of climate change. We'd like to thank all fellow crusaders who took part in the project. We hope that our project will attract many imitators. This is particularly important in India or other regions in South-East Asia, where this technology can not only eliminate many tons of CO₂, but can also create numerous jobs and pave the way to a modern, sustainable future.



Started operation: 2017
Input: 1,000 tons household waste/day
Technical equipment: 4 open newEARTH halls with 8 triangle-shaped negative-aerated windrows each, cable-free temperature monitoring and 7 irrigation lines each, 4 roofed, positive-aerated curing halls for 8 windrows with cable-free temperature monitoring
Turner: TracTurn
Scope of delivery: Engineering, aeration technology, El&C, exhaust system, TracTurn

What's in a name?

Common terms of our industry explained

What is an odour unit?

As its name suggests, this is the unit of odour measurement, calculated using an olfactometer. This device greatly dilutes the air to be measured, and then allows at least four probands to smell it. The probands are chosen by calibration, which means testing them beforehand to see whether they can smell a standardised test gas. If at least 50 percent can detect the odour, the concentration of the sample is defined as one odour unit per cubic metre (o.u./m³) of gas. Interestingly, no distinction is made between pleasant and unpleasant odours, so "Chanel No. 5" has the same impact as a manure pit. Odours are measured mainly to calculate how far they could spread, and to ensure that they do not exceed the maximum permitted level of a site.

What is an AT4 measurement?

This is the amount of oxygen consumed by a material over four days, and is measured by placing a specific quantity of the material in a reaction glass and monitoring it over this period. It is important to start measuring after the medium has begun to react, since there is often a time lag before this occurs, particularly in dry-stabilised media. This may result in an incorrect measurement. The value is expressed as the oxygen requirement in milligrammes of one gramme of dry sample over four days (mgO₂/g/4d), and is used mainly to determine the stability of waste. In most countries, waste may not be placed outdoors unless it is below 20 mg O₂ AT4, and may not be placed in landfill until it has reached 5-10 mg O₂ AT4. Compost is rarely tested using AT4.

Instead, it is traditionally categorised by its maturity, which involves placing a much larger sample in a heating chamber and measuring the temperature difference between the medium and the chamber. The greater the difference, the less the maturity. Compost with a maturity of 1 has only just started to decay, while level 5 compost is ready to use. The odour usually becomes neutral at level 3-4 which, depending on the material, normally occurs after about three to four weeks. Level 5 compost takes about eight to twelve weeks to achieve, again depending on the material. The lignin content of the mixture (ie how woody it is) also significantly affects the decay process and the carbon-nitrogen ratio of the starting mix.

What is CLO?

CLO stands for COMPOST-LIKE OUTPUT. Many countries have their own legal definitions of compost, and many specify that it may not be described as compost if it is made from municipal solid waste. This product is therefore called CLO. Different countries have different practices, and some make no distinction between CLO and compost. In some countries, such as Austria, it is against the law to use CLO on land, so all products of this kind are classified as landfill inert fraction.

What is the ABPR animal by-products regulation?

EU law on animal by-products regulation was first codified in regulation 1774/2002. This was later expanded by regulations 1069/2009 and 142/2011. It deals mainly with waste that has the potential to transmit

veterinary diseases, and distinguishes between three types of product:

Category 3 consists of by-products from healthy animals that are still fit for human consumption, such as past-dated food.

Category 2 comprises by-products that come from healthy animals but are not suitable for human consumption, such as manure or chicken feathers.

Category 1 by-products come from possibly sick animals, that may be contaminated. In Europe, these must be incinerated under supervision.

Catering waste is a category in its own right. This potentially contains meat products, even though it should not. Individual countries are allowed to define their own minimum hygienisation requirements on catering waste. Only category 2 and 3 material and catering waste may be composted. Different countries implement the hygienisation requirement under the animal by-products regulation in different ways. Some effectively allow only fully sealed containers, while others also permit open windrow composting as an adequate treatment method. Compost temperatures are generally monitored: depending on the treatment time, number of measurement points and consistency of materials, temperatures of 55°C to 70°C must be reached for a period of one hour to several days. Depending on the process used, hygienisation must be carried out multiple times. Most countries impose additional

requirements apart from temperature monitoring, which may include completely separate premises for hygienised and fresh material, and strict precautions to keep out birds, rats, and other thieves. Some factories even require employees' shoes to be sterilised after they leave the premises, while some countries require only manual temperature records using a handheld thermometer.

Speaking of which:

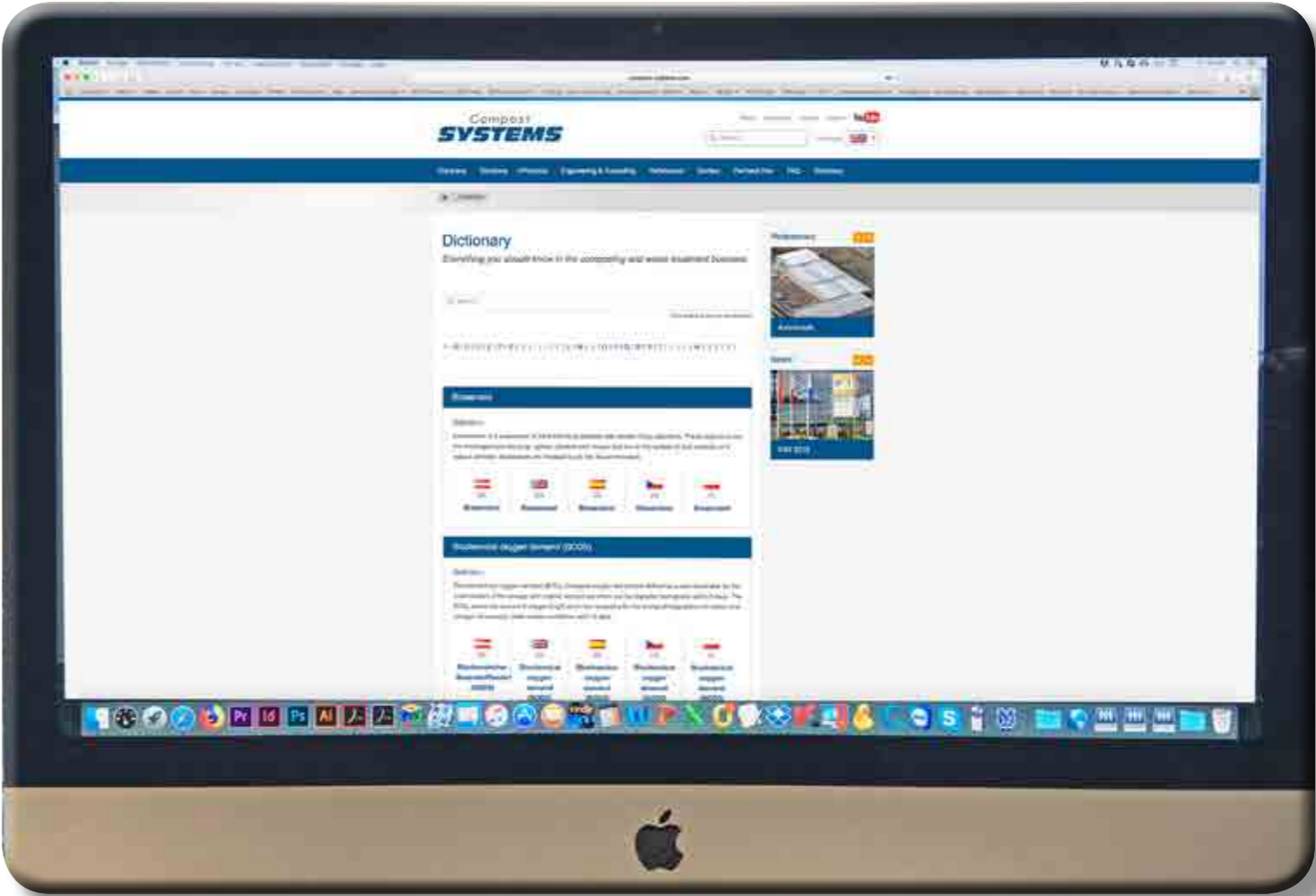
Longer doesn't mean better
A lot of people think that the longer compost takes to make, the better it is. Specifically, they believe that if compost is

poorly made – for example by not turning it enough, keeping it too dry or too wet, or starting out with a poor-quality mixture – this can be compensated by leaving it for a long time. But this simply is not true. Just as you can't complete your secondary school education by repeating the first year over and over again, turn bad grape juice into good wine by ageing it for longer, or improve a leathery, gristly steak by leaving it on the grill for twelve hours, you can't make a silk purse out of a sow's ear where compost is concerned. So always ensure your raw materials are as fresh as possible, avoid faulty fermentation and anaerobic processes wherever you can. This will

encourage beneficial microorganisms to take up residence, and give you a valuable, high-quality product in a relatively short period. If you can't start processing your raw materials straight away, you can always stabilise fast-decaying ones by adding products such as EM or SESO, which use lactic bacteria in a similar process to that of food pickling. But these won't give you a stable compost, since they acidify it. Use no more than about 20% of the stabilised product in normal compost, as it can severely delay year composting process.

We've explained other specialised terms in the Dictionary section of our website.

www.compost-systems.com



Protecting your pile

Which is better? In our work, we come across a lot of misconceptions as to how and whether to cover compost piles. Here's a comparison of the alternatives.

Compost during production should have a moisture content of 50 to 60 percent. But heavy rain can undo weeks of hard work, so it's important to protect your compost pile. Of course, the best solution is to put a roof over it, but this costs a small fortune and takes many years to pay for itself. Flexible covers are a much more cost-effective way of protecting your compost from the elements. While rain and snow can be the kiss of death for a compost pile, drying wind and sun can be bad news, too: dry compost can be rehydrated, but this costs money. Whichever type of cover you choose, it must be breathable so that it allows gas

exchange to take place. Many suitable products have appeared on the market over recent years.

Fleece covers

Compost fleece is made from non woven polypropylene fibre. It's green, and UV stabilised for extra durability: some manufacturers give a five-year warranty. Fleece works properly only when angled: if you lay it flat, water will seep through it like a sieve. A neat, perfectly shaped pile will make it effective. Compost fleece has been in use for over 30 years, and its effectiveness as a form of weather protection is undisputed.

Semipermeable membranes

Semipermeable membranes allow air to pass through, but not water. They are made from Teflon, which has very fine pores. Unlike fleece, they are completely waterproof, even to several centimetres of water. Like sports clothes, they allow air to exchange, but keep the rain out. The ultra-thin membranes are reinforced by a support fabric laminated to the front and back, but the one big difference compared to fleece is, that membranes also keep odours in. This is not so much because they act as a filter, but rather because a film of water builds up underneath them and absorbs the odour particles. The disadvantage is

that a membrane does not provide enough natural aeration, so you have to add active aeration. It's important to note that membrane aeration is effective only if the cover is airtight over the compost pile, which can often be a challenge in itself.

While a flexible cover is a very good idea, and much cheaper than a permanent

structure, it's not always easy to handle. If you've ever tried one, you'll know it can be hard work, particularly in winter, when it may freeze to the ground or get covered in snow. So a professional wrapping machine isn't a luxury at all. Our machinery division has been closely focused on these products over recent years, and developed practical solutions that are now working very well

and in large numbers.

It has to be said that membranes can't compete with fleece in terms of value for money, and it also takes more effort to keep them right, but they're better at reducing odour emissions. Though they also won't work without active aeration.

	Compost fleece	Semipermeable membrane
UV resistance	guaranteed > 5 years	guaranteed > 5 years
Rain and snow protection	yes	yes
Protects against drying	yes	yes
Prevents odour emissions	only when damp	yes
Ultimate tensile strength typically	approx. 600 N/5 cm	approx. 4,000-5,000 N/5 cm
Aeration required	optional	yes
Cost	approx. €2/m²	from €40/m²
Dry weight	approx. 200g/m²	approx. 500g/m²



Use of the membrane at a reference plant in Bulgaria



Compost fleece used at an Austrian facility



Winding unit for membrane



One-sided fleece roller



Two-sided fleece roller

Austria: last bastion of open-pile composting?

What is the future of open compost plants? And why has Austria gone its own way, like Asterix's and Obelix's Gaulish village surrounded by Roman occupiers? Since we don't have a crystal ball to predict the future, all we can do is base our predictions on national and international guidelines and standards (such as the draft BREF document).

Let's begin by explaining the special situation applying in Austria. The country began separate collections of biogenic waste almost thirty years ago, in 1989. In 1994, this became a statutory requirement. Austria is a small country, and its agriculture sector operates on a relatively small scale. It was therefore decided to build treatment plants for separately collected biogenic waste, such as compost bins and green waste, in close cooperation with farmers. This decentralised solution made it possible to use compost locally and close the carbon cycle in the short loop.

The policy has obvious financial advantages, as the compost does not have to be transported for long distances, and can be produced in small, simple, open-air facilities. Farmers operate these as a sideline, using existing workers and machinery. The quality of the compost has always been very high, and members of the public identify with the composting process because it is carried out locally. They may even know the individuals doing it. Since farmers are the people making and using the compost, they have the added confidence of knowing that the fields on which their livelihoods depend are not "contaminated" by outside products.

Against this background, Austria's composting industry tends to use open triangular piles and turn them several times

a week. With hindsight, this has been a good choice, and a success story. As the industry grew, many plants reached the limits of their capacity, thanks to factors such as increased public support, better separation at source, and improved collection of green waste. They had two choices: expand, or make better use of the available space. Operators tended to choose the latter, because it was cheaper. The move from tractor-powered compost turners to self-propelled units increased capacity by around 30 percent. Farmers also expanded their pile width from three metres to five, and heights from 1.5 to 2.5 metres. They expected this to double their capacity – but this proved a pipe dream, as we'll see later.

Today, Austria has more than 400 composting plants. Around 10 percent use closed systems, and 90 percent open ones. A clear national trend has become apparent among open plants. Because the industry is closely linked to agriculture, a large proportion of these are located in the provinces of Lower Austria, Upper Austria and Styria. In Upper Austria and parts of Styria, these still maintain their original form, using small piles and turning them several times a week. Lower Austria, on the other hand, mainly uses large piles. Because only a small number of plants are located in the other states, there is no clear trend one way or the other. In 2005, Austria's agriculture ministry published a set of guidelines entitled

"The State of the Art of Composting". This provides details of recommended minimum facilities and operating requirements. The certification body ÖNORM has issued standard S2205, Technical Specifications for Composting Plants, while ÖWAV, the Austrian Water and Waste

Management Association, has published a set of guidelines for operators entitled Composting Plant Management Requirements. In 2015, as part of the European debate on the best available technology for composting separately collected waste with a capacity of more than 75 tonnes a day, the Austrian department of the environment published a study of best practice examples in large open and closed composting

facilities in the country. It incorporated these findings into Austria's contribution to the debate on best available technology. There is a clear European trend towards the enclosure of plants processing

separately collected biowaste. Green waste is open-composted more often than in other countries, though this is mainly done using static heaps.

To be fair, it is important to compare apples with apples. Enclosing a plant is not the only solution of reducing odours. The Austrian open-pile composting system follows the guidelines listed above by using a multi-barrier concept, similar to a multi-stage safety plan:

Barrier 1 If you don't put it in the compost in the first place, it won't smell

Odour potential can be significantly reduced simply by limiting the input materials, though this does not mean processing only green waste. The rule in Austria is that only waste group 92XX code numbers, suitable for biological waste treatment, may be used. There are also other restrictions. For example, food and slaughter waste and similar materials may not be composted in open facilities. Unfortunately, there is no standard European framework for the allocation of codes to different waste types. The Austrian codes for biogenic wastes in the relevant categories are not always synonymous with the definitions used in other European countries. One example of the first barrier is: compost bin from household-like facilities YES, pure food waste (as restaurant waste) NO.

Barrier 2 Distance from nearest neighbours

Austria has an undoubted advantage in this respect because of its low population density. The Composting State of the Art guidelines specify a minimum distance of 300 metres from the nearest homes. Depending on the size of the plant and the input material, this minimum distance can be increased by providing evidence of emissions and immissions monitoring, but

it can also be reduced towards a minimum distance again.

Barrier 3 Plant operating procedures

This is undoubtedly the most important form of leverage, because the operator has the ability to minimise odour emissions. The guidelines mentioned above describe plant operations in terms of minimum possible setup time (slightly putrescible materials max. 24 hours until treatment), water content, and carbon to nitrogen ratio in the initial mix. In terms of aerobic piles, they note that during the first phase of the main maturation the O₂ value should normally be between 7 and 12 percent (v/v), while the CO₂ content should be under 12 percent (v/v) and the methane content less than 1% (v/v). Of course, not every plant has a compost pile gas meter. These devices are useful in monitoring the progress of composting, but they are mainly confined to larger plants and occasionally government bodies.

The Austrian Composting and Biogas Association (KBVÖ) has a very useful table, developed as a result of its work on quality control, showing minimum turning intervals depending on pile size and minimum maturation time. The Environment Agency has also incorporated this table into a position statement on the best available technology.



Open-pile composting:

Source seperated kitchen waste + bulking material, *without* active aeration

Pile height when turned	Pile cross section	Max. width of heaps	Minimum turning frequency/week	Composting time
up to 1.5 m	3 m³/rm	3 m	Several times 1*	Seven weeks Eight weeks
1.5-1.8 m	3-4 m³/rm	3.5 m	Several times 1*	Eight weeks Ten weeks
1.8-2.2 m	4-6 m³/rm	4.5 m	Several times 1*	Nine weeks Aeration requirement
2.2-2.5 m	6-7.5 m³/rm	5 m	Several times 1*	Ten weeks Aeration requirement

Source seperated kitchen waste + bulking material, *with* active aeration

Pile height when turned	Pile cross section	Max. width of heaps	Minimum turning frequency/week	Composting time
up to 1.5 m	3 m³/rm	3 m	1*	7 weeks
1.5-1.8 m	3-4 m³/rm	3.5 m	1*	7 weeks
1.8-2.2 m	4-6 m³/rm	4.5 m	1*	8 weeks
2.2-2.5 m	6-7.5 m³/rm	5 m	1*	8 weeks

1*) *Single turn

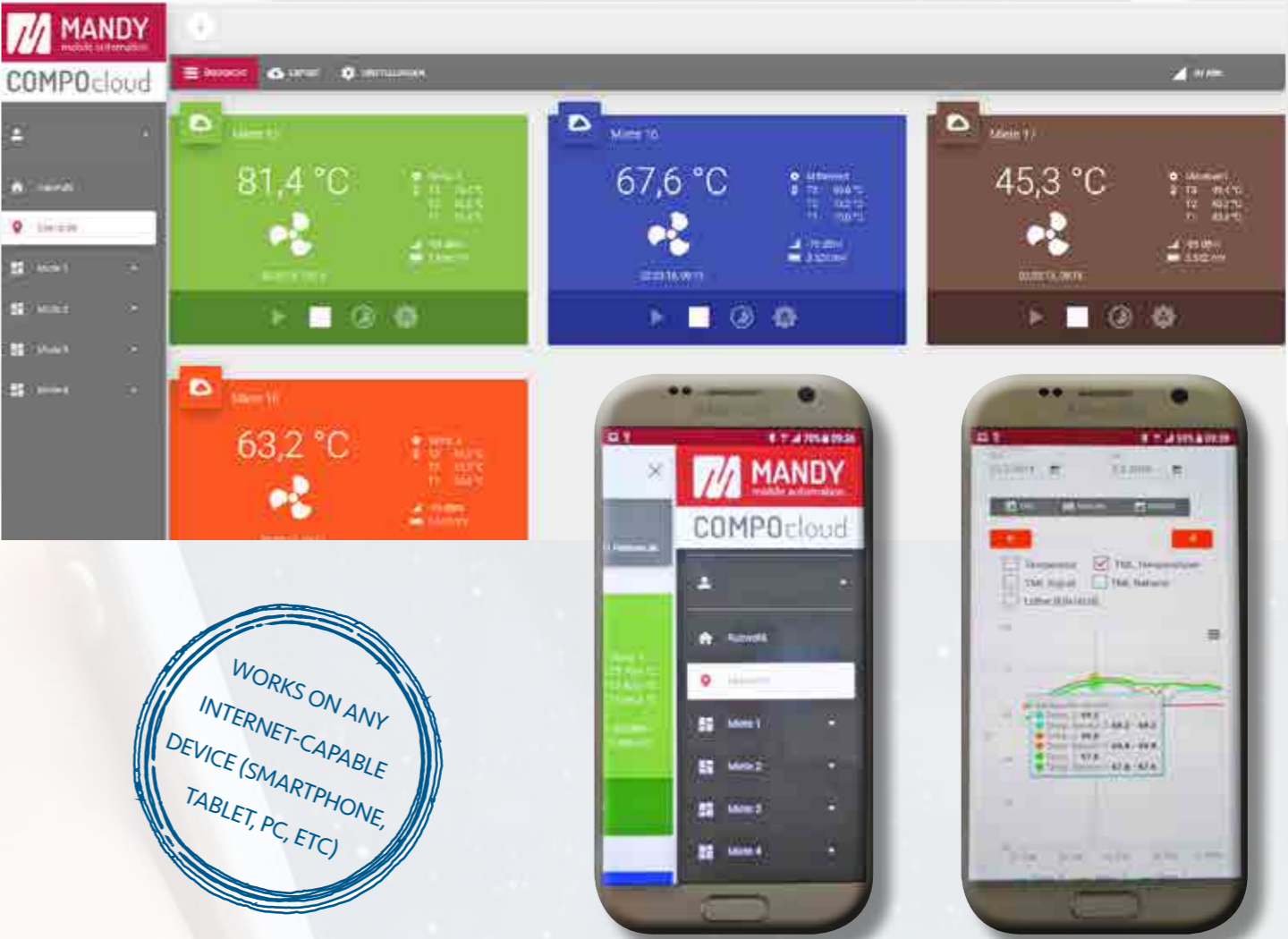
The main purpose of this procedure is to ensure aerobic conditions throughout the pile, which is the only way of minimising high odour emissions. This can be achieved by regular turning or an aeration system, yet turning is essential. Composting is a homogenising process, which is necessary even if an aeration system is used to provide microorganisms with water and nutrients .

The table clearly shows that the minimum maturation time without an aeration system is directly dependent on the pile size and turning interval. This disproves the old wives’ tale: doubling the size of

the pile does not automatically result in a significant increase in plant capacity. Increasing the minimum production time by about 30 percent increases capacity only slightly. Also, assuming the pile size, area and turning frequency remain the same, the use of an aeration system increases plant capacity by around 20 percent. Aeration means that the only purpose of turning is to mix the compost. The aeration creates continuous aerobic conditions, so the turning frequency can be reduced to once a week. As a result, peak odour emissions occur only weekly.

Compared to other European countries, Austria is going its own way in terms of composting. This small nation has found its own extremely successful strategy. The country has a good, positive attitude towards waste separation, and high-quality compost is easy to sell. Other European nations acknowledge that Austria has chosen the right path. We plan to continue producing high-quality open-pile compost in the future, following the above guidelines – and without any help from Asterix and Obelix.

MANDY - Mobile compost-pile automation



MANDY is a play on words, made up of **M**obile, **A**utomation, and **H**andy, the German word for mobile phone. It's hard to imagine life without a smart-phone today. But as well as providing a camera and letting you access email and WhatsApp, you can use it to manage a composting plant.

The idea behind Mandy is very simple. The control unit that serves as the plant's nerve centre is housed on a virtual online server rather than as a local PLC. The huge

advantage of this is that you don't lose data if you forget to do a backup, and costs are much lower because multiple plants can share the management and development costs.

Small and very small plants (CSC containers), usually with very limited budgets, can now manage their aeration and monitor temperatures using affordable technology. And if the plant needs to be expanded, the modular hardware makes this easy. It can be controlled from

any internet-capable device, such as a smartphone, tablet, or PC. Different users can have different access rights, from administrator to operator to guest. The data can easily be processed in other apps using any internet device and a CSV file. For example, these files are a standard import to Excel. The automatic use of the browser or smartphone system language minimises conversion errors. And if anything goes wrong with the plant, the app sounds the alarm by sending texts or emails to different groups of people.

Waste disposal is complicated! Or is it not?

People often ask us about the relative merits of different forms of domestic waste recycling. So here's a practical look at the various alternatives. Of course, we can't recommend one particular solution above all others. That depends on the overall local situation, the legal position, the resources available, and decision makers' commitment to recycling.

The fact is, whatever you decide, doing nothing is the most expensive option. As we know, decision makers are elected at local level, so they have a relatively limited shelf life. It takes much longer than a single politician's term of office to develop a waste management system. Politicians are good at ramping up expectations, but there's not much they can achieve during their four or five years in the corridors of power. So society must enact laws requiring the movers and shakers to take action. Eighty percent of people in this world still have to make the decision, whatever it may be. Landfills are the biggest manmade source of methane emissions. The biggest emitters of all are cows, which are obviously not manmade, but have provided us with milk and meat since long before the industrial age. So tackling methane emissions has become a key issue on the agenda, and the CO₂ equivalent of a country may be out by over 5 percent.

Let's start with the easiest, but most expensive, method of waste disposal. **Incineration** is a simple way of turning waste into energy and inert residues. *Or is it not?* When you realise that in some countries waste contains up to 60 percent water, along with non-combustible products, electricity generation is more of a figleaf. The fact is that from a purely financial viewpoint, incineration is

worthwhile only if the waste is relatively dry, and can be converted into heat and electricity close to city centres to minimise sorting and transport costs. It's also a fact that the current generation of incineration plants are not particularly cheap. When you factor in construction costs, they cost at least €80 per tonne. Another important factor is that these plants have a payback period of 40 years or more. That's how long it takes for the bank to recover its investment, so the money is tied up for 40 years, and there is no way of adapting to changes in the recycling market during this time!

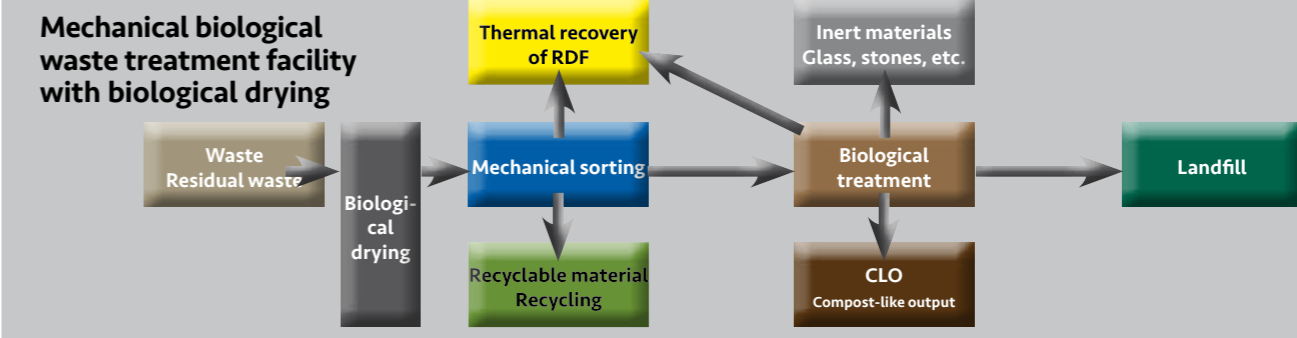
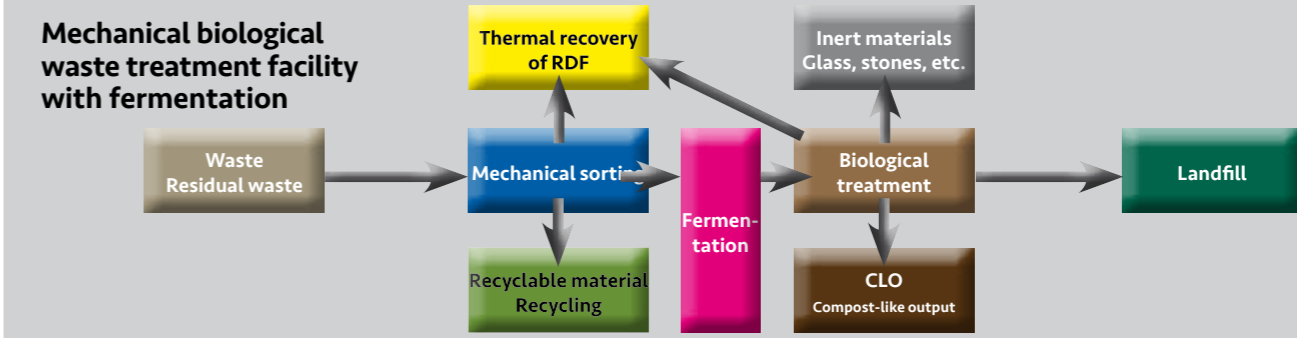
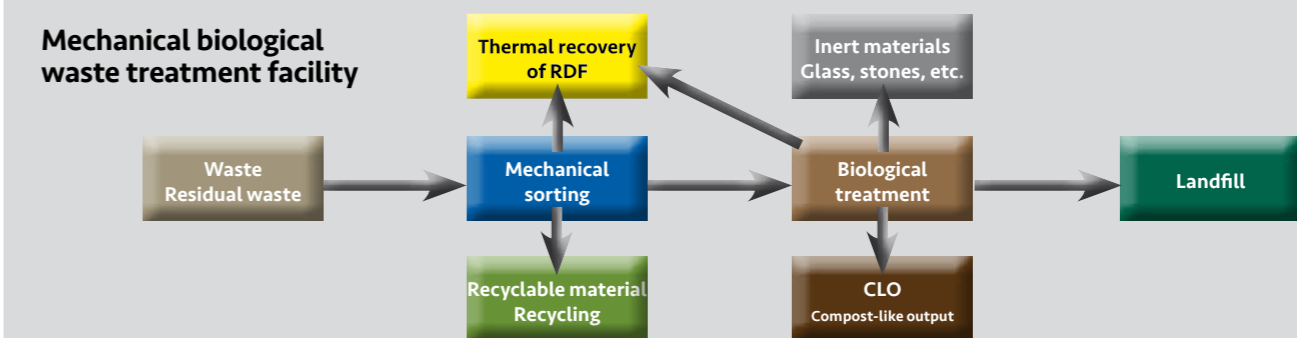
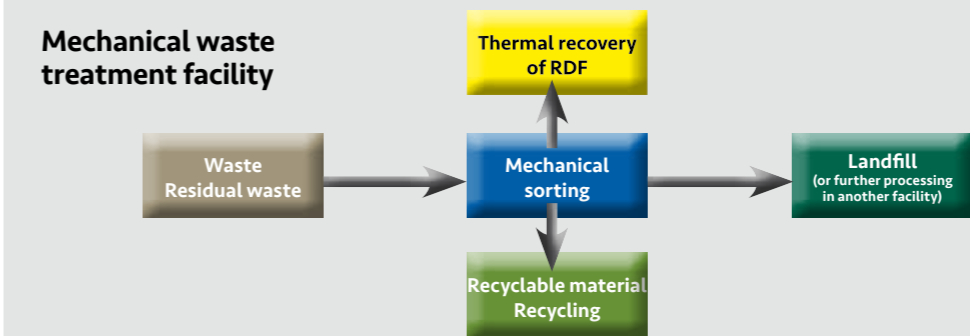
There are two forms of **landfill**: managed and unmanaged. Here, we'll just talk about the managed version. Once waste is dumped, it becomes active: like a fermentation plant, it begins to emit gases including methane, CH₄. Ideally, a landfill should be covered so that all the emissions can be collected after a few months, but in most cases 50 percent of it has already escaped. In number terms, this still gives 0.5 to 0.85 tonnes CO₂ equivalent, a significant burden with a 1.8-billion-tonne mountain of residual waste worldwide. Also, landfills tend to leach, and may still be incurring cleanup costs 100 years after they were created.

Mechanical waste treatment (MT) is slightly more expensive. It begins by taking out materials that can be recycled or converted into heat, but if the organic materials, representing 50 to 60 percent of the total volume, end up in landfill, its environmental benefits are limited. So mechanical waste treatment is viable only if the biodegradable waste is processed and not taken to landfill.

As a more rounded solution, both environmentally and financially, is **mechanical and biological waste treatment**. Here, the waste is not only physically sorted, but also rendered inert using a biological treatment. Next, the organic part is extracted to leave a compost-like output (CLO).

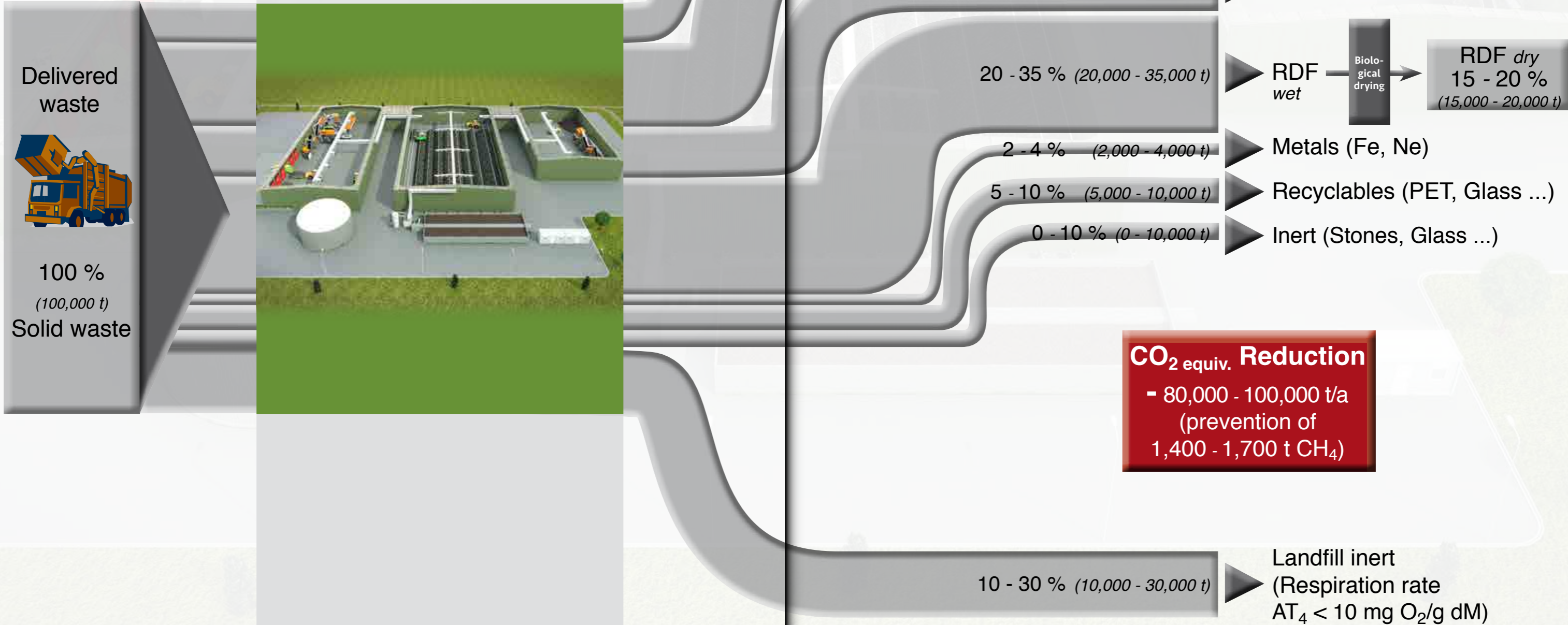
Mechanical and biological treatment can also be combined with fermentation technology to generate energy from the organic component of the waste. This works well, but it's also important to monitor the flows of materials. If you extract too much energy from them, there is not enough left to dry the material. It's out of the question to tax water where landfill taxes apply, as they do in Europe. But even in countries where the only cost is that of the landfill, this is an unpleasant task, because of the high cost of cleaning up the effluent.

One particular form of mechanical and biological waste treatment is **biological drying**. Here, all of the waste is biologically dried, and then separated as part of a mechanical treatment process. One advantage of this technology is that more paper and cardboard can be used to make refuse-derived fuel, though this usually has a lower energy content than traditional mechanical and biological treatment. Also, treating dry waste creates a lot of dust, which can lead to other problems. It is not generally possible to assess the feasibility of this form of mechanical and biological processing. This cannot be done objectively without first carrying out a detailed analysis of the site situation, including refuse-derived fuel prices and other cost factors.



Typical mass balance of a MBT plant

Compost Systems MBT-Technology



Field Report – Composting in Colombia

Cimmaron
Started operation: 2017
Input: 6,000 t/year residual waste from the palm oil industry
Technical equipment: six pressure-aerated windrows
Turner: Wheel loader
Scope of delivery: engineering, aeration technology, EL&C, irrigation



Transport and construction in Cimmaron



Compost Systems can proudly claim to already have many years of experience with composting in South America, specifically Colombia. Our turners have been used there for over ten years and five years ago, near Bogota, the flower industry's first composting facility was equipped with aeration technology. Three facilities for composting remains from the palm oil industry were constructed in the lowlands around Villavicencio (in the Llanos) since 2014. So far – so "simple". We knew in advance that the infrastructure is not comparable with a European standard. Power supplied by own generators that usually aren't synchronous with the network, limited communication to operating staff, only temporarily available Internet communication for remote maintenance... but we managed to adapt our system well to the local conditions and the customers are satisfied with the performance of the facilities.

This is why the operator of the Cusiana Guanares facility also decided to rely on our system again after doubling the processing capacity of his oil mill and to construct another composting vessel next to his composting system built in 2015. The unique geographic location posed a new challenge for the most recently constructed facility in Cimmaron. Located in the north of Colombia at the Venezuelan border near the Orinoco, vehicle access is only reliably assured for 6 months per year; the rest of the time it is impossible to reach by road and can only be accessed by small plane. Coordinating the delivery of construction materials and technology became a Herculean logistical task, but the facility was able to start up right on schedule. In the fall of 2017, the first windrows were set up to produce compost for their plantations. Just as with the other composting facilities

in the palm oil industry, the fibres and empty fruit bunch are saturated with POME (palm oil milled effluent – a production residue of water with remnants of palm oil) in a delivery box and then placed on the aerated composting platform in windrows. The decomposition process lasts about 8 weeks. The activation by the aeration system makes it possible to vaporize an additional 3 tons of POME per ton of applied solid material within 8 weeks. This resolves one of the main problems of the oil mills, so that the entire POME generated during the oil production (one liter of palm oil leaves about three liters of water - POME!) is composted and can then be used lawfully. The now possible recirculation of the compost in the palm oil plantations additionally results in a closure of the nutrient cycle.



Transport and construction in Cimmaron



Facility in operation



Expansion of the Cusiana Guanares facility



Epirus

The facility is located in Epirus region in northwestern Greece and specifically in the municipality of Dodoni which was the oldest Hellenic oracle, possibly dating back to the second millennium B.C. according to Herodotus.

Greece has been so far landfilling most of its Municipal Solid Waste. The last years serious efforts are taking place in the country in governmental and municipal levels to achieve the landfill diversion and recycling goals within the European Landfill Directive and Circular Economy frameworks.

One of the first projects of this effort is the Municipal Solid Waste (MSW) Treatment Facility in the Region of Epirus, in North Western Greece, in the historical Municipality of Dodoni. The project is managed by the Region of Epirus, while the



Ancient theatre of Dodoni which was one of the biggest ancient Greek theatres, very well preserved and very close to our site.

Private Agency awarded the project was the Sustainable Hepirus SA, through a procedure of Public International Competition in accordance with the provisions of Law 3389/2005 on Public-Private Partnerships, for the selection of the Private Partnership for the implementation of the work.

The project concerns the construction and operation of the Solid Waste Treatment Facility of the Epirus Region, with a capacity of 105,000 t/a of MSW, part of which (10,600 t/a) could be pre-selected organics. The facility will operate six (6) days a week



and a total of 300 days a year. The daily MBT facility capacity will be 350 t and the maximum hourly 40 t. The required staff for operation is estimated at sixty (60) people.

MSW will be mechanically treated, and then the organic fraction will be partially processed into anaerobic treatment (biogas production) and the rest in aerobic treatment (composting), while recyclable materials (paper, glass, plastics, metals) will be recovered. The outcome of the treatment will be recovered recyclables, high quality

compost for use as soil conditioner and CLO that could be used as landscaping or land restoration material. Additionally, the anaerobic digestion facility will produce biogas that will in turn be used for electrical and thermal energy production. The solid residues of the process will be led to the landfills of the Epirus Region.

Compost Systems is providing the design and technology for the Composting facility and Odour Treatment System. The main target is, to compost the digestate from the anaerobic digestion and turn it into

a valuable CLO (Compost Like Output). The technology is fully enclosed using the COMPObox technology, with a combination of a thermal drying plant. The plant will be operational by summer 2018.

MBT Facility Epirus
Client: Terna Energy
Capacity 105.000 t/a
Technology: MBT with AD
Fully enclosed
Start of operation: Summer 2018



AWR – waste management in Rendsburg-Eckernförde



Construction period: approx. 6 months
Started operation: 2017
Input: green waste, digestate
Technical equipment: curing with 4 positive-aerated windrows with cable-free temperature monitoring
Turner: triangular windrow turner
Scope of delivery: engineering, aeration technology, EI&C

AWR is responsible for public waste management in the Rendsburg-Eckernförde district in Germany. Some 80,000 tons of biodegradable and green waste produced in the district are used to generate biogas to supply power to 2,500 households and create compost for agriculture and landscape gardening during a two-stage process. An additional curing section was constructed alongside the existing curing hall in Spring 2017 to expand capacity in

the existing plant and enhance compost quality. The four windrows were also equipped with positive aeration to help improve quality. This ensures that the windrows up to 2.8 m high can be kept aerobic irrespective of the turning interval. The temperature of the individual windrows are monitored online to optimise aeration with the necessary aeration time automatically adjusted to windrow needs.

Grossefehn Composting Facility

MKW handles a large proportion of waste disposal in the district of Aurich in Germany at its disposal centre in Grossefehn. A new green waste compost plant was built at the Grossefehn site in Spring 2017. This plant is designed for windrows 45 m long and about 8 m wide. Two aeration

lines are always installed beneath each windrow to ensure sufficient uniform air supply. A wheel loader is used to turn and add to windrows as required. The oxygen content is also measured in the windrows in addition to their temperature.

Construction period: approx. 3 months
Started operation: 2017
Input: 6,500 tonnes/year of green waste
Technical equipment: five pressure-aerated rows with wireless temperature monitoring and O₂ monitoring
Turner: wheel loader
Scope of delivery: aeration technology, EI&C



Henčov Composting Facility

The existing Henčov composting facility in the Czech Republic was faced with a problem: as simply as possible, the existing facility for green and garden waste was going to be expanded to include a sanitization unit for biowaste in order to process locally generated materials from the separated collections from households and restaurants.

In contrast to other EU member states, the Czech legislation provides a very strict interpretation of the European Hygiene Directive (ABPR) – a temperature of 70°C must be reached in a closed room within one hour.

As usual, the budget was limited, which meant that either a small COMPObox or the use of several CSC containers were the two options. Based on the available space, the operator decided on a COMPObox that was constructed in the extension of the reception area.

The COMPObox is enclosed by a concrete wall on three sides and has a hermetically closable, hydraulic hinged flap in the front. The aeration is a pressure aeration and the exhaust air is cleaned with a semi-permeable membrane. The temperatures in the material are recorded online to demonstrate the sanitization process.

Once the sanitization is completed in the box, the material is further treated in the regular composting process of the existing composting facility.

In the future it will thus be possible to process a local material flow at the existing facility without major construction work, thanks to the simple integration of a COMPObox.

Construction period: approx. 4 months
Started operation: 2018
Input: 2,500 t/year of biowaste, 500 t/year of restaurant waste
Technical equipment: pressure-aerated sanitization box with semipermeable membrane and temperature control
Turner: triangular windrow turner
Scope of delivery: engineering, EI&C, box systems



Anzböck Composting Facility

There is a clear separation between livestock and animal free farming in today's modern agriculture. Some have "too many" nutrients while others try to compensate for the "too few" with chemical fertilizer, but this way they only exploit their own soil. The reduction of the humus reduces the soil activity and fertility; the water retention capacity is drastically lowered... The original idea of composting biogenic waste was not based on disposal but on closing the carbon cycle for agriculture with a reestablishment of humus. This was the concept underlying the collaboration of the farmer Christian Anzböck and Compost Systems almost 10 years ago. Based on his years of experience in organic agriculture, the farmer knew that applying compost is a valuable lever to maintain soil fertility in organic farming. As an experienced user of compost in organic farming, he no longer wanted to be dependent on the fluctuating availability of

compost and compost quality and take the control himself instead. This started a process that included a feasibility study, location search and project creation which culminated in the approval of a composting facility in 2016. The construction of the plant was started in the spring of 2017 and the first piles for the production of his own high-quality compost were installed after only 3.5 months.

Started operation: 2017
Input: 7,000 tonnes/year of organic waste, green waste
Technical equipment: six pressure-aerated rows with wireless temperature monitoring
Turner: TracTurn
Scope of delivery: engineering, aeration technology, El&C, TracTurn



Betonwerk Koch can also compost

Building a composting facility on the premises of a concrete plant is not exactly an everyday task...

Koch Beton GmbH is one of the largest manufacturers of concrete prefab parts in Eastern Austria. The family business does not just consider sustainability a catch phrase for a shareholders' meeting; it is actually the philosophy of the "boss". Even if the idea of building a composting facility may seem a little incongruous at first glance, it fits in well with the concept of a sustainable operation along with other projects such as a large photovoltaic system on the roof of the production halls. Of course the composting will not involve production remnants from the concrete manufacturing; instead, the plant supplements the circular economy in Mittelburgenland and the Mattersburg district. Although enough space was available, it wasn't so easy to find a suitable location

on the company premises. The composting and concrete production had to be spatially separated (for systemic reasons, compost is not very popular in concrete), it had to be at a suitable distance to the next neighborhood and it still had to be easy to access for traffic. Once the site was determined and the plant was approved, the construction proceeded at a rapid pace. With a start in the autumn of 2016, the favorable climate of the winter 2016/2017 made it possible to continue the construction without major delays. Unlike the usual open composting facilities in Austria, the attachment of the decomposition surface was finished in concrete – but there was no other alternative since, as a foreign body, asphalt could not be integrated into the "landscape" on the premises of a concrete plant.

The first windrows were already built in the spring of 2017. From the start, the operator was determined to create the highest-quality compost – the facility would only use starting materials without impurities. Organic waste bins were thus eliminated in advance; instead, the windrows are made from green/garden waste and animal dung. Since this nevertheless uses animal-derived products (dung is also an animal-derived product, according to the Animal Materials Act), online temperature measurement is used to monitor successful sanitization. After the aerated main rotting and resting phase in the post-rotting period, the compost is screened after about 10-12 weeks. Up to 2,000 tons of input materials are acquired and marketed regionally each year.



The installed aeration makes it possible to limit the turning to just once a week.



Compost turner CMC ST 300



Construction period: approx. 7 months
Started operation: 2017
Input: 2,000 tonnes/year of green waste, bulking material, dung
Technical equipment: five pressure-aerated windrows with temperature monitoring
Turner: CMC ST 300
Scope of delivery: engineering, aeration technology, El&C, CMC ST 300, screening station

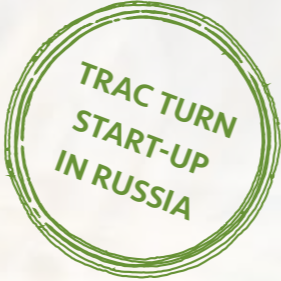
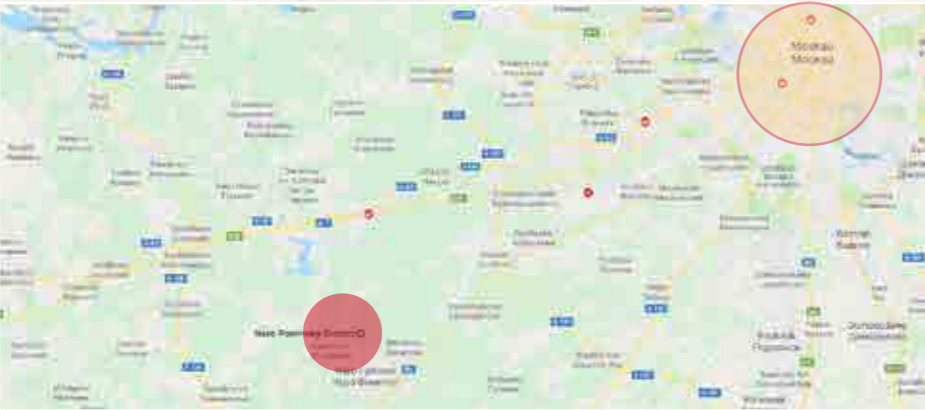


Screening station KA 4018-3.5

Recycling chicken manure in Russia

Also in Russia the environmental regulations are getting tougher, it is being since years the Russian law forbids farmers to apply raw manure on the fields or stockpile it on

the fields. However, the enforcement was quite liberal. From first of January 2018, new regulations on exhausts of ammonia, dust etc are affected.



In combination with the stricter enforcement of the law, it makes livestock companies reorganise the handling of manure. Within one year after visiting Elinar Broiler for the first time to explain the benefits of composting chicken manure instead of stockpiling, the General Manager ordered a fully equipped TracTurn 3.7. Fully equipped means with cutting chain, a cooling system and central lubrication. For him it was perfectly clear that the TracTurn, in combination with Compost Systems know-how, was the best solution for Elinars volume of manure.



TracTurn Start-up in Russia

In September 2017, the first TracTurn was delivered in Russia to work on the compost site of Elinar Broiler. Elinar is located south west of Moscow (see red marked in the map). The TracTurn will be used to compost tens of thousands tons of chicken manure per year.

Elinar is a closed system broiler, meaning it breeds its own hatchlings for their meat production. So, two types of manure are delivered at their site. One type is 80 % moist luckily the other type, the majority, is 35 % moist, combining the two types result in a compostable mix. The volume Elinar needs to process is over 100.000 m³ per year. Unfortunately, there is hardly any bulking agent, straw available, so Compost Systems is teaching them to work without it. This is saving Elinar on cost and volume. Compost Systems is guiding

them through the composting process. The employees are quick learners, as even in winter time they manage to heat up the piles and manage the process with the TracTurn. The Russian company INTERGEO (INN7715071186) is Compost Systems supporter for this very project.

Weight and Volume reduction leads to efficient transport of nutrients

The first amounts of compost are already produced and applied on their local fields in 2017. The General Manager was impressed about the speed the compost was produced as well as the looks and quality of it. The intention of the GM is to recycle the manure in such a way, so he will save on his transport and fertilizer costs. The company Elinar grows their own crops to produce chicken feed.

The transport costs drop with 50 % as composting reduces weight and volume in 6 weeks. This method of composting preserves nutrients and sanitizes the manure completely. Important for Elinar as no additives and only natural ingredients are used in their meat production process. To produce healthy meat, you need healthy crops to feed the chicken. Healthy crops require healthy organic fertilizer. Elinar is starting to close the ecologic circle.

Space saving

Elinars current site is 4 ha to process their manure, by learning to compost in a clever way using Compost Systems equipment, in the future they will only need 2 ha to process the same amount of manure into a safe fertilizer.

Sustainable horse husbandry with composting

It is well-known that nothing compares to riding a horse. And accordingly, horse husbandry is as popular as ever. Providing private care for these animals, especially in stables, means the use of a considerable amount of bedding that mostly consists of straw, which is deposited at an enormous volume in the manure storage. But it is actually easy to master this problem.

Composting horse manure provides a great benefit of reducing the volume while

the storage losses of ammonia are also significantly lower. Other positive aspects are the lower transport costs and simplified spreading due to the material's homogenization. Not least, the quality of the pasture and forage areas can be improved by spreading the finished compost.

The only important thing is to ensure adequate sanitization in the hot rotting phase by reaching the required minimum

temperatures and repeated turning, not just to reliably kill potential pathogenic agents but also seeds from weeds and neophytes. The relevant national legal conditions must be taken into account for the requirements of the composting area, in Austria including, for example, the "Nitrates Action Program" and "The State of the Art of Composting".



Composting on open topsoil – Mixing the windrow with a visible volume reduction.



Turning or loosening of the rotting material.

Have you ever moved fleece?

To prevent heavy rain from destroying the work of the last six weeks, protection of the compost pile with fleece is essential. It can certainly be considered heavy labor to manually move the green pile protection in

different weather conditions (higher weight due to moisture, snow, freezing on the pile...). To ensure that broken fingernails and damaged hands are a thing of the past,

our mechanical department has come up with a few ideas: a one- or two-sided fleece roller for front or wheel loaders – with the following advantages:

- Protection against rain or snow and drying out
- Space-saving storage of the fleece
- Longer lifespan of the fleece due to dry storage protected against mice, for example on the exterior wall of a barn or hall



VIDEO



You can find more information on our website at www.compost-systems.com

Stationary screening system KA 4018-3.5

powerful – space-saving - affordable

The KA 4018-3.5, the little sister of the KA 4018, is attached on flexible foundation elements so that it can be assembled to the customer's preferred height! The drum is driven electrically with

variable speed control. To load the sieve drum, a stationary hopper is used with a feed volume of 3.5 m³ and a speed-controlled feed conveyor. The optional discharge conveyor can be

expanded with an air separator, which separates the light plastic fraction and conducts it into a special container before the screen overflow returns to the rotting process.

VIDEO



NEW!

TracTurn – the flagship of tractor-driven compost turning

After almost a decade of experience, numerous TracTurn units are already successfully operating across the globe. Important values based on experience made it possible to perform continuous improvements.

2 Questions, 2 answers:

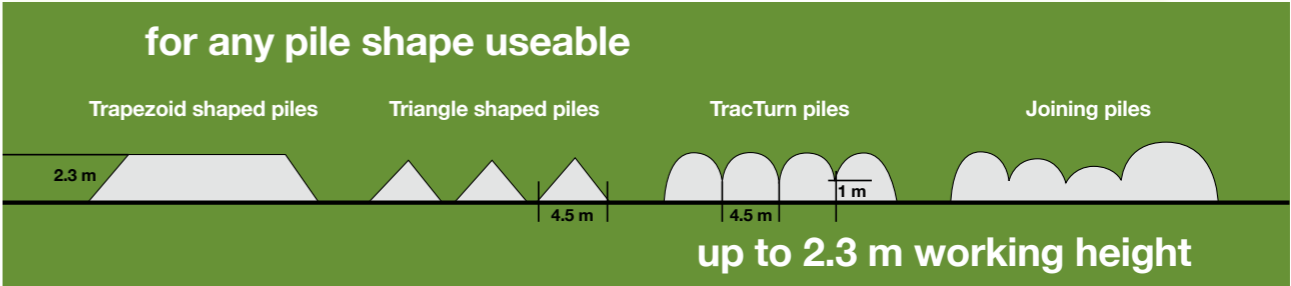
1. Is a cutting chain absolutely necessary?

No! For triangular windrows and overlapping rows, a less expensive version without a cutting chain is enough. This customer-oriented improvement has allowed us to take an additional step towards optimizing the acquisition and operating costs. The windrows only have to be "cut" in case of trapezoidal windrows.

2. Material discharge left/right?

The TracTurn's basic equipment includes material ejection to the right. But in the course of equipping existing facilities, a material ejection towards the left can now also be arranged for optimal site logistics.

VIDEOS



Without milling chain, discharge to the right



With milling chain, discharge to the right



Without milling chain, discharge to the right in action



With milling chain, discharge to the left in action

Find the right option for every need!

There is good reason to call our tractor-pulled compost turners CMC ST 230, 300 and 350 the market leaders. The successful models are manufactured in Austria and available with the following equipment options:

Hydraulic front shovels

With hydraulically operated guide vanes, it is easy to route material outside the turner's working width towards the inside, which reduces drag and significantly improves efficiency.

1,000 l irrigation and inoculation combo

To ensure the ideal moisture content throughout the entire composting process, our pulled turners can be equipped with an irrigation and inoculation combination if desired. This makes it possible to increase the row's moisture content if needed. The windrow can also be inoculated with the bacterial strains recommended as part of the CMC method (Controlled Microbial Composting).

Fleece roller

In addition to our fleece roller for operations with wheel or front loaders, the winding unit can also be mounted on a turner. This involves hydraulically or manually swinging the winding boom and hydraulically winding the protective compost fleece off or on. The speed of winding up the 6-meter wide fleece is variable from 0–10 km/h.

Electrohydraulic control

The various hydraulic consumers are easily and conveniently centrally operated with electrical control. The control unit can be positioned in the tractor cab in a user-friendly way. The important advantage is the fact that one two way hydraulic oil supply from the tractor is sufficient to supply an unlimited number of hydraulic consumers on the machine.



Hydraulic articulated hitch

The hydraulic articulated drawbar ensures adaptability to various heights of the tow bar on different tractor models. This option offers further advantages in that it is always possible to adjust the rotor to the optimal working height, even on unpaved surfaces – which may be important for activities such as roadside composting.

Hydraulic side displacement

This makes it possible to change the angle of the rotor tunnel to the longitudinal axis of the turner (which is usually 90 °). Particularly in cases of roadside composting with uneven terrain, this can prevent the windrow from "wandering off" to the side. On even surfaces as well, a lateral offset of the windrow by about 30 cm per turning process offers the advantage that the row can be offset by one windrow width after ten to twelve turning processes.

Road homologation

Due to their dimensions, the CMC ST 230 from the small and CMC ST 300 from the medium segment are ideal for transport on public roads in transport position. We can optionally equip the machines with a road permit according to the Austrian TÜV (Association for Technical Inspection), which includes a compressed air brake system, lighting according to the Highway Code and fenders. This means that nothing stands in the way for its multi-site use.

Push axle

As long as the tractor does not have a super creep speed or vario transmission, the installation of a push axle is an economical alternative. This allows the speed to be controlled hydraulically from the tractor at variable speed.

Stainless steel tunnel lining

The interior lining of the rotor tunnel can be furnished in stainless steel upon request, which can significantly extend the lifetime.



Compost testing technology

Testing is knowing! Without the continuous monitoring of a composting process, the operator is moving in a blind flight. Even or especially the most experienced operators of composting facilities control their rotting process. Here it is IMPORTANT that the devices will easily and quickly lead to reliable results.

Our measuring program has been successful for many years. The devices can be operated easily and in a practice-oriented way. The range of our measuring equipment focuses on fast measuring technology for on-site analysis at the composting facility to quickly and accurately make the necessary decisions for the operation.

Temperature

Digital thermometer

With our digital thermometer you quickly receive the temperature profile in your compost.

Compost analysis

CMC soil and compost laboratory

The CMC testkit stands out on account of its ease of sample preparation, simple test methods and fast, meaningful results for nitrogen, pH and sulphide.

Windrow gases

Carbon dioxide measuring device

The analogue carbon dioxide measuring device is widely used in practice on account of its ease of use. Pump, shake – and read off the gas content straight away.

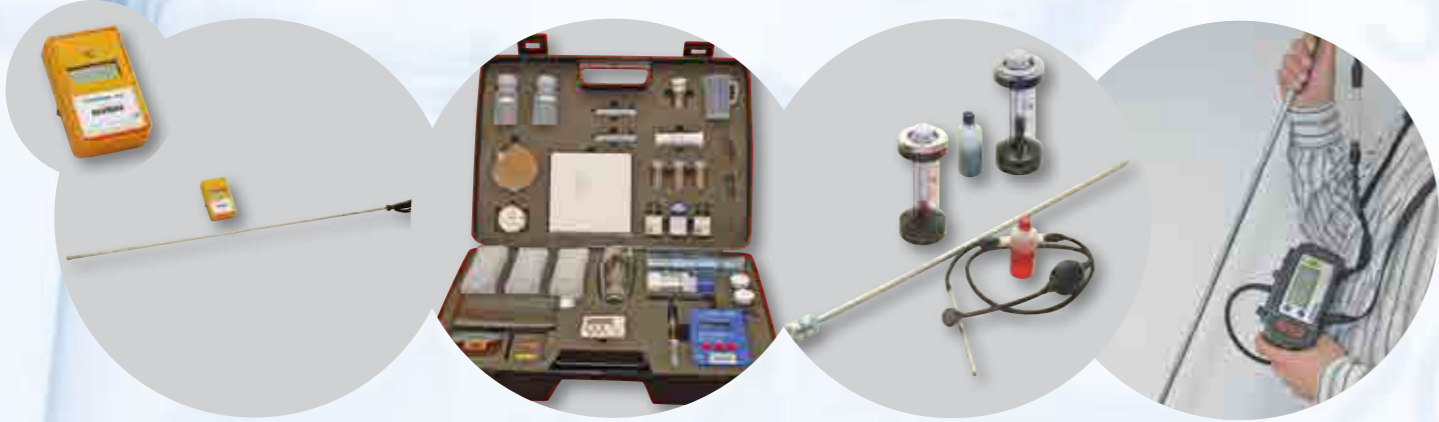
Oxygen measuring device

The analogue oxygen measuring device, like the carbon dioxide measuring device, is low-maintenance and simple to use.

Windrow gas measuring device

The digital measuring device simultaneously measures the three most important windrow gases (methane CH₄, carbon dioxide CO₂ and oxygen O₂), which are used to describe the process conditions.

Find more information on our measuring technology here:



CMC compost seminar

... Shared knowledge about compost and organic waste treatment.



Our experienced trainers share knowledge about compost, soil, plants and the environment, natural laws and their correlations from their own experience and daily application.

The training program also covers important topics such as material flow management, quality assurance, system design, water, mass and air balances or the application of compost, soil substrates or compost tea.

For us, it is important to demonstrate the link between theory and practice. Accordingly, hands-on work takes place directly on-site, where participants can learn about process

control, turning interval, water balance and measuring equipment.

The training course is targeted at plant operators as well as consultants, plant designers, compost users, lab assistants and anyone interested in compost and its effect.

You will find more information on the course programme as well as registration for the next CMC intensive course here:



We look forward to welcoming you on one of our courses. Please register early as places are limited.



CMC ST 230



CMC ST 300



CMC ST 350



CMC SF 200



CMC SF 300



Please refer to our homepage for further details:



TracTurn 3.7



Hopper/Mixer



Screening station



Fleece/
Membrane Roller



CSC-Container



Fleece/
Membrane Covers



CMC Testkit



Digital
Thermometer



Gas
Measurement



**We are happy to show you one of
over 90 working plants!**

Zawiszow, PL



Blaise Farm, GBR



Bihor, RO



Brixen, ITA



Hrastnik CEROZ, SLO



DAKA, AUT



Mumbai, IND



Cusiana Guanares-
Rodrigo, COL



We are happy to take care of your concerns:



*You can find our
whole team here:*



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