COMPOnews

INTERNATIONAL

IFAT 2016 edition

Palm oil and the fight for sustainability

CARBON FARMING

< 2 °C NOT ACHIEVABLE WITHOUT AGRICULTURE

FINAL SPURT: PRE-COMMISSIONING OF LARGEST MBT PLANT IN ASIA IN MUMBAI

SEWAGE SLUDGE COMPOSTING IN AUSTRIA – 25 YEARS OF EXPERIENCE

Reduce your Carbon Footprint!

Aurel Lübke
Managing Director
Compost Systems GmbH

Editorial

Dear readers,
Carbon recycling is one of our greatest challenges for the next few decades. Climate change is the magic word and this means the irresponsible use of the valuable resource of carbon. We took a closer look at the ways in which agriculture and waste management can make a considerable contribution to the reduction of climate-damaging gases. In doing this, we have come to the conclusion that sustainable containment of global warming will not be possible without integration of the soil.

In 1997 the world community signed the Kyoto protocol to reduce the emissions of greenhouse gases (GHG) to atmosphere with obligatory targets. Since then, little has happened. The emissions trading system collapsed and the effects of climate change are becoming more and more visible through new temperature records every month. Instead of results, those responsible have delivered excuses as to why the targets have not been reached. In the frame of COP 21 in Paris 2015 new and "obligatory" targets have been agreed to limit global warming below 1.5 °C.
The fact is that agriculture and "carbon farming" are playing a minor role in the current scheme of carbon reduction. However, without agriculture it will not be possible to counteract the large amounts of surplus CO_2 in our atmosphere.

(Continued on page 4)

CONTENTS

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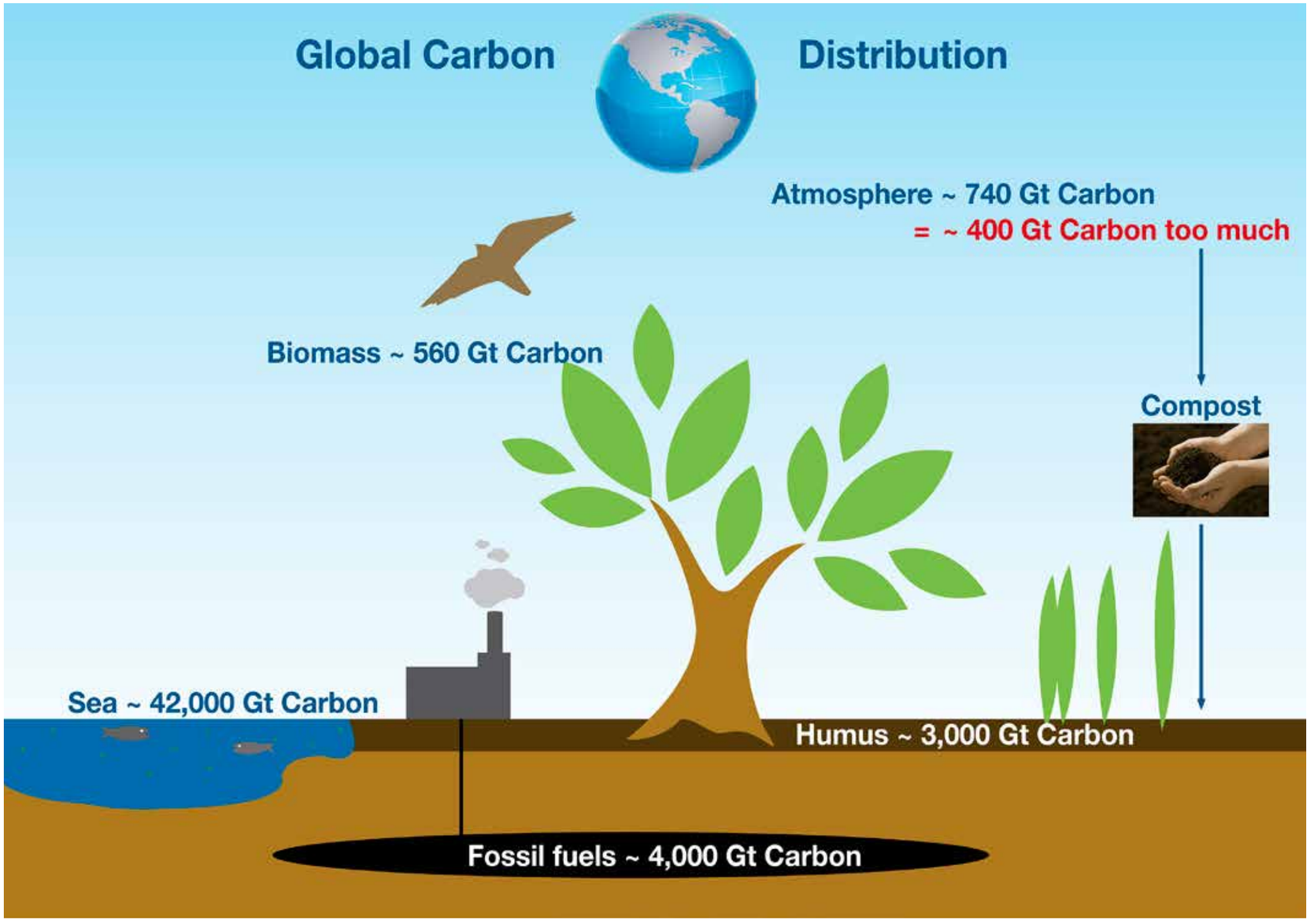


Carbon farming

CARBON RECYCLING IS ONE OF OUR GREATEST CHALLENGES FOR THE NEXT FEW DECADES

Different than with water and air

Back in the 1970's, when our rivers and lakes were getting poisoned, governments (even without the EU) were quick to pass laws to protect our water resources of lakes and rivers. It was logical to stop the direct disposal of pollutants into our waters by installing wastewater treatment plants to restore the water quality of our rivers. In the same way, at the beginning of the 1980's it was discovered that air pollution affects US ALL. So our industry and traffic were forced to minimize the emission of air pollutants. The sky turned blue again. With even the recognition that water and air are common property, the responsibility became clear and stakeholders acted accordingly. However, we perceive soil to be the personal property of humans and this attitude does not make the solution very easy. Extremely low prices for agricultural products do not boost the willingness of agriculture to go for sustainable soil management. The fight for economical survival kills any soil sustainability initiative. No other global industry currently creates less profit per dollar of investment than agriculture.

The global carbon balance

A pragmatic view of the numbers already gives a clear perspective of the facts. The magic word is humus: The carbon that forms the top layer of this planet, along with other mineral components, trace elements and nitrogen, which we also call fertile land or soil. Specifically, the amount of carbon bound in soil is 3,000 Gigatons. To help you be better able to envisage this: The top soil contains five times more carbon than all plants and living organisms put together. Also all trees on this planet only store 10 % of the carbon in our top soil layer!

Status and trend of our soils

Worldwide we are losing about 3,000 m² of fertile land every second through building, erosion, desertification and other means. This is a tendency that receives a rapid boost from today's practice of agriculture. The dramatic loss of organic matter in our soils is demonstrated in a recent study published in 2015. The chart "Carbon loss" on page 6 shows the carbon loss affected by today's methods of agriculture and soil management. So instead of fighting climate change, additional CO_2 from our soils is emitted into the atmosphere – not the right tendency in view of a potential climate change threat of up to 6 °C.

No better place

In contrast to the carbon in our atmosphere (in the form of CO_2), carbon sequestration in soil as humus only brings advantages. Carbon can store up to 8 times its own weight in water. In combination with the colloid structure in the soil, it can even store more water. But not only water is being stored, nutrients are, too. Carbon in the form of humus is therefore responsible for protecting our ground water. As the glue of our soil, humus also provides protection against erosion.

Urgently required

Soil scientists are rating soil with a carbon content of less than 2 % of organic matter as "IN DANGER". In danger of losing its capability to remain its ecosystem; in danger of becoming a desert. The loss of organic matter has dramatically been driven by the use of chemical fertilizer and chemistry. In the past centuries of agricultural industrialization, the protection of soil has been of low interest and the eco balance of our soils a matter of ignorance.

8 kg per square meter

To absorb the complete amount of surplus carbon in our atmosphere, the agriculturally used soils around the world would need to absorb 8 kg of carbon per square meter. At first glance, this is just a number. But if this number is taken into proportion by calling it a 20-year project, the required amount of carbon to sequestrate in our soil would only be 400 g/m²/year. Suddenly a number that seems feasible!

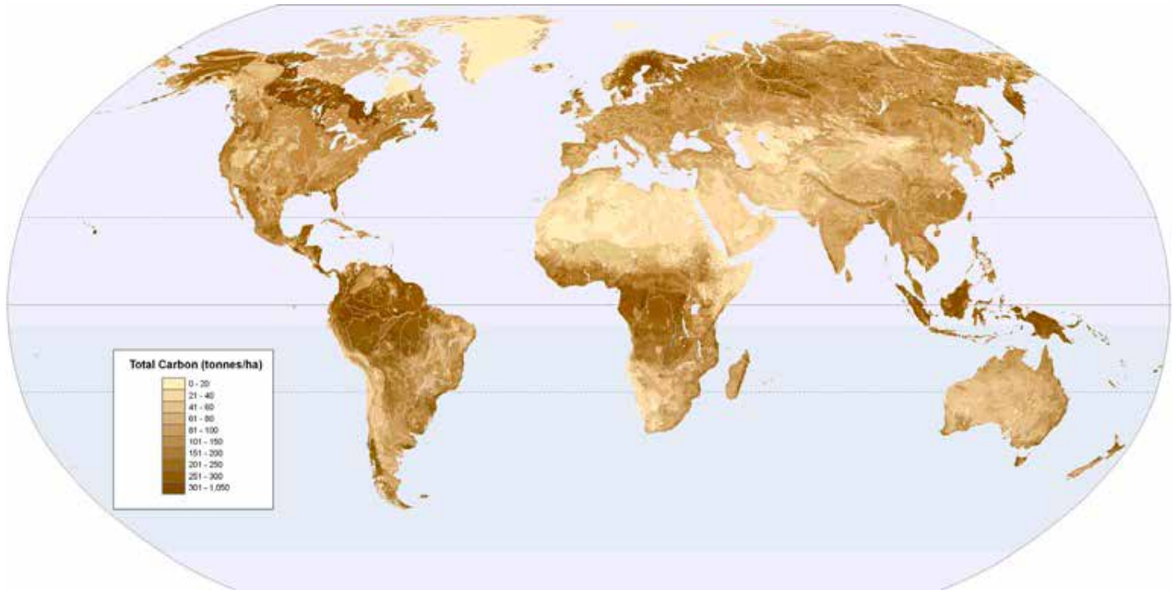
How do we do it?

In contrast to wood or straw, the sequestration of carbon in soil is in the form of digested and stabilized carbon. In this process, the work is done by microorganisms. Carbon in combination with nitrogen

is digested by microorganisms to produce humus. Unfortunately, our soils do not have the variety of microbial life that they once had. Because of this, the organic raw material going into our soils becomes spoiled, putrefies and causes problems. So it is our job to fix the digestion system of our soils. Recent studies in the field of soil science have become important, as they show that the combination of compost with sustainable soil management creates the best and most sustainable results. Only if the soil can recover its natural digestion system can sustainable farming with humus or CARBON farming become possible.

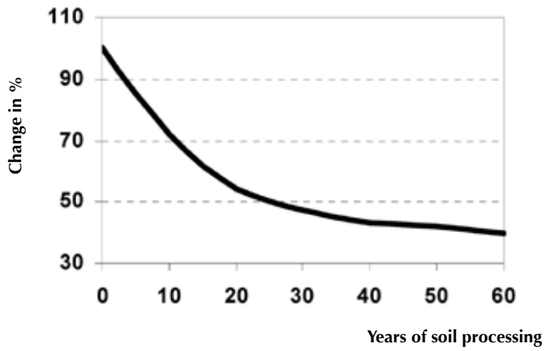
Why chemical fertilizer cannot be the alternative?

Without doubt, agriculture can be successful even without soil. The shelves in supermarkets are full of products that have been grown on glass or rock wool. The majority of our food however still originates from traditional agricultural production. There, with the targeted use of N/P/K fertilisers the yield is yet kept high. However, nitrogen is gained from air with a high use of energy resp. oil. Phosphorus and potassium are taken from mines. If these nutrients were not washed out of our soils every year, all agricultural land would be terribly overfertilized. But instead of keeping nutrients in our life cycle, we secure them from mines. It is the same industry claiming that feeding the world population will not be possible without chemistry, whilst at the same time relying on a finite source.



Carbon content of the soil worldwide in t/ha

Carbon loss through “modern” agriculture in agricultural soil



(Source: http://www.mdpi.com/2071-1050/7/2/2161/htm)

Due to monocultures of soybeans and corn the soils are partially in such bad condition that the ability of microorganisms to clean the soil is hardly present, so chemicals accumulate in the soil. Later they are washed out with the next rainfall and finally they end up in our ground water and are consumed by humans and animals! Recently NGO’s have drawn attention on glyphosate being found in the precious amber nectar “beer”.

Wrong turn

Therefore it is hard to understand why agriculture is still receiving support for emitting carbon to the atmosphere. Instead of encouraging agriculture to sequestrate carbon to soil, subsidies are based on the replacement of wood instead of oil. Agricultural support is still based on production volume and monoculture. It does not support the things that store CO_2, but those that replace carbon from oil. It would be important to reduce the carbon emissions, but not to replace those from oil by those from soil. Based on calculations and facts it will not be possible to limit the global warming to < 2 °C if agriculture is not considered in the grand scheme of things, along with all its consequences.

Which things does compost improve?

Right from the beginning it must be said that not all compost is the same. Due to a lack of quality criteria, which sometimes only consider heavy metal contents or foreign particles or colour, the microbial quality of the product is given little or no attention in order to make it of a high quality as standard. But this is exactly the criterion that is required for evaluating the quality of soil’s digestion process. The organic raw materials must be broken down to then be stabilized into a new matrix, our humus. In the digestion process of composting, raw materials are combined in the ideal proportion, moisture and oxygen are secured and optimal conditions are kept, in order to prevent any losses. In its highly concentrated form, this soil improver is used to enrich our soils with carbon. Several billions of microorganisms can be found in one hand full of compost, which then create a sustainable life in the soil. In combination with green manure or harvest residues, the digestion capability of the soil is further improved by compost to enrich soil with even more carbon.

What else does compost do for our soils?

Microbiology in soil is playing a big role in fighting diseases. In particular, the application of compost in soil can prevent the spreading of pathogens. For example, consider the recent discussion about pathogens being resistant to antibiotics. When breeding animals, antibiotics are used as feed, not as medicine for infected animals. This causes a strategic breeding of pathogens that are resistant to antibiotics. By spreading manure to agricultural lands without any treatment, these pathogens are transported to fields and consequently back to our food.
With a proper composting process, the infection cycle is broken and pathogens are destroyed. Uncountable numbers of microorganisms living inside of compost also form positive substances to support the health and natural growth of plants. These effects are used in agriculture, for example through the use of compost-tea.

What is it that counts?

It is a fact that the European Union only farms a minor part of this world’s agricultural land. Thus the change of European agriculture to sustainable methods of farming can only be seen as a demonstration model for global agriculture. In the same model as in industrial production and mobility, it will be China and India deciding whether the target of limiting global warming to < 1.5 °C is achievable or not. The change of agricultural production also means a drastic change for wealth development and therefore evokes a very high level of interest beyond climate change. Droughts drive farmers into the cities. The climate goes crazy and destroys the crops. However the aim is not just to stop the exploitation of modern Western agriculture, but also to find social solutions for millions of small farmers, who are at risk in your existence.

Conclusion

Agriculture will face a dramatic change in the coming years. It will be necessary for agriculture to be integrated in the scheme and structure of GHG emission reduction. No other business or industry (besides the oil and coal industry) has more potential for influence on our climate. Agricultural support funds – but also climate protection schemes – have to be evaluated and newly adapted to agriculture. Programs of sustainability, not the blind production of crops, need to be supported.
The sustainable farming of our soils will be one of the final decision makers as to whether we can limit the global warming to < 1.5 °C. Without massive actions of the agricultural industry and the support of the whole society, it will not be possible to reach the climate targets. Additionally there is the fact that the dependence on a massive fertilizer industry that can only supply more chemical fertilizers in bags for a limited period of time. The protection of groundwater and drinking water, erosion and desertification together with eco-social aspects of developing countries are additional aspects we should consider in the eco-balance. These will all form part of the final question mark as to whether the 9.6 billion people that there will be by 2050 will perceive this planet as worth living on.

For further information, please visit our website:

CSC container: First users report on their experiences

Two years ago, for the first time, the CSC container (Collection – Sanitisation – Composting) was presented for the use in decentralised collection and treatment of biological waste. Since then, it has been used in the treatment of various types of waste.

Especially in areas and countries in which the logistics for separate waste collection is not yet present or is now being constructed, the CSC container is widely used.
Also for special uses, such as for example, in slaughterhouses and chicken farms, the CSC container is used to complete the collection of slaughterhouse waste and especially its sanitisation under controlled conditions in an enclosed system.
This waste can cause considerable odour emission and pose a serious health problem (flies, pathogens).
Therefore, for the treatment of animal by-products (material of category 2 and 3) there are strict legal requirements in accordance with the Animal By-products Regulation (EC 1069/2009).

EXAMPLES OF BEST PRACTICE

Carcass treatment
In Israel the CSC container was filled with slaughterhouse waste from a chicken farm (capacity about 100,000 animals) and treated over a couple of days. Filling took place in layers with intermediate layers of bulking material; irrigation took place when necessary. The sanitisation temperature (60 °C) was already reached during collection.

All-in-all, the material was treated for 42 days. As soon as 14 days after the last filling, complete sanitisation (Salmonella, E. coli) could be proven.

Sewage sludge
Sewage sludge is an odour-intensive material with high water content and its processing is often linked with odour problems due to the present anaerobic conditions of the anaerobic digestion.

"The CSC container was used for the treatment and sanitisation of slaughterhouse waste.
After the enclosed intensive rotting phase, the material was further processed in open windrows without any problems."

Dani Pluda (Nativ Recycling)

Slaughterhouse waste was treated and sanitised in enclosed CSC containers.

For this reason, sewage sludge was mixed with bulking material in the ratio 1:2 and treated inside the CSC container. After a treatment period of 14 days the material could further be treated almost odour-free in windrows.

Waste logistics
In Algeria, the CSC containers are used for the odour-free pre-treatment of organic waste to then significantly accelerate the subsequent composting process. In the future, they will be integrated into waste logistics and used directly by customers for the decentralised collection of organic waste.

David Albertani (R20)

"The CSC container improves the quality of the compost and facilitates the biological process during the critical first few weeks. They also help us to record the quantity and to monitor the quality of our compost production, even when production takes place outside of the system. We are impressed by these technological solutions."

THE CSC CONTAINER IS AN IDEAL SOLUTION COMBINING THE DECENTRALISED WASTE COLLECTION AND WASTE TREATMENT, WHICH AVOIDS ODOUR EMISSIONS AND PROVIDES THE PROOF OF WASTE SANITISATION.

The CSC container was filled in layers with slaughterhouse waste and bulking material.

Automatic proof of sanitisation

The pre-treated material for further processing on open heaps.

Quality sewage sludge was mixed with bulking material and processed into high-value quality compost of Class A.

Compost tea

The theme of "compost tea" has been explored for more than two years in a nationwide field trial of Compost Systems in Austria, with the first comparable results now available.

Compost tea, an aqueous extract of compost, is said to have abundant benefits. This is why Compost Systems has already spent two years investigating its effect on a range of Austrian crops. To ensure the effect of compost tea would also be comparable, the same CMC compost of highest quality was used at all sites to produce compost tea.

Recent years reaffirmed the finding that compost tea had never had a negative impact on any crop. In fact, compost tea clearly boosted both plant health and growth in crops, even on conventionally cultivated land. The roots of soya plants on the compost tea trial plots, for example, grew noticeably faster and thicker. Meanwhile, actively supplying the microorganisms contained in the compost tea accelerated the decomposition of the maize straw present. Fruit in orchards and vineyards was also clearly enhanced. The actual plants were far less prone to fungal diseases and pest infestations and contained more sugar (up to 20 %) compared to when common methods were used. Using compost tea paved the way to reduce chemicals used by up to 80 % by keeping the same product quality.

Soya root growth boosted (left: without compost tea; right: with compost tea)

Winter wheat (left: compost and compost tea; right: conventional)

Wheat with compost tea; yellow rust virtually absent

Wheat without compost tea; yellow rust proliferates

Our compost tea machine comes in a range of designs:

200-litre compost tea machine

1,000-litre compost tea machine

THANKS TO ALL 20 FARMERS TAKING PART IN THIS UNIQUE FIELD TRIAL. THEIR SUPPORT ALLOWED THE FIRST SUCCESSES WITH REPRODUCIBLE RESULTS.

THE "COMPOST TEA" PROJECT BY COMPOST SYSTEMS CONTINUES TO PROGRESS.

Plant inspections

To further improve plant support for our customers, we introduced a new commercial section "Plant Inspection and Support" as part of a two-year research project.

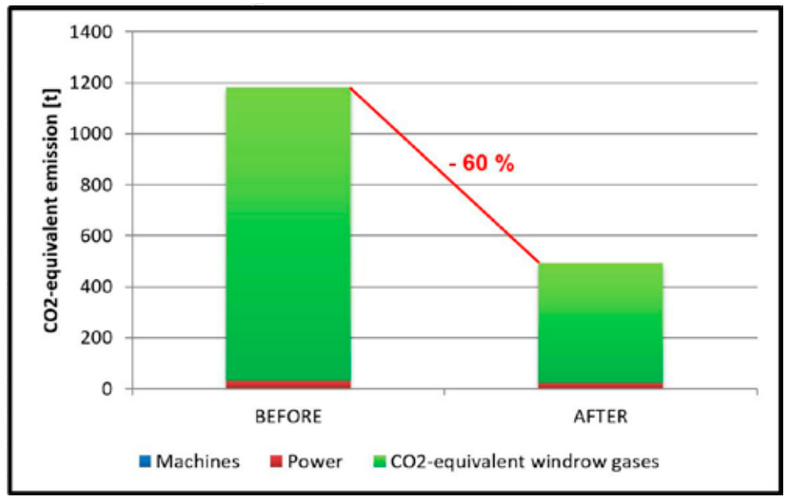
New composting and MBT plants are designed and built according to State-of-the-Art to comply with legal requirements and customer requests as efficiently as possible. For existing plants, the operators have to leverage existing technology and plant logistics to determine the best operational method.
And it is at these very plants that even minor changes made in the right areas can trigger considerable improvements.

To ensure continuous improvement in plant engineering and its operation, we have appointed Mr. Roman Lugmayr, an environmental engineering graduate from the Upper Austria University of Applied Sciences, as an innovation assistant, as part of a two-year training and research program. The research project included examining the technical, process control and product quality aspects of new and old plants and of various sizes.

After the examination, the plant operator was presented with a report including proposed improvements.

The gained information enabled us to make the following improvements:

- Plant optimisation reduced the energy costs of an MBT plant by up to 27 %.
- Enhanced plant operation allowed up to prevent approx. 60 % of CO_2-equivalent greenhouse gas emissions as a further positive effect.
- Enhancing product quality and improving plant logistics at the same time.



Sewage sludge composting in Austria – 25 years of experience

Extensive composting of sewage sludge has been existing in Austria for over 25 years. Soon the first plants were equipped with our aeration system to solve the problems which specifically occur with that material.

Over 25 years ago, serious restrictions in Austria limited the direct application of sewage sludge on agricultural land. Since then it has only been possible to a limited extent and under specific conditions (e.g. quality of the sewage sludge, geographical location, soil type etc.) The composting of sewage sludge thus established itself as a sensible alternative to closing the nutrient cycle in agriculture, relying on decades of farmers' experiences.
Compared to common green waste composting the following additional aspects need to be taken into consideration for sewage sludge composting:

1) Humidity
The high water content of sewage sludge (70–80 %) has to be reduced to approx. 40–60 % (max. 65 %) with a high percentage of dry bulking material. At the same time, the homogeneous, yet untextured sewage sludge "mass" must be mixed with the textured material to ensure good air permeability.

2) Process control
Sewage sludge generally undergoes biological decomposition process (digester) on the waste water treatment plant.
This means that the material contains significantly less energy compared with e.g. MSW or biowaste. It is difficult to get fresh windrows started, above all during the colder months.
Windrows also need to be protected from rainfall to regulate their water balance.

3) Odour problems
Through anaerobic digestion a very narrow carbon : nitrogen ratio occurs (C/N of 8-10:1; for composting a ratio of 25-35:1 is required). That means that there is an excess of nitrogen. If there is insufficient aeration during the intensive phase, odour-intensive decomposition substances and also high losses of nitrogen occur in the form of ammonia. Past experience has shown that odours are the main reason for authorities prescribing the closure of sewage sludge composting plants.

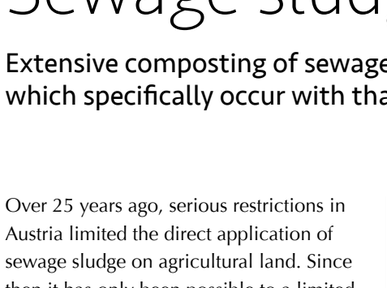
4) Cost
There is only a limited budget available for the treatment of sewage sludge due to the low disposal fee for sewage sludge. Problems during the colder months need to be taken into consideration, as does the lower irrigation cost and the resulting surplus in the waste water balance.

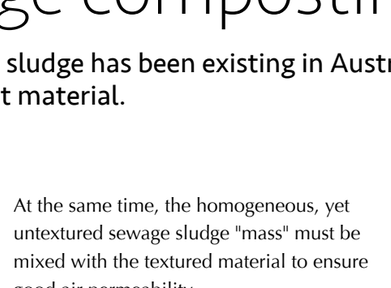
5) Product
The benefit of sewage sludge compost is in the high nutrient content (especially phosphorus), lower levels of contaminations (compared with compost from "biowaste bins") and the high degree of compost maturity caused by the previous decomposition of the sewage sludge.

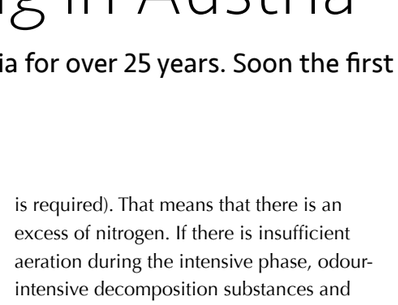
In conclusion, the challenge in sewage sludge composting is to find a cost-effective solution to solve the problem of humidity and odours due to limited budget, in order to be able to make use of the benefits of sewage sludge composting.

This is where our aeration system comes in: The evenly distributed aeration over the entire length of the windrow aerates the windrow very quickly and thus increases its activity. This also significantly reduces the production of odour-intensive substances. It has also been shown in practice that plants equipped with our aeration system generally have a closed water cycle (i.e. the high level of composting activity evaporates so much water that leachate does not need to be disposed externally). It is also possible to start fresh windrows during the colder months by extracting warm air from active windrows and blowing it into the fresh ones, which enables the plant to operate throughout the entire year. The required process time is reduced because of the increased activity of the windrow – this increases the possible annual throughput on the same area. Experiences from practise show an increase of the annual throughput of 30–45 % on modified plants!

THE BIGGEST CHALLENGE WITH SEWAGE SLUDGE COMPOSTING IS THE REGULATION OF MOISTURE AND ODOUR.







The "COMPOnent" aeration system was installed on the first composting plant in Austria in 1997. Today an annual volume of over 160,000 tons of sewage sludge is composted throughout Austria on 15 composting plants.

DUE TO INCREASINGLY STRINGENT REGULATIONS REGARDING EMISSIONS AND ODOURS, THE COMPOSTING OF WINDROWS STARTED BEING INTEGRATED INTO CLOSED SYSTEMS WITH EXHAUST AIR TREATMENT IN 2003.

From the composting plant to the biogenic recycling plant

Legal framework and current practice

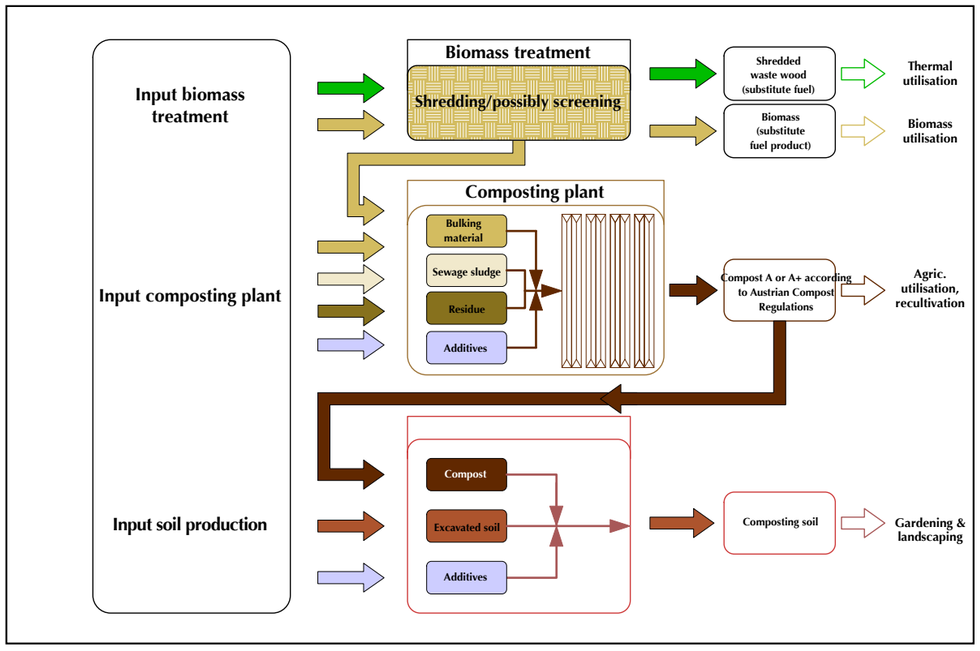
Austria and Germany are both undoubtedly considered pioneers in composting of source-separated biowaste. Whereas Germany has chosen to use large-scale, central composting plants, Austria has decided on decentralized plants due to its small-scale structure. There are almost 700 composting plants in Germany while Austria has ca. 450, which are unsurprisingly significantly smaller.
In 2010, the average Austrian composting plant had a capacity of ca. 2,500 t (except of the Vienna municipal composting plant, which processed 100,000 t per year). Composting on a commercial scale was first seen in the early 1990's when separated waste collection was introduced; prior to this, composting was mainly used to produce fertiliser from agricultural residues.

The first "professional" composting plants were simple affairs – a municipal authority or an association took the input material and then passed it on to an end customer (an own agricultural company).
The composting plant was generally licensed as an attached agricultural business operation.

Today the first plants are over 25 years old. Over time, individual plants have inevitably been enlarged and the range of input materials extended thanks to enhanced waste management with active involvement from the general public, optimised green waste and tree cut collection and an increased demand for quality compost and compost growing media.

As a result, in addition to organic waste, it is now very common to accept untreated waste wood to produce biomass or take excavated soil as a mix component to produce soil from finished compost under a compost plant licence. This makes perfect sense from a machinery, logistics or marketing perspective. However, operators need to take into account that such activities are not considered composting in a legal sense.

To fully comply with legislation, the entire plant needs to be licensed as **a "biogenic recycling plant"** consisting of **a biomass treatment plant,** a **composting plant** and **soil production plant**.



Under Austrian legislation, the production of soil mixtures or biomass treatment for fuel production are possible in composting plants, but they do require an extra licence.

TO FULLY COMPLY WITH LEGISLATION, THE ENTIRE PLANT NEEDS TO BE LICENSED AS A "BIOGENIC RECYCLING PLANT" CONSISTING OF A BIOMASS TREATMENT PLANT, A COMPOSTING PLANT AND SOIL PRODUCTION PLANT.

Operators need to take the following into account for licensing:

- **Distributing compost to a third party** for financial gain (= sale) constitutes an activity under trade law which is not classified as a secondary agricultural business operation.

- Processing waste wood (even if Austrian waste regulations classified it as tree and bush cut 92105 specification 67) to produce woodchips is not covered by compost regulations, but comes under the Austrian Waste Incineration Regulations instead, where it is classified as **substitute fuel production** or, alternatively, substitute fuel product manufacture if certain quality criteria are met.

- Excavated soil used as an additive may only constitute up to 15 % [m/m] of material for composting in a composting plant. **Mixing excavated soil** into finished compost is not covered under the Austrian Compost Regulations; waste legislation requires operators to apply for an additional licence for the **production of compost and soil mixtures**.

The introduction of the electronic data management (EDM) in Austria to handle information on all input materials and the different steps in their treatment ensures transparency, allowing material flows to be inspected using simple means. The individual waste plant types listed above – biomass treatment plant, composting plant and soil production plant – can be included in EDM master data management as a distinct plant type, allowing their own separate records to be kept.
Another approach to recycling is to combine a composting plant with an anaerobic digestion plant. This is easy to do on a technical level, but it is currently difficult to implement due to the current economic circumstances in Austria.

Operators also need to take into account that residues from a biogas plant do not constitute end-of-waste.
Such residues thus need to be treated in a composting plant or recycled through agricultural use in some way to ensure end-of-waste during recycling.

THE FIRST PLANTS ARE NOW 25 YEARS OLD!

Palm oil and the fight for sustainability

The palm oil industry is one of the fastest growing agricultural industries in the world.

Palm oil mill

The palm fruit, from which the palm oil is extracted

Residues from palm oil production to be composted

Even though the growth in the number of palm oil plantations is no longer in double digits, the annual production of palm oil is still increasing significantly. While in 2007/2008 the worldwide production of palm oil was just 39 million tons per year, it has now risen to over 60 million tons. Palm oil farmers around the world enjoy a yield of four to six tons of CPO (Crude Palm Oil) per hectare of the highest-yielding fruit that can be cultivated as a major agricultural commercial crop.

Oil palms are cultivated in many countries around the world. They need a tropical or subtropical climate and an adequate water supply all the year, meaning that production in Europe is rather limited. The largest producer worldwide is Indonesia, accounting for about 50 % of the total global production and earning 10 billion USD from the export of palm oil. This is closely followed by Malaysia, meaning that these two countries cater for over 80 % of global production of palm oil.

The palm oil industry is currently struggling worldwide with the falling mineral oil prices. A regulation calling for it to be added to diesel would be a lifeline for the industry. Indonesia has just passed a new law that requires an admixture of 20 % to diesel at petrol stations by 2020. A further increase is planned in the following years and it is expected to reach the 30 % mark by 2030.

If only it was not for the problem of sustainability! The palm oil industry has been under attack by environmentalists for years. NGOs are trying everything to prevent the creation of new agricultural land for palm oil, especially where rain forest is cleared to make space for palm oil plantations. Indonesia has a disastrous ecobalance for its agricultural sector as a result of this and leads the list of top CO_2 emitters from agricultural sources by a long way.
Illegal slash-and-burn cultivation is viewed as a particularly serious problem, but it gets even worse. In some areas, large peat swamp forests were drained, in part to make way for palm oil plantations. However, these drained peat swamp forests tend to emit large amounts of CO_2 into the air, once they start being cultivated. But it gets even worse. If a peat swamp dries out, it is at risk of self-ignite, and the fire is then virtually impossible to put out. At present, the Indonesian government is trying to regain control of a 2.5 million hectare problem with drained peat soils.

The CO_2 emission in Indonesia are thus between 0.5 and 5.5 kg CO_2 per kg of palm oil produced, for example.
In view of the intention to use palm oil as a sustainable product as a substitute for mineral oil it is thus a rather sporty undertaking, especially in a company's sustainability report.

The oil mills also produce CO_2.
Quite apart from the energy demand for electricity and steam there is a significant emitter – the POME! POME (palm oil mill effluent) is the liquid waste that is produced during separation of the oil from water.
This POME still contains large amounts of organic substances and oil.
Approx. 150 million tons of POME are produced worldwide, which are normally pumped into lagoons and left there to putrefy. The problem with this is that those lagoons soon become anaerobic, resulting a release of CH_4 (methane). This methane can emit into the atmosphere unhindered and is up to 25 times more harmful for the climate than CO_2 and thus impairs the CO_2 balance of palm oil considerably.
In addition to POME, an oil mill also produces solid waste, consisting primarily of the stalks of the fruits. Almost the same quantity is produced of this waste (EFB, or empty fruit bunch) as of the palm oil itself, in other words approx. 60 million tons of EFB worldwide.

According to standard practice, the POME and the EFB are either "disposed" on the plantation or else disappear miraculously. However, the disposal of the waste on the plantations also has its problems. All the way from disease transmission to transportation logistics, the handling of this waste on the plantations is an unpopular subject.

A POME lagoon

SOLID WASTE FROM PALM OIL PRODUCTION (EFB = EMPTY FRUIT BUNCH) IS COMPOSTED AND POME IS USED TO IRRIGATE THE COMPOST WINDROWS.

Irrigation using POME

Due to an amendment in Colombian law, the spreading of untreated palm oil waste on the plantations was prohibited for the above reasons. Initially, this only affected new palm oil plantations, with transition periods for existing mills – a difficult situation for the operators of palm oil mills.

To kill both birds with one stone, Compost Systems developed a technology that enables both of these components, the POME and the EFB, to be used to make compost.
Past experience had shown us that active aeration can have a very beneficial effect. After all, three tons of POME need to be evaporated per ton of EFB. We quickly discovered from our initial tests that it is impossible to evaporate all of the POME economically just by turning. Purely static aeration, without turning, was also shown by our tests to be a total flop. The ideal solution is achieved by a combination of aeration and turning.
After testing had been completed, we built three large-scale plants in Colombia in 2015, which have been operating successfully ever since. Over a period of about six weeks, three tons of POME and even more can be added per ton EFB.
The air exchange rates and POME irrigation are largely automated. Turning is performed by a TracTurn, i.e. by side displacement.
It was important to consider the space requirements when designing the layout of the plants. Since, with an average rainfall of over 2,000 mm per year, the success of this would very much depend on the weather, the plants needed to be paved and covered – costs that account for the bulk of the investment.
This meant that it was not only important to make optimum use of the space available, but also to reduce the composting time.

Our success proved us right! The very instructive construction period, which held rather logistical challenges than technical ones, was followed by the commissioning and calibration of the plants.
Now the plants are running more or less independently and producing compost!

After the required quantity of three tons of POME had been added to one ton of EFB, the raw compost has a C/N ratio of about 15-20:1 and can either be used on the plantations as "YOUNG compost" or can be processed to produce mature compost. Also growing media can be produced. Alternatively, it is possible to make a "DESIGN fertiliser" by addition of various additives from the 4th rotting week onwards.

Conclusion: Our technology can be used to completely prevent the production of methane, thus making a significant contribution to reducing the output of greenhouse gases from the production of palm oil and offering the industry a cost-effective solution for the production of fertiliser from waste, while almost 100 % of the nutrients remain in the compost and the transport weight is reduced by 80-90 %. Active aeration and smart design keep costs to a minimum.
The plants are computer-controlled, making them largely autonomous, except for the filling, emptying and turning, and, thanks to the roof, the system works independently from weather conditions. The positive effect of returning carbon back to soil where it belongs and has only a positive impact, is an extra bonus for plantation owners.

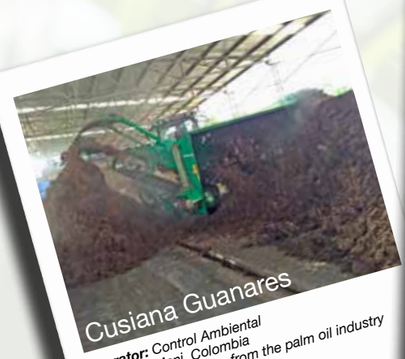
Outlook: Due to the recirculation or recycling of all of the nutrients from palm oil plantations and the supply of carbon to the soil, the focus of our further research will be on reducing the use of commercial fertiliser to a minimum. Ideally, the nutrient-holding ability of the soil will be improved to the extent that no more nutrients are lost and it is possible to completely do without the use of commercial fertiliser. That would be genuine "SUSTAINABILITY"!

Control Ambiental Facatativá

Operator: Control Ambiental
Location: Facatativá, Colombia
Input: Biowaste, sewage sludge, grass clippings, agricultural waste, residual waste from the palm oil industry
Capacity: 20,000 t/year
Operation since: 2012, extended in 2013, extended in 2015
Scope of delivery: Engineering, aeration technology, EI&C, TracTurn

La Paz

Operator: Control Ambiental
Location: San Carlos de Guaroa, Colombia
Input: Residual waste from the palm oil industry
Capacity: 40,000 t/year
Operation since: 2015
Scope of delivery: Engineering, aeration technology, EI&C, irrigation, TracTurn

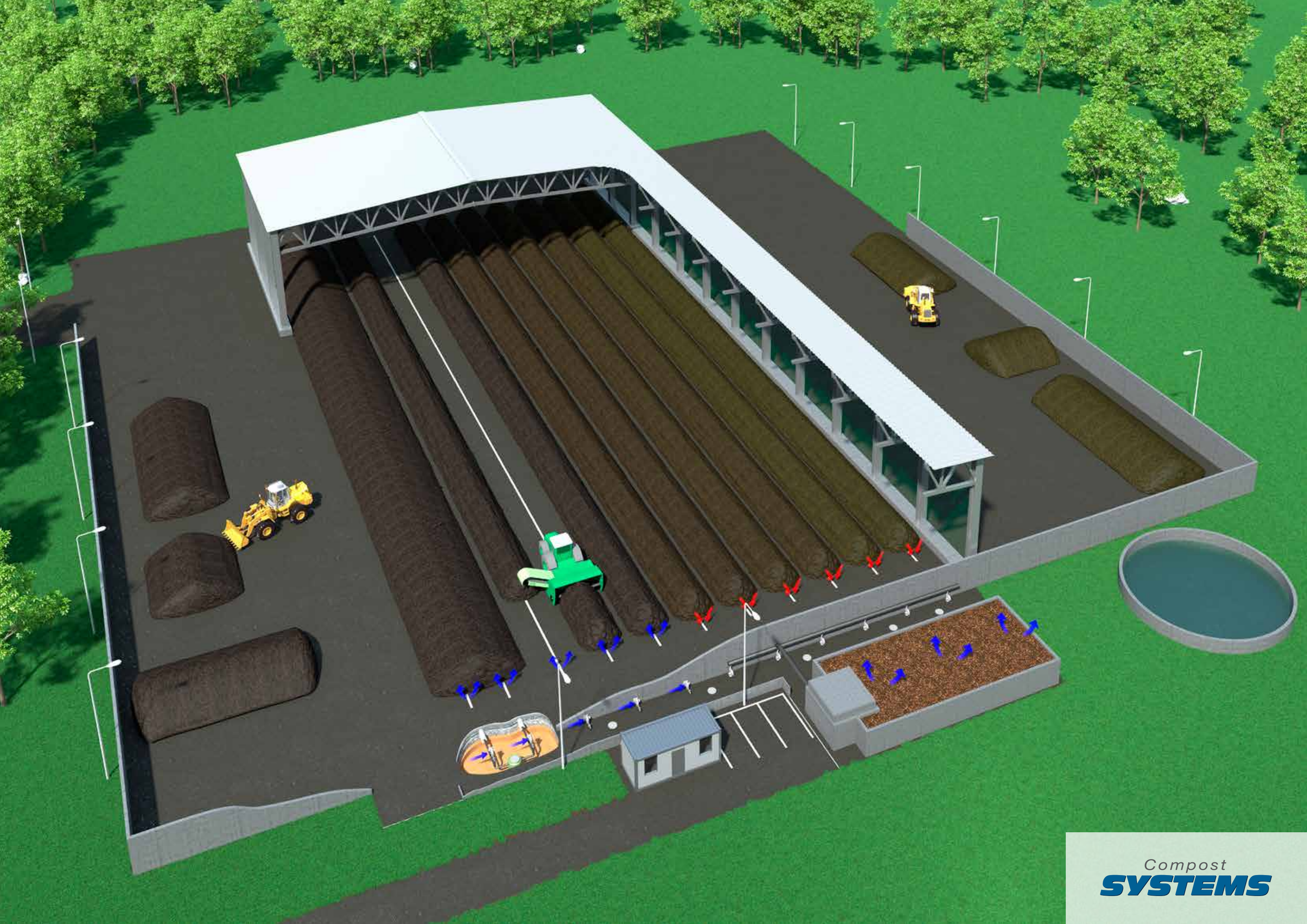


Cusiana Guanares

Operator: Control Ambiental
Location: Mani, Colombia
Input: Residual waste from the palm oil industry
Capacity: 20,000 t/year
Operation since: 2015
Scope of delivery: Engineering, aeration technology, EI&C, irrigation, TracTurn

San Marcos

Operator: Control Ambiental
Location: San Carlos de Guaroa, Colombia
Input: Residual waste from the palm oil industry
Capacity: 20,000 t/year
Operation since: 2015
Scope of delivery: Engineering, aeration technology, EI&C, irrigation, TracTurn



Compost
SYSTEMS

Mumbai – largest waste treatment plant in Asia according to Western standards

Built on a peninsular, Mumbai is the commercial centre of India, a city with a population numbering 20 million and a chaotic infrastructure. Also a finance hub, it is home to Bollywood, the Mecca of the Indian film industry, and a melting pot for an extensive variety of Indian ethnicities. It also produces thousands of tons of waste on a daily basis.

4,000 tons of municipal waste are taken to the Kanjur waste management centre daily, equalling up to 200 trucks an hour. Designed to produce compost-like output (CLO), the Compost Systems biological treatment plant is located right inside this centre.
Initial steps to construct a mechanical-biological treatment (MBT) plant were taken back in 2010. However, a legal dispute held back progress on the building project for several years (not an uncommon occurrence in India). Construction was restarted in December 2015 and the plant is scheduled to start operating in November 2016. After the initial development stage, the plant will accept 1,000 tons of municipal solid waste per day with 500 tons of this waste to be processed in the Compost Systems biological treatment plant. Waste will undergo biological treatment in four rapid rotting treatment systems based on the newEARTH process for four weeks. A mechanical process will then remove the organic waste. The compost will subsequently undergo further degradation, so that it can finally be used as a culture substrate. Recycling materials will also be separated and substitute fuel produced.

The plant will be the largest waste treatment plant built according to Western standards in Asia.

Up to 200 refuse trucks per hour dispose municipal solid waste in Kanjur, Mumbai

Swarzewo composting plant

Reconstruction of the Swarzewo waste water treatment and composting plant has eliminated an odour problem in a popular Polish tourist region while also increasing its treatment capacity significantly.

The Swarzewo waste water treatment plant and its associated composting plant for its own sewage sludge is located between the three popular Baltic Sea resorts of Puck, Jastarnia and Władysławowo in Poland. Operating far beyond its capacity, the existing waste water treatment plant could no longer be upgraded from a technical point of view. The composting plant was also facing odour problems and complaints from hotels in the surrounding area.
Two approaches were chosen to deal with this odour issue: firstly, with anaerobic stabilisation in its digester, the newly built waste water treatment plant delivers sewage sludge of higher degradation grade to the composting plant. This improvement is achieved by extending the treatment time by up to 80 %. Secondly, an aeration system was installed in the composting plant, which improves emission behaviour significantly.
The eight aeration lines in the sheltered intensive phase area and the eight aeration lines in the open curing area ensure that aerobic conditions are maintained over the whole process time, independently from the turning interval. To further reduce odours, the particularly odour-intensive first composting phase is done with negative aeration – this means that air is sucked from the windrow and purified in a biofilter.
When designing the composting plant, it had to be ensured that the extreme seasonal peak load would not cause any problems for operation – exactly the same amount of sludge is produced during the three summer months as during the other nine months of the year.
Operation throughout the year is guaranteed thanks to "pre-heating". This involves a negative aeration of active windrows extracting warm air and blowing it as pre-heated air into a fresh windrow. This ensures that even partially frozen windrows can be activated.
In addition to acting as a "turning machine" for the compost, the tractor-driven turner TracTurn also performs logistical tasks thanks to its side displacement system. The whole plant was designed in such a way to ensure that transport routes are as short as possible and material flows do not cross over one another.
In addition to composting sewage sludge with bulking material, the screenings of the waste water treatment plant's screen are pre-dried in a biological process in an own composting hall, thus reducing quantities for disposal significantly.

Construction period: approx. 10 months
Operation since: 2015
Input: 16,000 t municipal sewage sludge & bulking material per year
Technical equipment: 8 aerated windrows in a sheltered intensive phase, 8 aerated windrows on open curing platform
Turner: TracTurn
Scope of delivery: Engineering, aeration technology, EI&C, exhaust air system, irrigation, TracTurn

Epele composting plant

Construction period: approx. 8 months
Operation since: Summer 2015
Input: 22,000 t of biowaste and green waste
Technical equipment: 8 composting tunnels for the intensive phase; 8 aeration lines for curing, 4 positive-aerated compost storage boxes
Turner: TracTurn
Scope of delivery: engineering, aeration technology, EI&C, exhaust air system, box systems, TracTurn, screening station, mixing bunker

Gipuzkoa is one of the three provinces in the Spanish Basque Country with San Sebastian serving as its capital. A pioneer in many fields throughout Spain, this region is also renowned for its excellent cuisine. 17 Michelin stars have been awarded in San Sebastian and the surrounding area alone. If you take the size of its population into account, there are many more stars per head than in the gourmet capital Paris. Consequently, when it came to composting, the region also set itself the objective of producing high-quality compost to help close the carbon cycle, relying on Compost Systems' technical expertise in the process.

The master plan for integrated waste management in Gipuzkoa included the construction of a composting plant for biowaste as per EU Directive 2008/98 and the Spanish Waste Management Act 22/2011. The initiative promoted separate collection of biowaste and its treatment under optimum conditions using the best available technology. The existing composting plant in Gipuzkoa did not meet the higher technical standards with the available space also too small to consider upgrading or extending the plant. The Regional Government of Gipuzkoa thus drew up a sector plan and decided on a suitable location, next to an existing landfill, to build a composting plant.

The project was divided into three phases:

1. Creation of the geological basis: this phase was very complex due to the mountainous terrain and entailed removing vast rocks.
2. Construction of water tanks to save and prepare rainwater
3. Construction of the composting plant

This new composting plant has been designed to handle 22,000 t per year. A mixing bunker is used to blend the collected biowaste with bulking material and grass clippings, which is then homogenised and poured into one of eight composting tunnels. After four weeks, the raw compost is further processed on the aerated curing area. Once curing is complete, the compost is screened and can continue its curing in the aerated storage boxes until it is sold.

In addition to a biofilter, exhaust air treatment also consists of an acid scrubber to minimise odour emissions as far as technically possible.

Due to the heavy rainfall in the region, the whole composting plant is sheltered, including the handling sections.

The project was successfully completed in autumn 2015 with overall investment totalling around ten million Euros.

Pragersko and Hrastnik composting and MBT plant

Slovenia is basing its implementation of EU landfill regulations on regional concepts. The successful commissioning of two plants for the regions Slovenska Bystrica and Zasavje was a further step in the fulfilment of the target objectives.

There were two problems to be solved in the design of these two plants: due to the comparatively small size of the regions, it should nevertheless be possible to treat the limited waste volume at standard, low market prices and observe the strict Slovenian landfill criteria with regards to the level of decomposition (TOC < 18 %). In addition, separate treatment of municipal solid waste (MSW) and source-separated organic waste (biowaste) was required. The newEARTH technology of Compost Systems combines the benefits of windrow composting (high biological efficiency at low operation costs) with the benefits of an enclosed system (controlled emission management) and enables implementation within the narrowly prescribed framework. In the hall, biowaste and MSW are composted separately. Despite the waste streams being separated, it is still possible to use the same infrastructure (buildings, exhaust air collection and treatment) and equipment (wheel loader, windrow turner) for both, thus increasing cost efficiency.

Pragersko Composting Plant
Construction period: approx. 8 months
Operation since: Winter 2014/2015
Input: 3,000 t/year MSW, 3,000 t/year biowaste
Technical equipment: 5 negative-aerated biowaste windrows, 5 negative-aerated MSW windrows, non-aerated curing phase for MSW, positive-aerated curing phase for biowaste
Turner: TracTurn
Scope of delivery: engineering, aeration technology, EI&C, exhaust air system, TracTurn

Hrastnik composting plant
Construction period: approx. 12 months
Operation since: Winter 2015/2016
Input: 6,000 t/year MSW, 6,000 t/year biowaste
Technical equipment: 6 negative-aerated MSW windrows 4 negative-aerated biowaste windrows, positive-aerated curing phase for biowaste
Turner: TracTurn
Scope of delivery: engineering, aeration technology, EI&C, exhaust air system, TracTurn

Bihor MBT plant in Romania

The Bihor MBT plant is an integral component in adapting waste management in the province of Bihor up to a State-of-the-Art level. In addition to an MBT plant, three waste sorting plants and four waste transfer stations were constructed and three landfill sites were closed which did not comply with regulations.

The project fulfils the specifications of the EU Directive No. 2010/75/EU on industrial emissions, which also requires the use of the best available technology (BAT).

In future, the Bihor MBT plant will treat residual waste from the province of Bihor (575,000 inhabitants). The aim is to reduce landfill volume by 30 % and prevent methane emissions from the landfill site by disposing stabilised material.
The plant is conveniently located near Oradea, the capital of the province of Bihor. In future, 60,000 tons of residual waste will undergo both mechanical treatment and biological stabilization on an area of approx. 40,000 m². After the total mass has been shredded and the oversize material with high calorific value has been screened off, the fraction with particle size of 0/80 mm is filled into one of the eleven composting tunnels.
To accelerate the biological process, air is blown into the tunnel depending on current process activity. The exhaust air is cleaned via semi-permeable membrane spanning the tunnel roof. Any leachate from the tunnels can directly be re-irrigated ensuring an enclosed water cycle. After four weeks of intensive composting, the material is screened and further treated on a curing area as CLO (compost-like output) with the windrow turner CMC SF 300 (a self-propelled turning machine). Oversize material is disposed on the landfill and CLO is used for recultivation purposes.
The plant will start its operation in spring 2016, the total investment is approx. six million Euros.

Construction period: approx. 8 months
Operation since: Spring 2016
Input: 60,000 t/year MSW
Technical equipment: 11 positive-aerated composting tunnels, non-aerated curing phase
Turner: CMC SF 300
Scope of delivery: engineering, aeration technology EI&C, box systems, CMC SF 300

Tunisia test plant

In Tunisia, the German-based KfW (Kreditanstalt für Wiederaufbau – Reconstruction and Loan Corporation) has funded a trial composting plant for the treatment of Tunisian municipal solid waste using Compost Systems technology.

The catalyst for this project was the problem of high expenses for disposing leachate, which was generated by landfilling untreated municipal solid waste. The requirement, meanwhile, was to ensure that the waste treatment would be cheaper than the cost of leachate disposal, which would make the composting plant economically viable.

In this project, Compost Systems provided technical expertise on aeration technology and advice on plant design and experimental support. As well as the German consulting company GKW Consult, three international Universities were also involved (Innsbruck, Rostock and Tunis).

They were tasked with scientifically evaluating the function of a range of treatment technologies.
Over the space of a year, various trials were made to reduce the proportion of water or produce material ready for disposal.

Experimental results revealed that combining our process engineering with active windrow aeration was the key to maintaining optimal process conditions at all times.

Within just a week, we were able to reduce the initial water content of 55 % to 36 %. At the end of the four-week experiment, we achieved disposal-ready waste containing just 21 % water (a 60 % reduction)!

The treatment also successfully reduced the volume of Tunisian waste generated by 50-80 % within a few weeks, which helped optimize the use of the landfill site.

These experiments reaffirmed that our process engineering is ideally suited to treating Tunisian waste. As well as resolving the issue of leachate, our aeration technology also helped improve landfill use.

60 % WATER REDUCTION AFTER 4 WEEKS PROCESS!

Oran composting plant

Compost Systems supplies R20 with compost technology for Algeria.

R20 (Regions of Climate Actions) is an NGO and NPO, which was set up in 2010 by Governor Arnold Schwarzenegger, partnering the United Nations. This initiative is intended to encourage climate protection. With this in mind, it supports nations, regions and initiatives worldwide in developing their projects and best-practice examples and rendering them more publicly accessible.

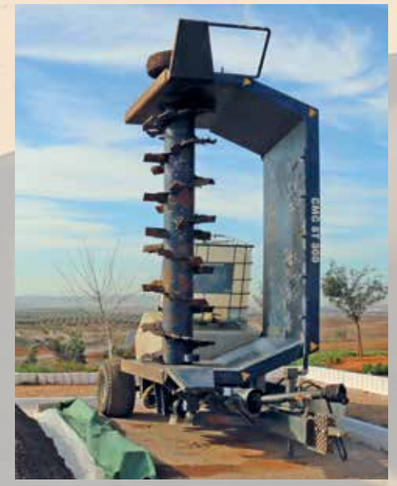
In Oran, Algeria's second city and home to around 800,000 inhabitants, most of the waste is collected unsorted. In 2015, R20 began to introduce simple sorting of collected waste, for plastic, paper and other residual waste.

As a technology expert, Compost Systems was commissioned to ensure the biowaste could also be utilised. The solution for local requirements to be met was an intensive decomposition for two weeks followed by a curing in windrows. For the first odour-intensive weeks the material is composted inside of CSC containers under controlled conditions as well as being sanitised. The final composting of the material then takes place in windrows with regular turning of the material (CMC ST 300).

To bring the Algerian workforce up to speed, the principles of composting were conveyed during training sessions held in Austria. The initial composting trials took place in Oran, in the form of multiple experimental windrows. Those involved in Oran were supported with the on-site composting by our employee, Roman Lugmayr, who supervised the experiments.

The experimental site is now being expanded to include a professional composting plant, capable of converting around 5,000 tons in total of organic waste into high quality compost each year.

R20 REGIONS OF CLIMATE ACTION



Composting in the cloud

COMPOcloud represents a new approach to the cost-effective control of the aeration system for small and smallest composting plants. The use of cloud-based software (sofware is on a web server) results in new methods of process control and visualisation.

The equipment of small and smallest composting plants (below 5,000 tons per year) with aeration technology is confronted with the challenge of finding a sensible solution with a very limited budget. Clarity about the small number of actuators and measuring technology is beneficial with smaller plants. Cost-effective control has been developed for our proven aeration technology to enable even smaller plants to procure our aeration technology.

Generally, the cost for aeration technology can be divided into two distinct areas:

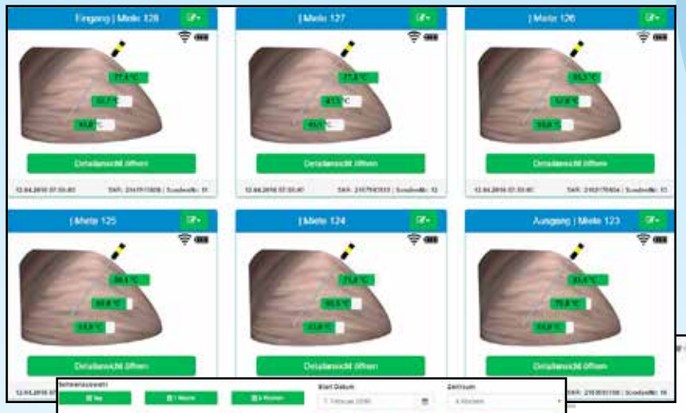
- The hardware (e.g. aeration ducts, aeration fans...) rises directly in line with the size of the plant – larger plants need longer aeration lines and larger fans.

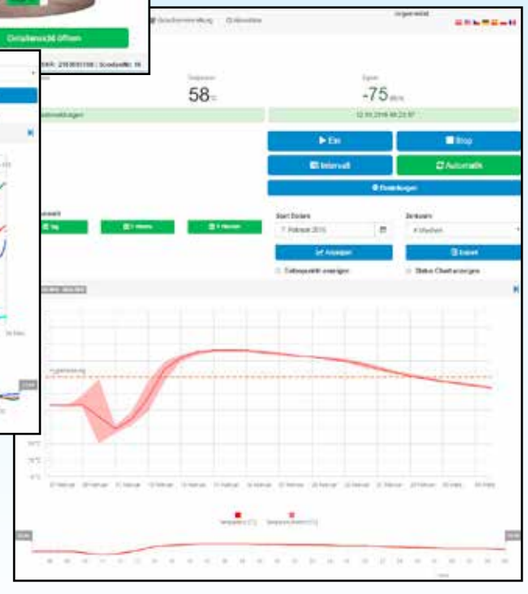
- The "software" (control system, visualisation) was specifically programmed and developed for every composting plant to meet their particular requirements.

This is where the latest development, the COMPOcloud, comes in. This "platform" standardises certain areas of a composting plant and is thus independent of the future size of the plant. Consistent modules can thus keep the cost of the "software" significantly lower. A COMPOcloud control module always consists of a maximum of six actuators (blowers, irrigation valves, pumps...) and six measured variables (temperature, pressure...). If necessary, two or more modules can also be combined to create one larger unit.

A further benefit of the COMPOcloud lies in the fact that there is no need for a local PC – the software is no longer tied to a computer, but located on a web server (= cloud). You can therefore keep track of the "processes" in your composting plant on any PC, smartphone or tablet with internet access and with the relevant access data, INDEPENDENT from time and location (even while comfortably watching TV in the evening). Apart from simpler update possibility a further positive side-effect is data security – it's not the first time that an operator has stood in front of the remains of his stolen PC early in the morning ...

Five small plants were equipped with a COMPOcloud in its first year of use. It enabled significant savings to be achieved with the new technology compared to the original budget.

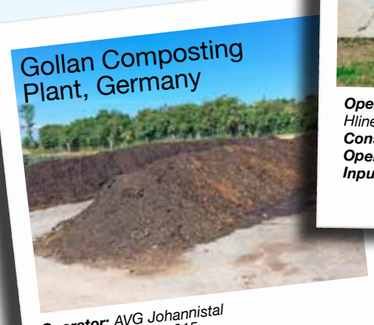




Operator: *Statni hrad a zamek v Českém Krumlově*
Construction period: *2 months*
Operation since: *2015*
Input: *1,100 t/year of park waste and green waste*

Operator: *Gerhard Eder*
Construction period: *1 month*
Operation since: *2014*
Input: *3,000 t/year of biowaste and green waste*

Operator: *Sdruzeni obci mikroregionu Hlinecko*
Construction period: *2 months*
Operation since: *2015*
Input: *2,000 t/year of green waste*



Operator: *AVG Johannistal*
Operation since: *2015*
Input: *10,000 t/year of biowaste and green waste*

Temperature monitoring of the windrows for hygiene certification

Operator:
Adam Mickiewicz University Botanical Garden
Construction period: *1 month*
Operation since: *2015*
Input: *300 t/year of green waste*

CMC ST 300

The king is dead – long live the king!

CMC ST 350

How big is “big”?

To all those who want more than just "big", meet the big sister, a full 50 cm wider!
Weighing in at 7.5 tons, the CMC ST 350 is anything but a lightweight. And anyone who thinks we just tweaked cosmetic features is sorely mistaken. As well as reconfiguring the powertrain far higher, the unit now boasts statics in the Panzer tank class.
But the key gain you will most appreciate in the CMC ST 350 is the larger windrow. The windrow cross-section of up to 4 m² accommodates a higher volume of material for processing within the same space. But every upside has a downside. While the CMC ST 300 had a transport height of 4 m, the CMC ST 350 is a lofty 4.7 m from top to bottom.
So if you have to negotiate any low bridges while on the job, you are probably best off sticking with the predecessor, the CMC ST 300!

TracTurn 3.7

Stand-out features of the TracTurn include the plant throughput, efficiency, logistics and flexibility.

Since coming onto the market in 2010, the TracTurn has been deployed in numerous plants. Whether in Colombia, India or Europe – the benefits of this machine are globally acknowledged and harnessed in numerous ways.

Flexibility
One of the features unique to the TracTurn is the scope for flexible windrow shape. It can accommodate both trapezoid as well as triangle-shaped windrows, without having to modify the machine in any way. While other turners are designed to fit a predefined windrow width, the TracTurn is fully flexible in this area. You can adjust the windrow dimensions swiftly and easily in no time. The laterally installed cutting system simply cuts through a wide windrow and turns it in a two-stage process.

Logistics
Site displacement of compost windrows helps ensure efficient plant logistics, from the raw material right up to the screening station. With sanitary control in mind, we have also ensured that finished (sanitised) compost cannot come into contact with raw material. The TracTurn also paves the way to cut wheel loader operating hours considerably.

Throughput
In recent years, the “non-tramline windrow” has really proved its worth. It accommodates both the space-saving trapezoid windrow with the triangle-shaped windrow for accelerated breakdown, all in a single unit. Helping optimise the throughput per m², which also allows a space reduction up to 70 % compared to conventional alternatives.

Combining windrows like this also elicits the other advantage of using the last windrow for storage.

Efficiency
TracTurn has an official turning capacity of around 2,000 m³/h. That said, field tests have already shown that turning capacity of up to 3,000 m³/h is feasible. Comparative fuel consumption tests revealed similarly impressive figures and savings of up to 40 %.

2,000 m³/h
Perfect logistics
Simple transport

CMC SF 300

For around five years now, we have continued this success story with a mechanical rotor drive. We are adding new chapters now with a fully hydrostatic version. What spurred us on here was not simply the “non-functioning” mechanics, but technological developments in the engine field, which convinced us of the need for this step.
Every downside has an up – the user benefits in several ways, e.g. the ability to operate the rotor bidirectionally and most importantly, seamlessly adjustable rotor speed, likewise in both directions.
Carefully selected hydraulic components are set to consolidate the success of this system in future. We have retained the basic frame, engine, chassis, rotor and cabin as tried and tested components of the original mechanical model.
We have expanded the accessory count though, to include a fleece/membrane roller on the rear of the machine, complete with reverse camera.

Screening station

Powerful – Space-saving – Affordable

From spring 2017, the established KA4018 will be joined by the KA5522 which will allow us to boost the effective screen surface by 50 % and provide even greater performance, with power consumption unchanged. Mounting the system on flexible structural components allows its height to be adjusted as required to meet the customers' needs. The feeding process involves deploying a stationary or mobile bunker with a supply volume of 10, 15 or 20 m³ and an ascending conveyor belt. An air separator mounted on the output belt of the screening unit separates the light fraction, which is then discharged into a special container, while any overflow is channelled back into the composting process.

Bunker

Mixing – Bag opening – Dosing

This bunker represents the ideal solution when it comes to constantly preparing a range of fractions for the next work step. Whether the task is ensuring the right dose for a downstream screening system, optimally mixing two or more fractions for the composting process or even opening up biobags – we leverage the rotor tool allocation to ensure this system covers as many of our customers’ needs as possible.
Thanks to filling quantities of 10, 15 or 20 m³ and a connected load to the rotor of 25 kW, this unit really can do it all. The frequency-controlled engine-gearbox units allow the required revolutions to be optimised for the material in use, to maximise the performance range at all times, while consuming as little power as possible. Vertical side walls prevent the so-called "bridging" within the bunker, however high the feed rates.

Compost measurement technology

Composting is a living process, which is continually changing throughout the weeks of producing compost. It is crucial to monitor the composting process to produce the best possible compost quality every time. Measuring technology is your best indicator, above all with process changes (windrow size, material mixture, turning technology etc.)

Compost Systems offers you the necessary measuring technology for your compost. You can now guarantee the best possible process conditions and compost quality by measuring the temperature and gas, coupled with analysis of the compost.

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 CH_4, carbon dioxide CO_2 and oxygen O_2), which are used to describe the process conditions.

Find more information on our measuring technology here:

CMC soil and compost seminar

THE NEXT SEMINAR IS SCHEDULED FOR 17-21 OCTOBER, 2016

CMC (Controlled Microbial Composting) essentially describes the LÜBKE process for composting biowaste. The first courses began as early as 1983 and taught people how to use compost on land in a sustainable and productive way for the long term.
We have now intensively refined our training programme as part of our international CMC courses. Knowledge of composting and biological waste treatment is taught in greater detail in English over five days. We are lucky enough to have the services of Uta Lübke as a consultant, who provides unique insight into the interplay of compost, soil, plants and the laws of nature.

We have also added key topics, like material flow management, quality assurance, plant design, water, mass and air balancing to the training programme. The training course also covers the use 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

Bunker

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 70 working plants!

And the winner is...

Compost SYSTEMS

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