



Compost  
Systems

2024 Edition

INTERNATIONAL

# COMPO news

From nitrogen and carbon

Sewage sludge –  
The forgotten resource

Fertiliser for viticulture

Plant construction  
in Poland and Slovakia

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# Dear Friends!

We have survived COVID-19, accepted inflation and are once again reflecting on the fact that we need to also get to grips with the environmental issues of the immediate future.

They are multifaceted and complex issues that have a profound effect on the financial, social and fundamental aspects of the economy and the way in which we engage in production and trading. They will significantly change the way we live! We know that we need to manage our resources and we are very much aware that we cannot emit our resources into the atmosphere through big chimneys.

The foundation of any successful project is the successful planning in advance. There is no longer a lack of will in our society to implement future projects; there is a lack of good projects that can be implemented. A project that is not technically, technologically, commercially and administratively "sustainable" will struggle to find an investor.

And this is precisely where we as an engineering company see our role, our service to society. We see ourselves as a service provider and partner who together with its customers, develops the projects, the concepts and the plants that do their work SUSTAINABLY. So that good ideas can become successful projects that give pleasure to banks, investors and the environment in equal measure!



  
Aurel Lübke  
Managing Director  
Compost Systems GmbH

## Editorial

COMPOnews 2024

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To improve readability, we refrain from using the gender forms male, female and diverse at the same time. All references to people apply equally to all genders. Errors and omissions excepted. Subject to printing errors.





# From nitrogen and carbon

In a blog that I wrote 10 years ago, I allowed myself to discuss why it is not actually possible to cope with the climate crisis without the involvement of agriculture. What was still considered a thesis 10 years ago, is now clear for science, politics and the public.

The phenomenon of our political, commercially driven reactionism can be best explained with the topic of rapeseed. In the late 1990s, agriculture was still celebrated as an important partner for ensuring our mobility. Factories were constructed, an admixture regulation for biodiesel was passed and large agricultural areas were allocated to the cultivation of rapeseed. Gradually it became apparent that production-related emissions from agriculture through the cultivation of rapeseed would have a much worse impact on the climate than the use of oil. In order not to accept direct responsibility for errors, the unproduced quantities of rapeseed oil were offset by the purchase of palm oil.

“A few years ago, rapeseed oil was considered the fuel of the future. Today, rapeseed oil has completely disappeared as a fuel due to its poor carbon footprint.”

## But what is so bad about rapeseed oil?

The answer is: Nothing, nothing at all! The problem is not the oil itself, but its growth-related handling of nitrogen. As so often in agriculture, everything works much better in abundance. Naturally, the rapeseed grows significantly better, even if nitrogen is available in decent quantities.

Unfortunately, nitrogen not only remains in the soil, but also enters the air to a certain extent. This would not really be an issue in the area of elemental nitrogen, which already surrounds us with around 78% in the air. HOWEVER, part of it can or is converted to nitrous oxide  $N_2O$ , which with a factor of 298 compared to  $CO_2$ , has significant leverage in climate damage compared to  $CO_2$ .

## But what does all this have to do with us?

The fact is that the European Union has made a commitment to drastically reduce the emissions from the release of nitrogen. However, the implementation of a law that is not thought to have been completed in all its aspects is problematic. For example, Ireland is strongly considering whether it is not necessary to reduce the number of cattle in its own country by 200,000. In the Netherlands, they are talking about a reduction in agricultural production of up to 30%! Pertinent demonstrations by farmers on the motorways and roads in the Netherlands testify to the extremely heated situation.





© Robin Utrecht / AFP



© Dina Panneck / Pixabay

In the Netherlands, farmers are on the warpath to defend themselves against the new EU directives on nitrogen emissions. In Ireland, the government is considering slaughtering 200,000 cows to reduce methane and nitrogen emissions.

The gauntlet has been thrown down on the constant over-fertilisation of our fields. A frontal war against agriculture as we know it? A look at the greenhouse gas figures in agriculture helps to identify the extent of the problem.

Figures from the German Federal Environment Agency, which have only recently been published, report a significant contribution from agriculture to climate change. With just under a tenth of the carbon footprint, agriculture permits itself to make just under half of the contribution to climate change, like mobility and transport.

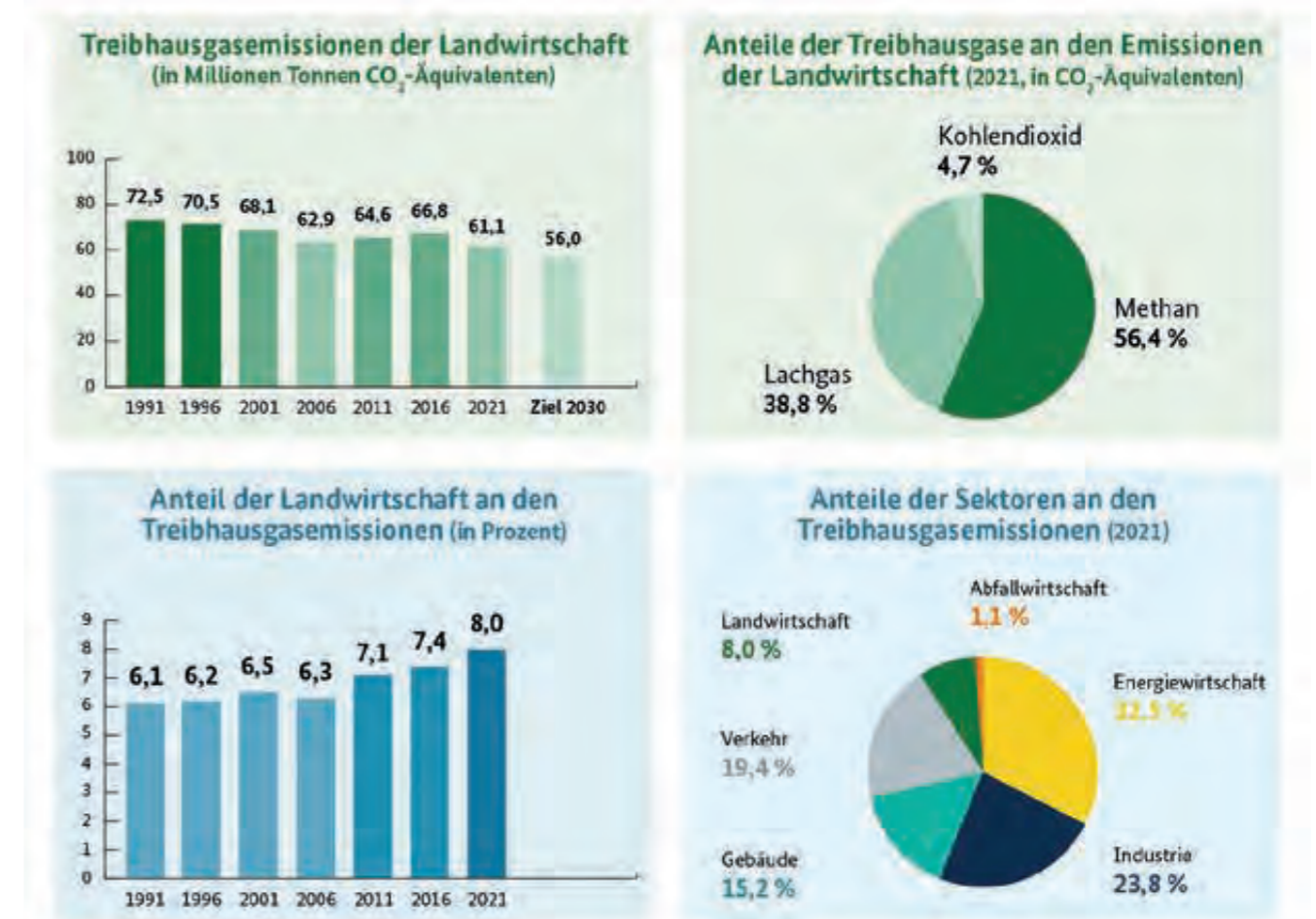
Until now, the contribution from cows, which have a bad digestive tract, was considered the root of all evils. However, it seems that cows produce only about 25% of agricultural emissions. Almost precisely 50% of the agricultural climate-damaging emissions are produced by the greenhouse gas methane. Cows are only directly responsible for about half of these. The other half is produced upstream and downstream of the animals, for example, within the scope of the storage, handling and spreading of manure or the poor condition of the soil on which the manure has been applied.

Surprisingly low CO<sub>2</sub> emissions arise through the direct impact of CO<sub>2</sub>, i.e. emissions from engines in tractors, combine harvesters or other equipment that emit CO<sub>2</sub> into the air in agriculture. With just 4-5% of agricultural emissions, or less than 0.5% of total German emissions, combine harvesters, tractors and forage harvesters are quite modest in terms of the overall assessment.

Much more frightening, on the other hand, is the nitrous oxide, which has just come into the limelight. With 45% of agricultural emissions in Germany – or around 4% of total German emissions – nitrous oxide has become a significant target for potential savings among climate protection activists.

## Greenhouse gas emissions in Germany: The role of agriculture

Source data: Federal Environment Agency © 2022 BLE Infografik © Federal Information Centre for Agriculture (BZL)



The figures from the Federal Environment Agency show that agriculture has a significant share of greenhouse gas emissions. It is clear that nitrous oxide and CO<sub>4</sub> (methane) are the main causes of greenhouse gases.

### But what exactly happens there?

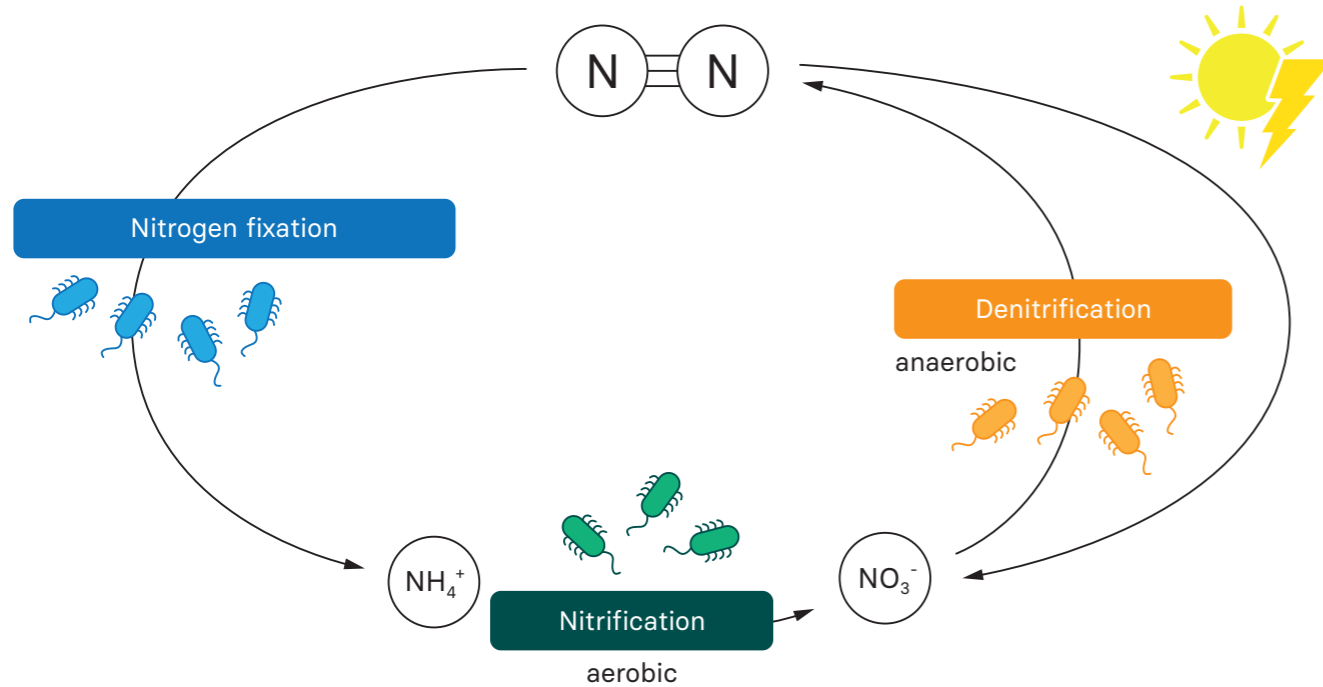
So as not to make it too technical, a slightly simplified version to explain it:

In principle, N<sub>2</sub>O (nitrous oxide) is produced from water-soluble nitrogen. This is defined in agricultural practice as N-min and describes the total amount of the water-soluble nitrogen types in the soil – such as ammonium or nitrate. Science assumes that part of the nitrogen present as N-min is released into the air, and that part of it in turn becomes nitrous oxide. This occurs in 2 phases: In

the first phase, nitrification, nitrogen is converted from ammonium to nitrate. The worse the conditions for this are, the worse the process will be. Once the nitrate state has been reached, however, we cannot yet be lulled into a false sense of security. Through the process of denitrification, the nitrate can reduce to nitrite and subsequently also to elemental nitrogen N<sub>2</sub> or even – nitrous oxide N<sub>2</sub>O.



## "Outer" cycle



### And what can we do about it?

In principle, it can be said that the studies on nitrous oxide, its formation and prevention are still quite sparse and poorly explained in scientific terms. This is also due to the fact that analytical methods are difficult, expensive and complicated.

In fact, the release is significantly influenced by the application of industrial and artificial fertiliser, the climate, moisture, the application rate and of course the quality of the soil.

As farmers know from day-to-day operations, nitrogen losses in groundwater and the air are significantly lower in good soils than on poorly drained soils with little humus and/or soil life. This is probably due to the fact that these conversion processes in the soil are mainly caused by the activity of microorganisms. Poor soil life and poor soil retention = high losses!

Now it would probably be a little too simple to say in reply that we can only fertilise with compost because the nutrients are only partially available in a water-soluble form.

“Nitrification or denitrification can convert nitrogen into nitrous oxide. Nitrous oxide is 298 times more harmful to the environment than  $\text{CO}_2$ .”

In short, the higher the content of water-soluble nitrogen in the soil, the higher the chances of losing nitrogen into the air and the chance of nitrous oxide being formed. A problem that, according to new studies, seems to account for almost half of the agricultural emissions in Germany.

It is indeed a bundle of measures that we have at our disposal to reduce emissions. First and foremost, of course, is the drastic reduction in application rates. This can actually be achieved by optimising the application time and the application process.

For a region that is highly dependent on the import of fertiliser in the form of commercial fertiliser, this is a rather easy undertaking. In fact, the EU wants to drastically reduce the total amount of nitrogen per hectare. For example, the currently drastically exceeded 170 kg/ha would be the limit for the moment. However, these 170 kg/ha are to be significantly reduced in the future.

In the case of biogas slurry, for example, it's a different story. Due to the fermentation process, almost all the nitrogen present after the process is in the form of ammonium ( $\text{NH}_4^+$ ). The ammonium must therefore first be nitrified in the field. If the nitrate that is then formed is not absorbed by microorganisms, there is a further risk that some of the nitrogen will escape into the air again due to denitrification. Again, the quality of the microlife in the soil is decisive as to whether and how much of the nitrogen escapes or is retained.

The situation with regard to the application of manure is similar. Manure or other untreated fertilisers must be broken down in the field first. Due to the introduction of abundant bacterial feed into the soil, soil life is required to carry out the digestive process in the field. If the process becomes anaerobic, for example, methane is produced, which should ideally be avoided.

Here we are again bringing compost into play. Take digestate as a raw material, for example. Typically, the digestate is extracted from the biogas plant with a high saturation of ammonium. If the digestate is applied directly to the field, high losses in the form of ammonia are difficult to prevent. If applied at ground level or integrated directly into the soil, this can have a certain effect here, but also greatly promotes the risk of nitrous oxide forming through this shock charge of water-soluble nitrogen.

The nitrogen present in biogas slurry is almost entirely in the form of ammonium. The risk of nitrous oxide forming during the nitrification and possibly during the subsequent denitrification is high. Especially in poor soils!



© Franz W. / Pixabay



However, if we first feed the digestate into a controlled composting process, then we actually get significant amounts of nitrogen in the exhaust air during the first days (week). But thanks to efficient technology, we can remove this from the exhaust airflow and thereby obtain ammonium sulfate, which we can subsequently add back into the composting process or use as a separate fertiliser. It is important that we can ensure a controlled aerobic process in order to prevent the formation of nitrous oxide as part of the nitrification.

**And what can compost actually do for us now to reduce the emission of greenhouse gases?**

Let's look at the potential in 2 steps. In the first step during production, it is important to ensure that the process is ideally ALWAYS kept within the aerobic range. If there is a lack of oxygen, there is a risk that methane can be produced in sometimes extremely high quantities. (We have already found concentrations of 50% by volume or more in poorly maintained windrows.) To the same extent, there is a risk that nitrous oxide will also form due to the interference in the nitrification process.

Once the conversion process (oxidation) has taken place, most of the nitrogen that is present is nitrate nitrogen. From here, the nitrate must be bound into different compounds (humus). This is usually done with a well-managed maturation process. The careless storage of unfinished compost is very bad in this case. Nitrate is not integrated into humus, but is reduced to nitrite due to a lack of oxygen. Here we are again at the precursor to nitrous oxide (denitrification).

A controlled rotting process can greatly reduce or completely prevent the formation of methane and nitrous oxide.

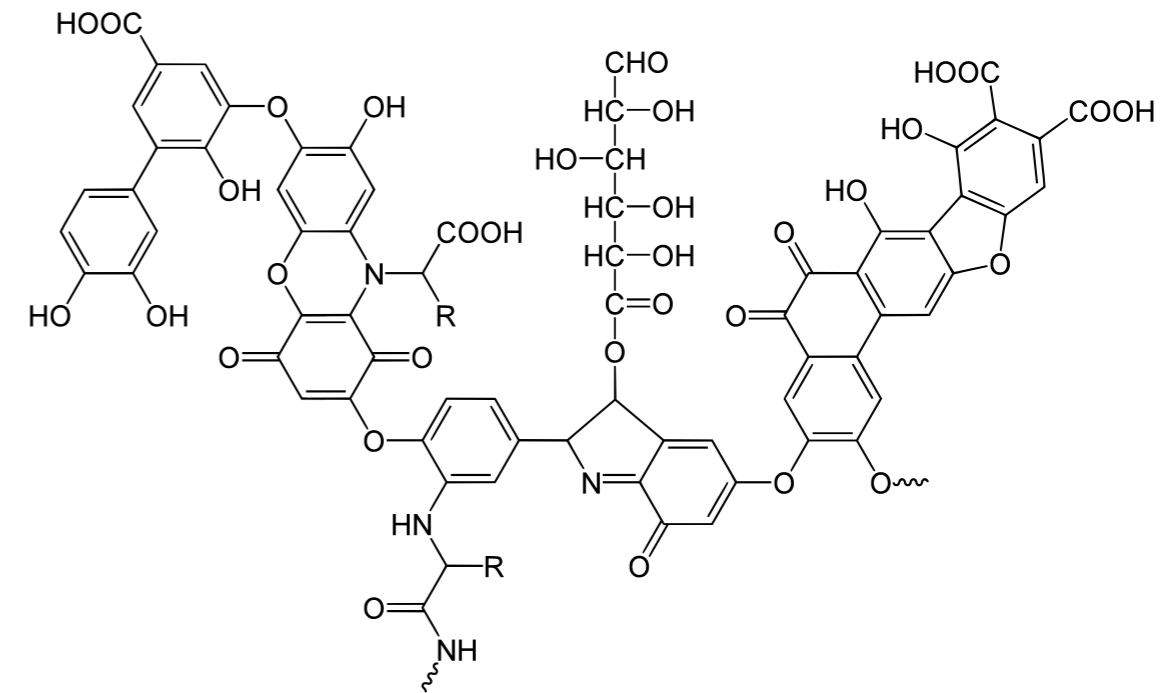
However, if the compost is integrated in a controlled manner, a healthy nutrient humus is formed, then the nitrogen is no longer water-soluble and the risk of loss is largely contained and therefore also the formation of nitrous oxide.

Now it is an open secret that compost is used very successfully in many integrated agricultural models to reduce the total nitrogen to be applied. With the same yield, of course. This is mainly due to the fact that compost is not only able to hold and bind the nutrients of organic fertiliser well, but also those produced by industrially produced fertilisers.

As a further example, compost-based potting soils may be listed here. If we were not able to successfully bind the nutrients in the finished compost, then any lettuce from the raised bed would probably have a toxic effect as a food if it could grow at all due to the large amounts of total nitrogen. Next year, fertilisation would be necessary again because we might have lost the available nitrogen to the groundwater over the winter.



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Source: Wikipedia

But the fact is that a good potting soil in raised beds remains fertile for years to come. It remains a matter of caring for an active microorganism that is careful with nutrients and minimises losses.

Let's return to the active role of the farmer in the fight against climate change. "Carbon sequestration" and "carbon sink soil" – keywords that we have been hearing more and more recently. Of course, we can also follow the Icelandic model and try to pump the CO<sub>2</sub> back into the natural gas boreholes. From a financial point of view, it is a costing issue or as politicians tend to say: "It's not my money!" From an environmental point of view, however, the carbon at a depth of 5,000 m is of no benefit. The situation is different in the field, where the carbon contributes to about 70% of the substance we call fertility or HUMUS. Once again, taking into account the economic calculation, there is no way around recognising the soil as the most environmental and cleverly made, even the most economical carbon sink. But there are some stumbling blocks in the way. One of them is nitrogen. We know from the literature that a good compost has a C:N ratio between 10:1 and 15:1. This means that we need about 6 to 8% nitrogen to store CO<sub>2</sub> in the form of humus in our soil. If we lose nitrogen into the air unintentionally, carelessly or unknowingly, we will not only

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contribute to climate change unintentionally, but also lose an important component for the formation of humus on our arable land.

With this in mind, we will continue to deal with this issue for the next few years. And now let's be honest: In the last 70 years, we have increased the efficiency of agriculture. Tractors, combine harvesters, livestock and livestock farming have been increased by a factor of between 10 and 50. There have only been little changes in the way in which we handle and process our animal waste. Time to also turn to this issue in modern agriculture: Not only in order to save the climate, but also because the "MODERN FARMER" probably cannot afford not to handle their internal nutrients carefully in the future.



# Biochar

The topic of biochar is on everyone's lips. The benefits have been known FOREVER. Already 5,000 years ago, the Mayans proved that the enrichment of soils with biochar could bring a real boost to fertility. The (black) soil, which is widely known as "terra preta", is supposed to work true MIRACLES.

In fact, biochar has some physical properties that have a beneficial effect on compost or compost soil. Above all, it should be mentioned that the large surface area of biochar has similar properties to activated carbon. It can bind nutrients and therefore prevent their loss. In addition, biochar has a very high water retention capacity. In fact, emissions of nitrogen into the air or water are greatly reduced by the addition of biochar. This is also noticeable with potting soil because the ability to retain nutrients is significantly improved (keyword: long-term fertilisation).

BUT: Not all that shines is gold! Although biochar has the property of binding substances (nutrients), this also has a downside. If the few nutrients in a product are then also bound by the biochar, this has an untended effect. The biochar must therefore first be saturated or "charged". In most cases, this refers to the nitrogen. In addition, the approach of actively revitalising biochar, i.e. colonising it with microorganisms, is important. Compost plays an important role here.

If biochar is added to the compost, it is not only saturated with nutrients, but also revitalised by the bacteria and fungi in the compost. In principle, the following applies here: The earlier the better! Of course, you can add biochar to the finished product first, but then it behaves like adding soil to the compost: The earlier it is added, the better it is for the microorganisms in the layers to quickly integrate the nutrients into the new compost product. Ideally, biochar is added before the process, for example to raw materials that need it especially, such as very odour-intensive raw materials (manure or food waste).

© NGE



Pyrolysis plants are essentially furnaces without supply air. At temperature > 350°C, the raw material is carbonised and at the end of the process, the biochar remains!



© Betonwerk Koch GmbH

In addition, it makes sense to add biochar to the soil for long-term carbon storage. The following also applies: Be careful when applying biochar directly to the soil! This may result in temporary nutrient fixation. It is better here if the compost process in turn is carried out upstream – i.e. the charging process takes place in the windrow and therefore unwanted side effects are avoided.

## Which biochar is suitable?

First of all, the motto here is "Every grocer praises their goods!" or "Trust nobody!" In fact, every biochar has its own properties. The biochar can have different properties depending on the input materials, the process temperature or possible contamination. There are concerns that some raw materials are more or less suitable for carbonisation. From a purely financial point of view, of course, a fraction with a lot of sewage sludge is an attractive mixture. However, probably less advantageous from the point of view of the accumulation of heavy metals in compost and soil. Therefore the clear recommendation: Go to your trusted pyrolysis operator and get them to show you an analysis!

Finally, biochar is also accepted by the *United Nations Framework Convention on Climate Change (UNFCCC)* as a permanent carbon storage system.

COMPOnews 2024 / Biochar

In order to supply the pyrolysis plant with continuous raw materials, the drying process is carried out first. In this case, the screen overflows dried and homogenized in an earth flow process.

In the fortunate situation that the coal did not end up on the barbecue for the preparation of a hearty steak, but it is possible to demonstrate that it is used for agriculture and therefore that it is sustainably enriched in the humus in the soil, the operator is free to get certified and also to obtain CO<sub>2</sub> certificates for this. Since the biochar in the soil has significantly better life cycle assessments than pumping carbon dioxide back into boreholes, the attractiveness compared to other *CCPs (carbon capture projects)* should be significantly higher. But that's a different story!



After the reaction in the pyrolysis plant, the biochar is extinguished and can be used.





# Production of compost (manure) for viticulture

Although there is only low nitrogen loss in viticulture, the annual release of nitrogen from the grape harvest must be offset accordingly. The current practice in viticulture is to use greening mixtures with legumes (clover, grasses, etc.) and integrate them into the soil. However, the resulting bioavailable nitrogen is not permanently integrated into the soil conglomerate as a "free humus", but rather decomposes relatively quickly and represents only a conditionally satisfactory solution.

High-quality compost, on the other hand, is available in the long term due to the formation of long-chain clay humus complexes (permanent humus). Compost therefore creates the conditions for a sustainable nitrogen supply to the vine in organic viticulture. A partial over-supply of nutrients, which has an adverse effect on root growth and the wine quality, is therefore avoided.

It has also been proven by experts that the use of compost brings significant advantages for the soil (e.g. humus formation, water retention capacity) as well as for the soil life.

In a well-known Austrian winery, long-term comparative measurements showed that after 10 years of compost use, the humus content could be increased from an average of 2% in 2009 (1.8 – 2.2%) by more than 50% to about 3.3% (3 – 3.5%) in its vineyards. It is expedient to compost agricultural residues



Grape pomace as the main base product.

(e.g. cuttings, grape pomace, etc.) as well as straw manure and loamy soil and to produce valuable agricultural fertiliser for their own vineyards. However, in principle, a high constructional investment would be necessary due to the surface waterproofing with the appropriate collection of rainwater.

Composting on open topsoil is possible if the site is fundamentally suitable (based on a site assessment e.g. a distance > 50 m to the nearest surface water, flood safety, soil condition, slope of the terrain, a distance > 2 m to the highest groundwater level, etc.), but only if an annual processing quantity of < 300 m<sup>3</sup> is observed (specifications according to the latest composting technology, Austria).



The *Nitrates Action Programme Regulation* (2022) allows the processing of higher quantities if the site is suitable, but limits it to materials from the site owner's (own) agriculture and requires an annual change of location.

However, as a rule, for infrastructural reasons, composting always takes place in the same place, processing more than 300 m<sup>3</sup> per year and also using materials that do not come from the site owner's (own) agriculture (e.g. loamy soil, excavated soil, straw manure), in the Austrian federal state with the largest vineyard area (Lower Austria), a satisfactory exception for viticulture could be found by complying with the following points, provided that it is in principle suitable for the location:



Laborious manual application of the manure on the slopes of the Wachau valley.

- Once a year, small triangular windrows (max. 3.5 m base width / 1.6 m height) are set up and regularly turned (at least once a week at the start of the rotting process).
- No materials with a high water content – No moist putrescible materials or waste (e.g. lawn clipping from the garden area, moist cow manure).
- Materials mainly from agriculture and forestry (straw manure, grape pomace).
- Loamy soil as a conservation aid or additive to improve the rotting properties.
- Admixture of agricultural products, such as straw, clover, alfalfa, meadow grass/hay, legumes and maize straw improves the diversity of compost mixing.
- Compost is covered with fleece to improve the quality and protection against losses.

The main component of the input material for the rotting process is straw manure. All other components are added depending on availability.

In the autumn, after harvesting the grape pomace, it is immediately mixed with sufficient clay soil after pressing and therefore preserved until the windrow is set up in the following spring. Due to the dense storage, hydrolysis (silaging) occurs and there are no quality-reducing digestion processes (composting or fungal growth).



The windrows are set up at the end of the winter. "Preserved" material, "straw" manure and, if necessary, other agricultural materials are added based on a recipe tried and tested in *controlled microbiological composting (CMC)*.

After setting up the windrow, it is immediately mixed with the compost turner and irrigated if necessary. In order to be able to start the rotting process in a controlled manner and also provide an adequate oxygen supply, the windrow must be turned several times a week with a tractor-drawn compost turner and irrigated if necessary.

The finished compost is stored under a fleece cover protected from the weather at the end of the rotting process until it is applied in the form of windrows. In addition to temperature measurement, the CO<sub>2</sub> content is also measured and documented before each conversion process.

Without any structural and only minimal mechanical equipment (tractor + ST 200/230/300/350 compost turner, depending on the quantity to be processed annually), compost fleece (KSV 200, width depending on the windrow width) and a combined CO<sub>2</sub> and temperature measuring device, it is possible to document and sustainably produce quality-assured manure on site for viticulture.



© Farmárska Revue

At the end of a long journey: The manure is ready for use in the vineyard.





# Sewage sludge – the forgotten sources in the European Union

Sewage sludge is a classic provocative subject – when it comes to the term sewage sludge, people immediately think about the risk potential that could be lurking in it. Sewage sludge is generally described as a hazardous "pollutant sink".

However, it is not considered that sewage sludge is also a valuable resource – nitrogen, phosphorus and organic matter are needed in agriculture and are better off there than in an "incinerator" or in landfill. Studies from long-term applications with sewage sludge compost have shown that the organic matter in the soil has almost doubled over 20 years or that there is also a positive effect on the physical parameters of soil such as the pH value.

On average, about a quarter of the volume of sewage sludge produced has been directly applied to agriculture and an additional fifth has been composted in recent years in the European Union countries according to a Eurostat report. Agricultural countries such as France, Czechia, Hungary and Slovakia account for a much higher proportion than the EU average. Austria is fairly close to the European average.



## Sewage sludge is not just sewage sludge!

It has been shown that a large number of organic harmful compounds can be effectively degraded if the composting process is carried out properly. Therefore there is no reason to object, if suitable sewage sludge is still composted, taking into account the origin (municipal or industrial), potentially discharging industry (indirect dischargers), heavy metal content and also a potential for existing microplastics, and therefore returned to the cycle as a valuable resource.



# Sewage sludge composting in the EU Turda composting plant

📍 Câmpia Turzii, Romania

Within the scope of the regional EU project "Development of a water and wastewater infrastructure in the Turda region – Câmpia Turzii" a unique project was put into operation in Romania in March 2023. Located directly next to the sewage treatment plant and after almost a year of construction, the sewage sludge from the neighbouring sewage treatment plant can now be refined into high-quality compost together with agricultural structural material (straw from cereals, rapeseed and maize) and green waste. In addition to its use as a fertiliser in agriculture, it is also intended to produce crop substrates mixed with various materials from the compost.



It is the first sewage sludge composting in Romania, where work is being carried out in a closed facility with regularly turned triangular windrows. This method of operation produces high-quality compost. With the closed design, all exhaust air from the composting facility is collected and purified with a biofilter in order to keep the immission pollution to households located near the plant as low as possible.

|              |                                      |
|--------------|--------------------------------------|
| Operator:    | Compania de apa Aries                |
| Waste types: | Sewage sludge, straw and green waste |
| Capacity:    | 5.250 t/year                         |

Scope of supply: Engineering and consulting, 8 negatively aerated windrows, two-stage exhaust air treatment (biofilter with washbox), TracTurn, ST 350 compost turner for mixing, screening station, automated windrow temperature monitoring



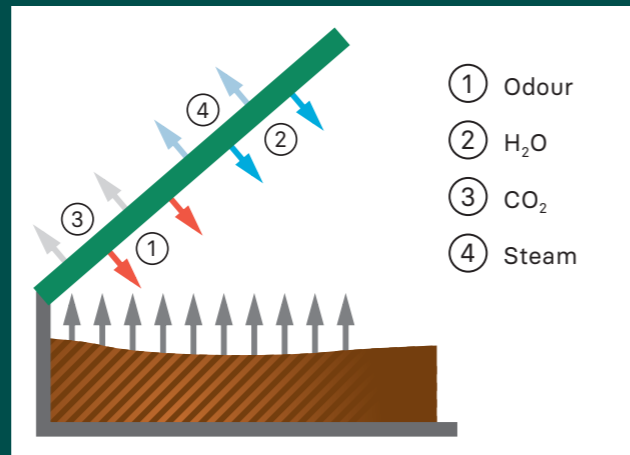
# Sewage sludge composting in the EU

## Osijek composting plant

Osijek, Croatia

In the composting plant in the city of Osijek, the green waste generated has been collected and composted for many years. In order to be able to make good use of the sewage sludge from the municipal sewage treatment plant, construction of the sewage sludge composting plant was started in autumn 2023. In the future, some of the green waste will be processed regionally together with the sewage sludge generated in Osijek and will again be used regionally in the cycle as fertiliser (compost or substrate mixtures).

The first odour-intensive phase takes place in 5 closed boxes. The boxes are covered with semi-permeable membrane. Due to the rising warm air, the membrane forms a layer of condensate in which odour molecules are dissolved and therefore retained. Each box is closed with a hydraulic door so that the material manipulation – filling, turning and emptying – can be carried out easily.



Function of a membrane.



|              |                            |
|--------------|----------------------------|
| Operator:    | Unikom                     |
| Waste types: | Sewage sludge, green waste |
| Capacity:    | 5 boxes                    |

Scope of supply: Engineering and consulting, aeration technology, ICA system, boxes with aeration including a hinged hydraulic door, automated windrow temperature monitoring



# Sewage sludge composting in the EU

## Lengel composting plant

Pottendorf, Austria

Lengel GmbH has been operating several composting plants in Eastern Austria for more than 25 years. For many years, we have been able to support Lengel GmbH with technical approvals. The Compost Systems aeration system has also been used successfully since 2009 at their composting plant in Markgrafneudsiedl to ensure the aerobic degradation phase in the composting of organic waste, green waste, digestate and sewage sludge.

In the summer of 2023, the construction of the next approx. 10,000 t Lengel plant in Pottendorf was completed. The water table was almost the same level at the planned location so this required an increase in the rotting area and also only an elevated tank was possible instead of a leachate collection tank.

Biogenic waste such as green waste and sewage sludge are processed into compost and fertiliser for agriculture with the operator's many years of experience.



|              |   |
|--------------|---|
| Operator:    | Lengel GmbH                             |
| Waste types: | Sewage sludge, biowaste and green waste |
| Capacity:    | 9.900 t/year                            |

Scope of supply: Engineering and consulting, aeration technology, ICA system, automated windrow temperature monitoring



# Sewage sludge composting in the EU

## Elbląg composting plant

📍 Elbląg, Poland

Elbląg is an almost 800-year-old city with over 120,000 inhabitants in north-eastern Poland, directly on the "Highlands in the Vistula Delta", a nature protection area protected by Natura 2000.

One of the most important environmental investments in Elbląg in recent years was the reconstruction and expansion of the sewage treatment plant with its associated composting. The work was completed at the end of 2023, with a total investment volume of 42 million euros.



In addition to the expansion of the sewage treatment plant, the existing composting was also upgraded. It is now possible to convert sewage sludge and straw into high-quality compost in 8 weeks instead of the previous 6 months, while at the same time improving the quality of the end product. Suction aeration is used during the first 4 weeks of the composting process and the exhaust air is purified with a scrubber or biofilter to reduce the higher emissions at the start of the rotting process to a minimum. A compressed aeration system is used during weeks 5 to 8 of the rotting process to ensure an aerobic windrow stack. All relevant process parameters (windrow temperature, aeration duration, biofilter temperature, etc.) are recorded and controlled by a control system. In addition, the plant has been covered to eliminate the impact of precipitation.

In the winter months, it is possible to extract preheated air from a windrow using a special "heating function", and blow it into a freshly set up windrow, thereby rapidly preheating it to a mesophilic windrow temperature and therefore accelerating the rotting process.

In addition to composting technology and exhaust air purification, Compost Systems also supplied the TracTurn compost turner and a screening station with a wind sifter.

The installation of the aeration system, the optimisation and reorganisation of logistics as well as the exhaust air purification with a scrubber and biofilter have significantly reduced the odour emissions of the plant and eliminated a major point of conflict with the residents during the last 20 years of operation.



Biofilter with a washbox.



Stationary wind sifter including a screening station.



|              |   |
|--------------|---|
| Operator:    | Elbląskie Przedsiębiorstwo Wodociągów i Kanalizacji (WPWiK) |
| Waste types: | Sewage sludge, biowaste, straw/structural material          |
| Capacity:    | 25.300 t/year   |

Scope of supply: Engineering and consulting, 4 negative + 4 positively aerated windrows, material preheating system, storage boxes with aeration, automatic control system with windrow temperature monitoring, two-stage exhaust air treatment (biofilter with washbox), TracTurn, screening station





## Waste treatment in Poland

# ZGO GAĆ composting plant

📍 Wrocław, Poland

The plant in Gać was constructed in 2013 and was originally used to stabilise mixed municipal waste. In a first expansion step, a fermentation stage was added for 0 – 60 mm fractions and the digestate was then stabilised in the existing COMPOboxes. With this concept, Gać was considered one of the most modern waste management plants in Poland more than 10 years ago.

In light of the requirements of the European Union to increase recycling rates and the immediate resulting separate collection of biogenic waste, a significant increase in waste flows was expected for the Gać plant and a further expansion had to be carried out.

One advantage of the COMPObox system is its modularity. The boxes can be filled with different input materials depending on the amount of material used. This made it easier for the operator to decide on and implement the expansion of their plant. Within the scope of the expansion, a new box has been constructed mainly for the composting of green waste and integrated into the existing control system. The existing monitoring system (temperature and oxygen) in the existing boxes has also been replaced.

With the new box, it will now be possible to treat the resulting material flows selectively based on their properties.



|              |   |
|--------------|---|
| Operator:    | ZGO in Gać  |
| Waste types: | Household waste, digestate, (separately collected) biowaste |
| Capacity:    | 33,000 t/year (6,000 t/year due to the new expansion)       |

Scope of supply: Engineering and consulting, installation of a new box with aeration and irrigation including a hinged hydraulic door and monitoring, replacement of the irrigation system (clean water and wastewater) in all existing boxes, replacement of the control system with temperature, oxygen and moisture measurement

## Waste treatment in Poland

# ELWOZ ECO plant expansion

📍 Chlewnica, Poland

Since 2014, the private operator ELWOZ ECO has been operating a stabilisation plant for mixed municipal waste in Chlewnica with Compost Systems technology based on the COMPObox system. In order to achieve the recycling rate of 50% for biowaste in Poland from 2025 and to be able to use compost as fertiliser for agriculture, ELWOZ decided to expand its existing plant and add an additional covered, aerated maturation system and 2 aerated boxes for compost storage.

The intensive first phase of the composting process of the separately collected biowaste takes place in 2 closed boxes. After about 4 weeks, the maturation process is continued in a covered and aerated maturation system with regular turning (TracTurn side movement system). After a further 8 weeks, the compost is screened and stored in an aerated compost storage area until it is used as fertiliser in agriculture. In addition, a simple plant for the treatment and aeration of the leachate has been constructed to ensure the circulation of the wastewater.



|              |   |
|--------------|---|
| Operator:    | ELWOZ ECO   |
| Waste types: | Household waste, (separately collected) biowaste      |
| Capacity:    | 16,000 t/year (6,000 t/year due to the new expansion) |

Scope of supply: Engineering and consulting, adaptation of the existing composting boxes (construction of an aerated maturation area as well as an aerated compost storage facility, leachate treatment and aeration)



## Waste treatment in Poland

# Tarnów plant modernisation

📍 Tarnów, Poland



Tarnów is a city in southern Poland, about 80 km from Krakow. The city is currently implementing the "Zielony Tarnów" (Green Tarnów) programme, which aims to increase the proportion of green spaces and improve air quality.

A composting plant has been operated by the municipal waste management company in Tarnów (MPGK Tarnów) for many years. This is now to be adapted to the requirements of the latest technological standards in order to be able to process up to 20,000 t/year of separately collected biowaste and green waste in the future.

Protected from the weather under one roof, the biogenic waste is set up on in 8 aerated windrows and regularly turned. In addition, an irrigation system has been installed to keep the water content in the optimum range at all times. The temperature is measured wirelessly and documented to demonstrate adequate hygienisation. The aeration is also controlled depending on the windrow temperature.



|              |                       |
|--------------|-----------------------|
| Operator:    | MPGK Tarnów           |
| Waste types: | Biowaste, green waste |
| Capacity:    | 20.000 t/year         |

Scope of supply: Engineering and consulting, aeration and irrigation system for windrows, control system, temperature measurement system in the compost material



## Waste treatment in Poland

# Start of construction of the Olsztyn plant

📍 Olsztyn, Poland

Olsztyn, located in the north-east of Poland, with its approximately 180,000 inhabitants is the capital of the Warmian–Masurian Voivodeship (administrative district) and is very popular for tourism thanks to 2 national parks and 120 nature reserves.

The construction of the composting plant was started at the end of 2023 in order to process up to 20,000 t/year of biodegradable waste from the city of Olsztyn into high-quality compost from the end of 2024.

There are 8 aerated windrows available for this purpose. These are aspirated and the exhaust air is purified with a scrubber or biofilter. The windrows should be turned regularly with the TracTurn side movement system.



|              |                                   |
|--------------|-----------------------------------|
| Operator:    | R-Terra Sp. z o.o.                |
| Waste types: | Biowaste, green waste, food waste |
| Capacity:    | 20.000 t/year                     |

Scope of supply: Engineering and consulting, aeration and irrigation system for windrows, exhaust air treatment, control system, process water treatment system, temperature measurement system in the compost material



# Waste treatment in Croatia

📍 Šibenik, Piškornica and Babina Gora, Croatia

In Croatia, the European Union's requirements for the separate collection of waste have been successfully implemented in recent years.



© Jure Orlić / Pixabay

Biogenic waste and plastics are collected separately, the remaining residual waste is processed in 11 regional waste treatment centres (CGO – centar gospodarenje otpad) – distributed throughout the country. Reusable recyclables are sorted out there, the biological fraction is stabilised in accordance with the requirements of the Croatian Landfill Ordinance and deposited in a newly constructed landfill facility connected to the waste centre.

To date, three of these centres have already been put into operation. The newest of the three CGO *Bikarac* plants near the popular tourist town of Šibenik, with a treatment capacity of 40,000 t/year, uses Compost Systems technology to stabilise the biological waste fraction.



The next two waste treatment centres, which are now being constructed, will also be equipped with Compost Systems technology.

The *RCGO Piškornica* centre is part of the region of north-west Croatia with the two largest cities Koprivnicka and Varasdin. In the future, the waste generated by 110 cities and municipalities with around 530,000 inhabitants will be treated there.

On an area of almost 50 hectares, a sorting plant and mechanical treatment facility are being constructed as well as a biological drying system with a downstream biological stabilisation stage and a residual waste and inert material facility. The total investment is around 100 million euros.



Up to 100,000 t/year of residual waste can be processed in a section of the mechanical-biological treatment plant (MBT). This becomes recycled material (e.g. iron), substitute fuel (RDF) and stabilised landfill fraction.

The *RCGO Babina Gora* centre is located in the heart of Croatia, not far from the city of Karlovac. The catchment area comprises a total of 20 towns and cities and surrounding communities with about 135,000 inhabitants.

In addition to a sorting plant and mechanical treatment facility, a biological stabilisation stage and a residual waste landfill facility are being constructed on an area of almost 30 hectares. The total investment is around 44 million euros.

The MBT processes up to 30,000 t/year of mixed residual waste.

With the implementation of the 11 regional CGOs, Croatia will in future have the appropriate plant technology for the treatment of municipal waste in accordance with the European standard (BAT – best available technology).



# Waste treatment in Greece

📍 Tripoli, Kalamata and Sparta, Greece

Anyone who wants to construct plants on the beautiful Peloponnese in Greece should expect ancient stumbling blocks. And this is in the truest sense of the word.

Attentive readers of the last edition of COMPOnews 2022 may remember an article about this project with Terna Energy. In recent years, we have been able to implement a great project on the wonderful peninsula in Greece, consisting of three state-of-the-art waste treatment plants. A large proportion of the waste from the Peloponnese will be treated at three sites near Tripoli, Kalamata and Sparta. These three plants have a total capacity of more than 200,000 tons of waste per year and not only produce CLO (= compost like output), but also generate energy in the form of biogas. This energy is used to supply about 6,000 households in the area.



Archaeological finds caused unforeseen delays in the construction of the plants. Unfortunately, not all plants have been able to be put into full operation yet. We are looking forward to the last of the three plants switching to full operation in the near future.

The largest of the three plants in Tripoli went into test operation in February 2022. Since spring 2023, the plant has been in full operation with a capacity of over 100,000 tons of domestic waste per year. The biological waste treatment stage is carried out in the form of a combined anaerobic-aerobic process. The upstream fermentation process produces biogas, which is converted into electricity in a 1.5 MW CHP (combined heat and power plant).



A completed compost facility at the Tripoli plant.



The plant in Sparta is already in full operation.

The Sparta plant has also been in full operation since spring 2024. This is the smallest of the three plants, without a biogas stage. The annual capacity of the plant is about 40,000 t. During the construction of this plant, there was a time delay due to archaeological finds and their excavations, which unfortunately could not be fully recovered in the course of the construction of the plant.

The longest time delays have occurred on the Kalamata site due to the archaeological finds. However, the plant has been in test operation here since spring 2023. In spring 2024, the plant will switch to full operation mode after the successful commissioning of the fermentation stage.

In the course of this project, we were not only able to act as a full-service provider for the aerobic treatment and exhaust air treatment, but we were also able to get to know the beautiful Peloponnese and work in an area where others spend their holidays.

|              |                 |
|--------------|-----------------|
| Operator:    | Terna Energy    |
| Waste types: | Household waste |
| Capacity:    | 200.000 t/year  |

Scope of supply: Engineering and consulting, aeration technology, ICA system, air purification, TracTurn, membrane roller and membrane



# Waste treatment in Greece

## Thess Compost

Thessaloniki, Greece



The plant processes presorted municipal biowaste and plant-based agro-industrial waste to produce high-quality, quality-assured compost that meets European standards. With a licence to process up to 5,470 tons of biowaste and 18,250 tons of agricultural waste, the plant has a total capacity of 23,720 tons of input material.

Composting at the Thess Compost plant is done in large, fleece-covered, aerated triangular windrows, which are turned regularly. Of course, active aeration supplied by Compost Systems is used on the plant.

The wireless temperature probes transmit the necessary temperature data, the METIZ software controls the process fully automatically and documents the hygienisation of the raw material in accordance with the Animal Material Ordinance. A tractor-operated Compost Systems branded compost turner with a windrow width of 4 m is used as the compost turner. The plant has also been equipped with a screening station with an efficient wind sifter.

European directives such as the Green Deal's "Farm to Fork" strategy, the common agricultural policy and national legislation provide the framework for sustainable biowaste management and drive the demand for high-quality compost in organic farming. However, Greece currently lacks the necessary infrastructure, legal framework and control. The aim of Thessaloniki Composting is to set a certain standard in the industry as a flagship project and to lend stimulus to the production of premium products in the compost industry in Greece as a model plant.

Greece has pursued an ambitious environmental policy that focuses on waste reduction and the introduction of alternative waste management concepts with the ultimate aim of establishing an efficient circular economy. Mandatory legal requirements for the separate collection and treatment of organic waste, coupled with the global trend towards recycling, the presence of numerous large hotels and strong local agriculture, are factors that will definitely promote the development of efficient composting.

Thessaloniki Composting was founded in 2019 and is jointly owned by Compost Systems GmbH and the Greek climate technology company Melion Labs EE. The composting plant is located on an 11-hectare plot in central Macedonia, 40 km from Thessaloniki city centre. Its customers include municipalities and private customers such as high-quality food producers, plant nurseries, garden owners and hotels in the western region of Thessaloniki, Pella, Imathia and the surrounding areas within a reasonable transport radius.

# Biological waste treatment in Slovakia

Compliance with the European Union's legal regulations regarding the reduction of the biogenic content in residual waste has resulted in the construction of numerous composting plants over the past two years. To keep transport distances short, decentralisation is being strategically pursued.



Composting in a closed system (CSC or box) and subsequent maturation.



## Composting separately collected biogenic waste

In accordance with the EU regulations on the separate collection of biogenic waste, green waste has been collected and composted in Slovakia since 2016. Since 2021, every household must be connected to the collection system for food waste. The separately collected food waste has to be hygienised as Category III at 70°C for a minimum of one hour according to the Slovak national regulations. To make the existing green waste composting plants "fit" for Cat. III material, it makes sense for smaller plants to have a CSC-Container upstream or, in the case of larger quantities, to erect closed boxes.



## Composting in CSC-Containers

Smaller plants use CSC-Containers: These units are able to hygienise between 20 m<sup>3</sup> and 30 m<sup>3</sup> depending on the version. The container can be easily manipulated and emptied using a standardised hook lift system. With a membrane as the container roof, this prevents the release of odour-intensive degradation products into the environment. After hygienisation is complete, the material can continue to be processed in an open plant.



### Čadca

Capacity: 900 t/year  
 Input: Kitchen waste, green waste  
 Number of containers: 3  
 Maturation: Windrow composting

Delivery incl. screen and compost turner



### Trebisov

Capacity: 2,800 t/year  
 Input: Kitchen waste, green waste  
 Number of containers: 3  
 Maturation: aerated windrow composting



### Bošaca

Capacity: 900 t/year  
 Input: Kitchen waste, green waste  
 Number of containers: 1  
 Maturation: aerated windrow composting



### Mepos

Capacity: 250 t/year  
 Input: Kitchen waste  
 Number of containers: 1  
 Maturation: Windrow composting



### Tvrdošín

Capacity: 1,500 t/year  
 Input: Kitchen waste, green waste  
 Number of containers: 3  
 Maturation: aerated windrow composting

## Additional plants with CSC-Containers currently in progress:

### Befte

Input: Kitchen waste, green waste  
 Number of containers: 2

### Ekobard BJ

Input: Kitchen waste, green waste  
 Number of containers: 1

### Hater Handlova

Input: Kitchen waste, green waste  
 Number of containers: 1



### Humenné

Capacity: 250 t/year  
 Input: Kitchen waste  
 Number of containers: 1  
 Maturation: Windrow composting



### Zlaté Moravce

Capacity: 1,820 t/year  
 Input: Kitchen waste, green waste  
 Number of containers: 4  
 Maturation: aerated windrow composting



Watch our video on how our CSC-Container works!



## Plants with closed boxes

The *COMPObox* system is used for higher annual throughputs. In this system, hygienisation is carried out in a box that is closed with a hinged door. After hygienisation is completed, the phase in the boxes can still be extended to obtain odour-stable material for further treatment on the open maturation system. The exhaust air treatment can be carried out in a similar way to the CSC-Container using a membrane or a separate exhaust air treatment system with a washbox and biofilter).



### Dolný Hričov

Capacity: 5,000 t/year  
 Input: Kitchen waste, green waste  
 Number of boxes: 3  
 Maturation: Windrow composting

Delivery incl. screen, compost turner and fleece winder



### Kežmarok

Capacity: 3,000 t/year  
 Input: Kitchen waste, green waste  
 Number of boxes: 3  
 Maturation: aerated windrow composting

Delivery incl. screen and compost turner



### Partizánske

Capacity: 3,300 t/year  
 Input: Kitchen waste, green waste  
 Number of boxes: 3  
 Maturation: aerated windrow composting



### Brezno

Input: Kitchen waste, green waste  
 Number of boxes: 3  
 Maturation: aerated windrow composting



### Puchov

Input: Kitchen waste, green waste  
 Number of boxes: 3  
 Maturation: aerated windrow composting

## Composting in bays

The first hygienisation phase or odour stabilisation can take place in bays, which are covered with a membrane. The exhaust air treatment is carried out using a membrane as in a CSC-Container.



Contact our team and convince yourself of our composting solutions!



Delivery incl. membrane winder



### Trnava

Capacity: 4,990 t/year  
 Input: Kitchen waste, green waste  
 Number of bays: 8

Delivery incl. screen membrane winder



### Levice

Capacity: 3,500 t/year  
 Input: Kitchen waste, green waste  
 Number of bays: 6

## Plants for the processing of municipal solid waste (MSW)

With the amendment of the Slovakian Landfill Ordinance, it is no longer possible in Slovakia to put waste to landfill if it contains more than 5% (m/m) organically bound carbon (TOC) without it being treated. Operators are therefore forced to introduce a biological treatment step, as is common practice in the EU, to be able to continue operating the existing landfills for bulk waste. In a similar manner to countries such as Poland, Slovenia, Czechia or Greece, Slovakia follows the concept of a classic MBT plant (mechanical biological treatment plant). We have already planned several plants and the *Envigeos plant* is the first one to be put into operation.

Delivery incl. compost turner



### Envigeos

Capacity: 5,000 t/year  
 Input: MSW  
 Number of boxes: 3  
 Maturation: Windrow composting



# Treatment of cannabis waste in CSC-Containers

📍 Cannabis farms, Israel



The cultivation of medical cannabis has started in Israel over the last decade and has since become a major production segment with high economic value. The production of medical cannabis in Israel is limited to greenhouse farms that operate under controlled conditions to ensure the best production processes. The production is regulated and monitored by the *Israeli Medical Cannabis Authority (IMCA)*, a department of the Ministry of Health. The IMCA regards cannabis farms as a pharmaceutical industry and not as an agricultural business. The production processes and protocols therefore comply with high standards, including all aspects of biological safety, occupational safety and environmental protection.

According to local law, the cannabis plant including all its parts, is considered a dangerous drug. The implementation of this law impacts the entire production system. Cannabis farms are closed facilities behind fences with routine controls, only authorised workers and visitors are allowed to enter the farms and any delivery must be carried out with guarded transport. These strict regulations also concern the treatment of plant residues from

cannabis farms. These are also considered drugs and must therefore be treated with special care.

The cannabis plant produces a considerable amount of waste. The branch sections collected during the growth cycle form the majority of this waste. According to the preliminary instructions given to producers, cannabis waste had to be incinerated, either in small in-house incinerators or in external plants. On-site incineration proved to be very expensive (high labour and fuel costs) and problematic (air pollution). The external incineration was also very expensive due to the strict requirements for secure transport. Both the IMCA department officials and growers were looking for a suitable solution for the cannabis waste.

The CSC-Container developed by Compost Systems was launched on the Israeli market by *Nativ Recycling Ltd.* The idea of composting cannabis waste in CSC-Containers was created as a joint venture between two companies: *Shiloni Organic Recycling*, a contractor engaged in compost production and agricultural services, and *Nativ Recycling Ltd.*, Compost System's Israeli agent.

The first attempt to compost cannabis waste took place in 2020 at a cannabis farm. The requirements that the IMCA set for the process were as follows: The process must take place completely in a container, the process must be carried out without external additives, the process must lead to a stabilised product and, most importantly, the process must eliminate all the active ingredients present in the cannabis waste.

During a three-week trial in which a CSC-Container was filled with cannabis waste, an orderly composting process was demonstrated, maintaining temperatures above 55°C, resulting in dry and stabilised compost. Chemical analyses of the product show that the active cannabinoids, including THC and CBD, have been completely eliminated by the composting.

Based on the promising results from the trial, the IMCA approved the composting with CSC-Containers as an acceptable solution for the treatment of cannabis waste. Since then, a dozen cannabis farms, especially the larger players in the market, have introduced the composting container solution as a waste treatment method.



The CSC-Container is located in the waste collection station within the farm. All cannabis waste is brought there, weighed and documented. The waste is shredded with an electric macerator and filled into the container. It is routinely loaded with waste for several weeks until it is fully filled. After another three weeks of keeping the container closed and active for complete stabilisation, it is taken to a composting station where the compost is unloaded and mixed with other compost.

The operation is controlled and monitored by the IMCA. The data collected by the container's sensors and the operators, including input quantities and process temperatures, is documented and sent to the IMCA. This allows the regulatory authorities to ensure that all waste is treated and the composting process leads to a product free of active ingredients.

The operational team at *Shiloni Organic Recycling* works with the professional support of *Nativ Recycling Ltd.* Hand in hand with cannabis growers to find the best and most efficient solution for cannabis waste. After three years of commercial operation, the majority of cannabis waste is now successfully treated with the CSC-Container. According to the growers, this solution is very easy to use, requires minimal work, consumes minimal energy and has no impact on the environment.





Closed windrow composting



Sheltered windrow composting



Open windrow composting









# CSC-Containers in France and Croatia

## France



France is an emerging market for the CSC product line. Several CSC-30 composting containers are now in use by customers and more will be supplied in the near future. CSC-Containers are often used on the composting plants as the first stage in the biological process. This is also the case with French customers who use CSC-Containers primarily for the hygienisation of food waste from municipal collections, canteens and restaurants.



With this in mind, Compost Systems has adapted its successful CSC product line for the French market and enhanced it with some features for even more effective deployment of personnel. These include, above all, a (manual) hydraulic system for opening and closing the roof and a ladder as a climbing aid, which can be locked in place for transporting and manipulating the container.



CSC-Container at ValOrbioCompost.

CSC-Containers at the Savoie Dechet plant.



## Croatia

In Croatia too, the CSC product line has been successfully positioned in the market in association with the national implementation of the European Union's requirements for the separate collection of biogenic waste. The hygienisation of food waste is also the focus of attention. Several CSC-30 composting containers are now in use in Croatia, which have been enhanced with country-specific features. As there are a lot more hours of sunshine in Croatia, it was clear that the (low) CSC energy requirements would be effectively met. The majority of CSC-Containers were therefore coupled to PV systems.



CSC-Containers and PV system



Biofilter of a CSC-Container.

In addition, it is important for tourist communities in Croatia to minimise the risk of odour development over and above the standard in the course of the course of composting beyond the standard composting. In order to comply with this understandable request, the CSC composting containers allow a mobile biofilter to be connected next to the membrane.



# Goldeimer gGmbH - CSC-Container and Earth Flow system

📍 Hamburg, Germany

## P2GreeN project

The P2GreeN Project is an international innovation project funded by the EU within the scope of the "Clean environment and zero pollution" call for funding entitled "Closing the gap between fork and farm for circular nutrient flows" ([p2green.eu](http://p2green.eu)). It aims at closing nutrient cycles and will be evaluated at regional level on the basis of demonstration projects.

The decentralised processing of digested food is intended to reduce nutrient losses to the environment and make compost usable for the cultivation of food.

The North German Plain is a pilot region for this project and includes rural areas in Lower Saxony and Brandenburg. Sustainable sanitary systems with material flow separation are installed here. *Goldeimer gGmbH* will process the collected raw materials into recycled fertilisers by composting them; the fertilisers will then be used for agricultural production in field trials.

The first recycled fertiliser of this kind is to be applied to the fields this year (2024).



CSC-Container for the hygienisation of the material.



After a detailed analysis of the technologies and machinery available on the market, *Goldeimer gGmbH* decided to opt for the innovative container-based solutions from Compost Systems for the implementation of this promising and sustainable project.

In addition to an existing *CSC-Container (CSC-30)* for the hygienisation, Compost Systems supplied an *Earth Flow system (EF-IM-40)* for the composting. These two machines ensure an effective operation because they can be operated remotely with minimal effort thanks to the automation options and the location-independent monitoring.

The material is composted for about three weeks in the Earth Flow system.

## Process

The human waste produced in the sustainable sanitary systems with material flow separation (in waterless toilets) is collected and brought to the plant. In the first step, these are hygienised in the CSC-Container according to the authority's specifications. The material is then introduced into the Earth Flow system with the addition of additives. The material is composted (main rotting stage) for about three weeks in the Earth Flow system.

During this composting process, the integrated mixer unit also conveys the material from the filling to the unloading side. There it is removed and brought to the maturation system or later to the compost storage facility.

The recycled fertiliser produced in this biological process offers a balanced and stable nutrient ratio and is in comparison to phosphate mineral fertiliser, which is derived from wastewater or sewage sludge, not contaminated with heavy metals.







# Earth Flow system made of precast concrete parts

📍 *Betonwerk Koch GmbH – Mattersburg, Austria*

In close cooperation with our long-term partner, *Betonwerk Koch GmbH*, the idea originated to operate the automated composting process in an *Earth Flow* system in a completely newly conceived precast concrete part construction.

While the capacity of the container-based variants is determined by the design, the precast concrete parts can be seamlessly aligned next to each other with their integrated aeration pipes. This opens up design possibilities that can be perfectly matched to the customer.

In addition to the Earth Flow composting system, the KOCH concrete plant operates a state-of-the-art pyrolysis plant for the production of biochar. In addition to composting, Koch uses the Earth Flow system for the efficient technological drying of residual materials containing carbon.

The automatic mixing and aeration of wood chips, bark mulch or compost screen overflow, which is adapted to the material, ensures a quick and effective reduction of the water content and therefore forms an optimal starting situation for the subsequent biochar processing in the pyrolysis plant. The waste heat from the pyrolysis plant is used to preheat the air injected into the Earth Flow system. This sustainable method not only contributes to the reduction of waste volumes, but also enables the production of a valuable and environmentally friendly raw material that can permanently store CO<sub>2</sub>.

The first test runs by Betonwerk Koch GmbH were extremely successful and all project partners are enthusiastic about advancing this innovative technology.





# Plant upgrade in Austria

## Grüne Tonne

📍 Breitenau, Austria

Text: Dipl. Ing. Michael Schick,  
Composting plant of Reinhalteverband Grüne Tonne GmbH

Since 1992, waste from the organic waste bins of around 87,000 inhabitants in the district of Neunkirchen has been composted at our site in Breitenau. An increase in the collection volume due to the improvement of the collection level as well as an increase in the population required an initial expansion of the plant in 2007.

In order to improve the emission performance requirements of the plant and to increase the quality of compost, we made the decision at the beginning of 2023 to fundamentally upgrade our approximately 30-year-old plant. By retrospectively installing an aeration system under the lines of windrows, we can guarantee aerobic rotting windrows over the entire rotting period. As a result – and due to the extraction of the windrow air during the initial weeks with subsequent exhaust air purification – the system emissions have been significantly reduced.



A scrubber and downstream biofilter significantly reduce the odour-intensive initial composting phase. We have also reduced the windrow cross-section slightly to improve aeration through the natural chimney effect. Due to the switch in logistics to side movement, significantly better space utilisation and a longer storage capacity for the finished compost could be achieved.



Educational work in the association's area and strict rejection of deliveries that are too heavily contaminated already achieve an improvement in the contaminant level in the material supplied. In addition, due to its low rotor speed, the compost turner now used provides a better mixing and less aggressive treatment of the rotting material. It now "destroys" contaminants (plastic) much less and these can be efficiently separated at the end of the rotting process.

Due to the modifications carried out, our plant even surpasses the latest composting technology. We can produce about 4,000 m<sup>3</sup> of grade A+ compost each year (the highest grade, suitable for organic farming), which is mainly distributed to farmers in our area.



Aeration for the leachate aerobisation

Operator: Reinhalteverband GRÜNE TONNE Neunkirchen

Operational since: 1992 and 2023

Waste types: Biowaste, green waste and sewage sludge

Capacity: 16.000 t/year

Scope of supply: Engineering and consulting, ICA system, aeration technology, exhaust air systems, automated windrow temperature monitoring, TracTurn, fleece and fleece roller



## Plant upgrade in Austria

# 25 years of experience with aeration

📍 Klosterneuburg, Austria

The composting plant in the municipality of Klosterneuburg was constructed in 1991 and in 1999 – 25 years ago – it was one of the first plants in Austria to be upgraded with a Compost Systems aeration system to optimise the rotting. Since this time, aerobic and odour-reduced rotting has been guaranteed.

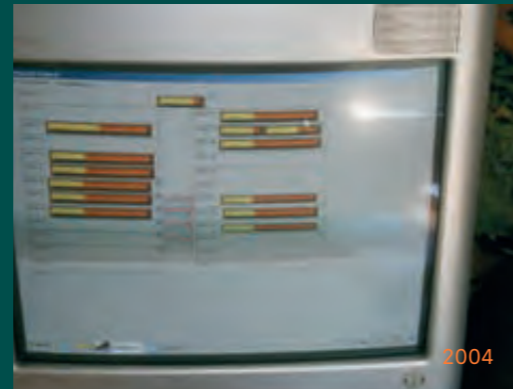
The plant processes separately collected organic waste and green waste from private gardens and the municipal parks in the district of Klosterneuburg.

Operations began on a 3,600 m<sup>2</sup> asphalted area, which was extended by 3,400 m<sup>2</sup> in 1994. Continued complaints from the neighbours about unpleasant odours led to the decision in 1998 to upgrade the main rotting area with an aeration system.

Aeration slots were cut into the existing area parallel to the ongoing operations and the aeration pipes were laid. The plant was put into operation in 1999 with a simple interval control system.



In 2013, the simple time control system for the aeration fans was replaced by a temperature-controlled solution and wireless radio measuring probes to monitor the windrow temperature. All the records for the production of quality compost according to the Compost Ordinance are now captured electronically.



Dietmar Schuster, Head of Farming Division

In 2024, it was time to keep pace with technology – the control system was updated, the visualisation system was switched to METIZ Pro and therefore became Win11-compatible and the temperature measuring probes now transmit with a WLAN signal.

Over the last three decades, the plant has grown continuously and now covers an asphalted area of 1.4 hectares. In addition to compost, wood chips are also produced for a district heating plant. Due to ongoing investments, the plant complies with the latest Austrian technological standards as a basis for the production of high-quality compost despite its age.



Gerald Kainzbauer, Composting Plant Manager and Thomas Pöll, Head of Waste Division





# Measuring is knowledge...

...and knowledge, as we know, is power.  
This is also the case in composting.

The more you know about your process, whether in a small private pile or on a large industrial plant, the more "power" you have over it. Composting is a complex process with many interdependent parameters. The more you know about it (and a lot can only be determined if you measure it), the more information you can gather about your composting process. This helps to better understand composting, reduce emissions and produce quality compost.

Our range includes many suitable measuring devices – from the digital thermometer with second reading (measuring the temperature is a MUST) to the digital windrow gas measuring device. This measures the most important windrow gases as standard, CO<sub>2</sub>, CH<sub>4</sub> and O<sub>2</sub>, but the measuring device can be equipped with up to five additional sensors. For all those who want to know more about it and want to grapple with the biological chemical processes in order to optimise their compost quality, there is the CMC measuring case, which is a complete field laboratory for the analysis of nitrate, nitrite and ammonium as well as sulfides, amongst other things.

The digital CO<sub>2</sub> measuring device with temperature measurement is new to the range. A low-cost entry-level version for determining aerobic rotting conditions while simultaneously measuring temperature.

And since we ourselves are great supporters of measuring these parameters and also collecting the measured data, we have been travelling in recent years to many national and international plants to collect data. This allows the composting process to be mapped and continuously improved. In this way, we have already been able to help various plant operators, especially those who have had to deal with complaints about odours, to better understand and optimise their process. And, reducing emissions usually also means upholding neighbourly relations. The compost quality has incidentally also been improved. A win-win for all involved!



Over the years, an extensive measurement programme has been established, which we recommend to our customers and partners. The print template of such a measurement log including comprehensive tips on measurement as well as a smart digital version of the measurement log can be found on our homepage for free download. In this way, we want to help plant operators understand, manage and optimise their processes. We have developed a new method to obtain representative samples of odour emissions over an

entire windrow segment, especially for the extraction of odour samples from composting plants.

A representative segment of the windrow is covered for this purpose. The chimney effect results in an exhaust air flow from which an odour sample is obtained – compared with active extracts from spot cover measurements, we get a much more realistic picture of the odour emissions from the entire windrow surface.

| windrow section | point of measurement | set up     | last turning | material age [weeks] | T [°C]     | CO <sub>2</sub> [Vol.-%] | CH <sub>4</sub> [Vol.-%] | O <sub>2</sub> [Vol.-%] | squeeze test (dry, ok, wet) | MC [%] | pH  | note           |     |                              |
|-----------------|----------------------|------------|--------------|----------------------|------------|--------------------------|--------------------------|-------------------------|-----------------------------|--------|-----|----------------|-----|------------------------------|
| 1A              | 0,5 m                | 10.08.2023 | 14.10.2023   | 10                   | 46,1       | 18,0                     | 0,0                      | 4,6                     | etwas trocken               | 39     | 7,9 | before turning |     |                              |
|                 | SP                   |            |              |                      | 48,3       | 21,4                     | 0,0                      | 2,3                     |                             |        |     |                |     |                              |
| 1B              | 0,5 m                |            |              |                      | 49,0       | 7,7                      | 0,0                      | 12,4                    |                             |        |     |                |     |                              |
|                 | SP                   |            |              |                      | 57,3       | 20,6                     | 0,0                      | 0,9                     |                             |        |     |                |     |                              |
| 1C              | 0,5 m                |            |              |                      | 51,2       | 6,9                      | 0,0                      | 13,5                    |                             |        |     |                |     |                              |
|                 | SP                   |            |              |                      | 53,6       | 11,2                     | 0,0                      | 9,9                     |                             |        |     |                |     |                              |
| 2A              | 0,5 m                |            |              | 24.08.2023           | 14.10.2023 | 8                        | 56,5                     | 14,1                    | 0,0                         | 6,2    | ok  | 53             | 8,1 | before turning               |
|                 | SP                   |            |              |                      |            |                          | 62,4                     | 14,0                    | 0,0                         | 5,7    |     |                |     |                              |
| 2B              | 0,5 m                |            |              |                      |            |                          | 55,2                     | 6,4                     | 0,0                         | 13,4   |     |                |     |                              |
|                 | SP                   |            |              |                      |            |                          | 63,2                     | 8,6                     | 0,0                         | 12,8   |     |                |     |                              |
| 2C              | 0,5 m                |            |              |                      |            |                          | 57,1                     | 11,8                    | 0,0                         | 10,3   |     |                |     |                              |
|                 | SP                   |            |              |                      |            |                          | 63,8                     | 17,2                    | 0,0                         | 3,1    |     |                |     |                              |
| 3A              | 0,5 m                | 07.09.2023 | 16.10.2023   |                      |            | 6                        | 65,4                     | 5,9                     | 0,0                         | 14,6   | ok  | 55             | 8,3 | after turning                |
|                 | SP                   |            |              |                      |            |                          | 71,3                     | 9,8                     | 0,0                         | 10,3   |     |                |     |                              |
| 3B              | 0,5 m                |            |              |                      |            |                          | 64,9                     | 6,3                     | 0,0                         | 14,2   |     |                |     |                              |
|                 | SP                   |            |              |                      |            |                          | 66,0                     | 10,0                    | 0,0                         | 10,1   |     |                |     |                              |
| 3C              | 0,5 m                |            |              |                      |            |                          | 52,6                     | 3,3                     | 0,0                         | 17,5   |     |                |     |                              |
|                 | SP                   |            |              |                      |            |                          | 57,9                     | 4,4                     | 0,0                         | 16,7   |     |                |     |                              |
| 4A              | 0,5 m                |            |              | 21.09.2023           | 16.10.2023 | 4                        | 61,2                     | 6,6                     | 0,0                         | 15,1   | ok  | 57             | 8,6 | after turning; small windrow |
|                 | SP                   |            |              |                      |            |                          | 63,1                     | 5,9                     | 0,0                         | 14,9   |     |                |     |                              |
| 4B              | 0,5 m                |            |              |                      |            |                          | 53,5                     | 4,0                     | 0,0                         | 16,6   |     |                |     |                              |
|                 | SP                   |            |              |                      |            |                          | 60,2                     | 8,8                     | 0,0                         | 11,9   |     |                |     |                              |
| 4C              | 0,5 m                |            |              |                      |            |                          |                          |                         |                             |        |     |                |     |                              |
|                 | SP                   |            |              |                      |            |                          |                          |                         |                             |        |     |                |     |                              |





# Measuring made easy!

Our digital CO<sub>2</sub> measuring device is the ideal partner for your process monitoring!

To ideally monitor the degradation process, it is important to have a good overall view of several measurements in the windrow. We therefore have a combined measuring device in our range that is compact, robust and easy to use: Our combined digital device simultaneously measures the CO<sub>2</sub> concentration in the pore air of your windrow as well as the temperature.

The measurement of CO<sub>2</sub> and temperature can be carried out by any employee on the plant. No complicated training is required and the measurement is carried out quickly. CO<sub>2</sub> and temperature are measured via two independent probes. The sensors have a rapid response time and have a high accuracy and service life.



## Technical data

|                                   |                   |
|-----------------------------------|-------------------|
| Measuring range CO <sub>2</sub> : | 0 – 20% by volume |
|-----------------------------------|-------------------|

|                              |           |
|------------------------------|-----------|
| Measuring range temperature: | 0 – 600°C |
|------------------------------|-----------|

Scope of supply: Digital carbon dioxide measuring device incl. battery and charger, hose set incl. filter tube, temperature probe, suction probe, silica gel





# TracTurn goes to Chile

📍 Santiago Pudahuel, Chile

The fight against climate change and the loss of soil fertility is also a very topical issue in Latin American countries. One of the countries in South America most affected by the negative impact of climate change is Chile.

The country, which extends from south to north for 4,300 km, without counting the areas in the Antarctic, is located in several climate zones. The narrow strip of land between the icy peaks of the Andes and the South Pacific is – contrary to belief – one of the most important agricultural areas of the global south. When the snow covers the cultivation areas in the northern hemisphere, the countries south of the equator supply the markets of the USA, China and Europe with vegetables and fresh fruit.

The loss of fertile soil, which is caused not only by building development, but above all by radical climate change, is beginning to accelerate significantly. The desertification of the land south of the Atacama is becoming an ever-increasing challenge. Hot weather, forest fires and increasing dryness with the disappearance of the Andean glaciers are becoming a real and already apparent threat to the country's agriculture and economy.



© falco / Pixabay

Awareness of this is prompting the country's government to accelerate the implementation of reforms related to the energy transition and environmental improvement. New programmes are being developed to fundamentally modernise the system of waste management and biomass management.

The biggest obstacle for this ambitious process seems to be the lack of models for financing programmes, which often require changes to constitutional provisions. Both public authorities and municipal authorities are beginning to benefit from the knowledge and experience of countries that have progressed further in developing a solid legal basis, particularly the countries of the European Union and, in particular, Austria.

Despite the sometimes unfavourable market conditions, the initiative for environmentally friendly activities is already being driven by private companies, which are learning to navigate a market where there are no basic legal regulations under which waste should be treated according to the polluter pays principle.



The result of these efforts and explorations is, amongst other things, an intensive cooperation between *Armony Sustentable* based in Santiago Pudahuel and *Compost Systems*.

The result is not only the transfer of know-how, but also the creation of new and creative solutions that meet the specific requirements of the South American waste market, which in some areas is very different from that of the European Union.

A plant for the treatment of biodegradable municipal and industrial waste is currently being constructed in Pudahuel with a target capacity of around 100,000 tons per year. The technological centrepiece of this solution is the system of aerated side stacking windrows with the TracTurn as the basis for the efficient and rapid mixing of light and dry structural material as well as various types of liquid and semi-liquid sludge, mainly from the food industry.

In 2023, the first TracTurn in Chile went into service on the newly constructed plant. In addition to the machine, the scope of delivery provided by Compost Systems also included commissioning and user training. Among the applicants, Ms. Luz Romero, a young and energetic employee from the Armony Sustentable administration office, proved to be the most promising operator.

After several months in practice, Luz Romero achieved an exceptional level of operator competency by navigating the huge MF 7832S tractor with more than 325 hp and the new TracTurn 3.7 safely through the material. She deposits windrow after windrow in a straight line, mixes the structural material effectively with liquid and sludge and has managed to more than halve the composting time on the plant. These experiences and techniques that have been developed are now also considered "best practice examples" for the development of future legislation and standards for composting plants in Chile.

For example, experts such as Gonzalo Rivera, the company's director, and Luz Romero, together with the technologists at Compost Systems, are pioneering a Chilean flagship project in the field of biogenic waste processing, which has the potential to advance beyond Chile to other countries in South America.



Luz Romero is not only the first, but also the only female TracTurn operator worldwide

It's on its way and it's HEAVY DUTY!

# TracTurn HD

Even bigger, even more flexible and even better performance!

Following the positive completion of the practical tests, we are pleased to announce that the TracTurn HD will be launched in autumn 2024.

In addition to a significant increase in performance with regard to the turning output in cubic metres, the new TracTurn also offers additional features that have some advantages for operational practice.

In a nutshell, it has become heavier, making additional demands on the tractor. The target group of tractors wanting to attach a TracTurn HD is the performance class 350 hp or more. Realistically, we are talking about tractors from the Fendt 900 class onwards, the Massey Ferguson 9S class, Case Magnum or equivalent models in order to fully exploit the possibilities of the TracTurn HD.



With a turning output of 3000 m<sup>3</sup>/h, the TracTurn HD is in its own class when it comes to side movement. But that's not enough! Within the scope of the reengineering, we have included one customer request in particular. This involved having the possibility to be able to process trapezoidal windrows up to a height of 3 m.

Up until now, we were able to process trapezoidal windrows with our cutting system "ONLY" up to a height of just over 2 m. With a completely redesigned side cutter, we can now offer a solution for trapezoidal windrows with a height of up to 3 m.

We look forward to seeing you at one of our demos from autumn 2024 onwards, where you will be able to get an idea of the NEW possibilities of the TracTurn HD.



For enquiries and appointments, contact August Würzl on at [a.wuerzl@compost-systems.com](mailto:a.wuerzl@compost-systems.com) or on [+43 664 48 24 852](tel:+436644824852)



# New accessories for our ST machine family

With the constant pursuit of improvement and practical solutions, always in cooperation with our customers, we can present two new variants of accessories for our tractor-drawn compost turners. These options have been developed to meet the needs of modern users and provide practical innovations for even more efficient processes.

## Hydraulic drive axle: inexpensive – efficient – universal

The advantages of the hydraulic drive are its adaptability to different tractor models. There is no need for a tractor with an infinitely variable transmission and the machine can be operated efficiently with almost any towing vehicle. This economic versatility allows for its smooth integration into community use or on farms with different tractor models.



## Draft link hitch: flexible – unbeatable manoeuvrability

The draft link hitch of a tractor offers some key advantages:



- Easy height adjustment to a wide range of soil conditions without additional hydraulic cylinders – 2 fewer connections on the tractor.
- It enables an unbeatable turning radius. Individual windrows can therefore be extended by up to 5 metres.
- Irrespective of the towing eye, the machine can be operated with any tractor.

# A flexible solution for unsurpassed compost quality AELUS air separator

The growing demands on compost quality by customers and plant operators require innovative solutions. Our wind sifter has been developed for precise separation of plastic films from compost screen overflow.

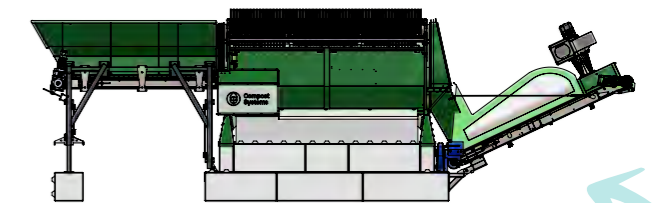
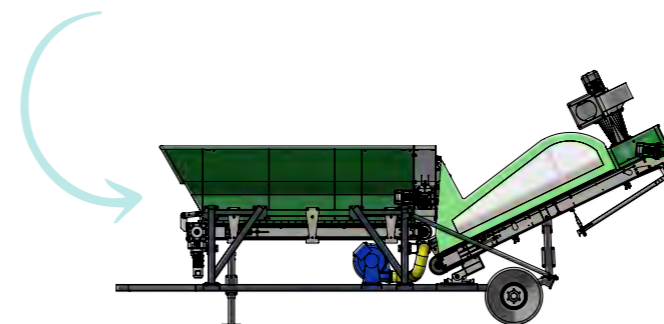
The design of our system consists of a pressure aerator, a powerful exhaust fan and a well-thought-out design of the conveyor housing.



## Mobile wind sifter

**Flexible choice of location and efficient adaptation**  
Its mobility enables rapid and efficient integration into existing plants. The adaptability to virtually any screening machine is another advantage that underlines the flexibility of our system.

The electric drive unit of all components not only ensures maximum efficiency, but also enables precise adjustments. With an optional generator as additional equipment, our wind sifter becomes completely independent of external power sources, which offers you maximum flexibility in use.



## Stationary wind sifter

**Complete solution including screening station**  
Our stationary system presents a comprehensive solution with multiple separation stages. The screening station and the feed hopper form a well-thought-out overall concept that aims to make the process steps seamless and smooth. The new wind sifter conveyor completes the sorting process. We offer a complete solution that combines reliability and performance, especially for larger plants.





# Covering compost means protecting compost

Every plant operator knows: If you want to produce quality compost, you have to protect and support your product during the process. So covering compost, both during the production phase and later during the storage of the finished product, has been a tool that operators have used for many years.

Covering compost is an essential tool for regulating the water content of windrows. Not only does it help to drain water from the windrows in the event of heavy rainfall, it also helps to reduce them drying out and retain water in the material on hot summer days. In recent years, the compost cover has evolved and is now also an active tool in odour reduction.

However unlike complete enclosures, covers with odour reduction only work when they lie on top of the material. Covers are removed before the turning process and consequently there is no odour-reducing effect. Air-impermeable materials are completely unsuitable for use in the compost area. A choice of two cover types is available:  
Cover with fleece or membrane.

A fleece or membrane provides protection against rain and drying out as well as odour reduction.



Fleece and membrane winders help with the handling of compost covers.





## Fleece cover

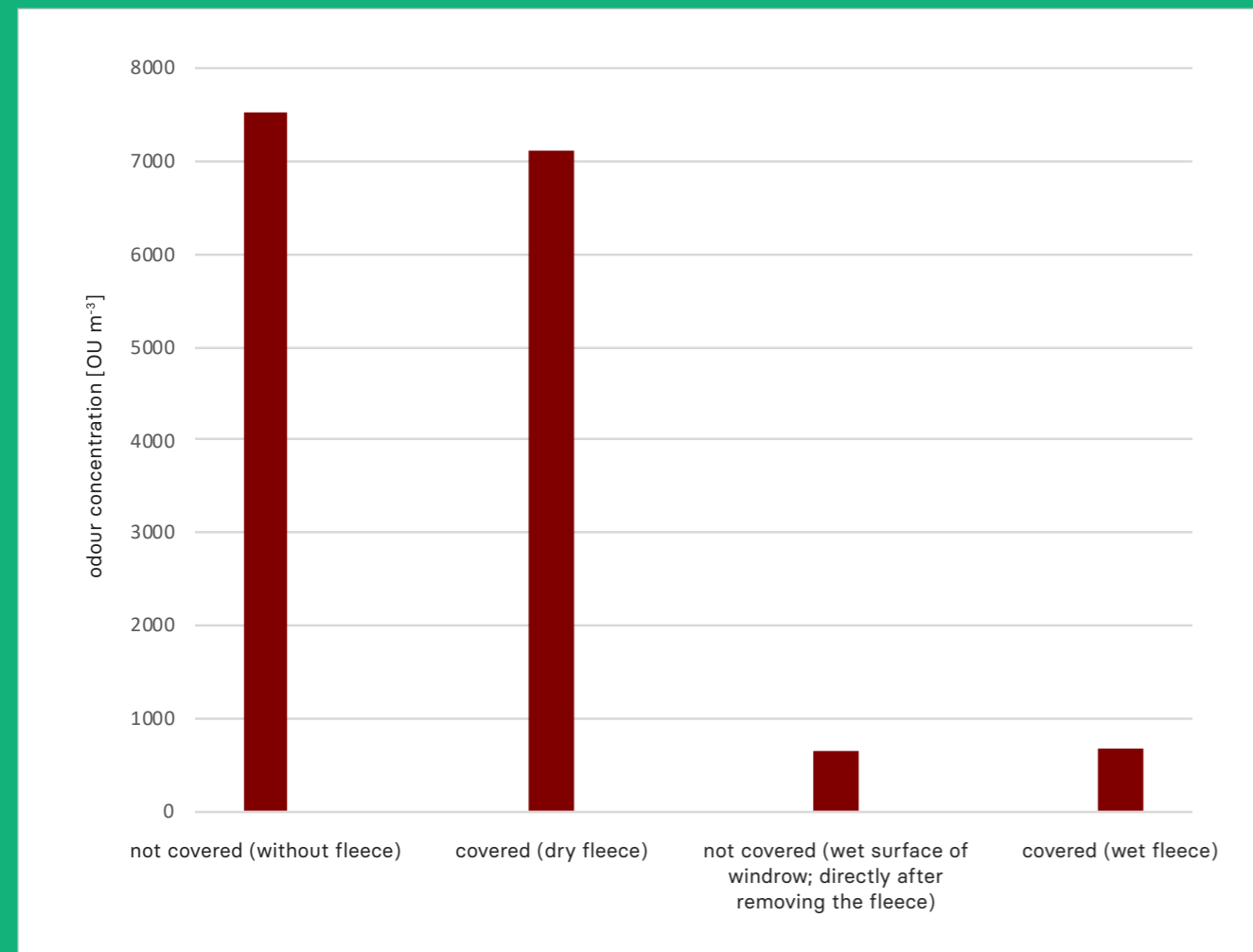
The compost fleece is made of polypropylene and is a very simple variant of the compost cover. If the compost fleece is laid on a windrow and it rains, the rainfall in the fibre is dissipated along the fall line. An odour-reducing effect on fleece covers is achieved by the condensate film between the fleece and the windrow surface. This effect therefore only works with damp fleece (but also with a damp windrow surface); with dried-out fleece (e.g. due to strong sunlight), no odour-reducing effect can be observed. We were able to demonstrate this in the course of our own odour measurements on plants.



Preparations for odor sampling.

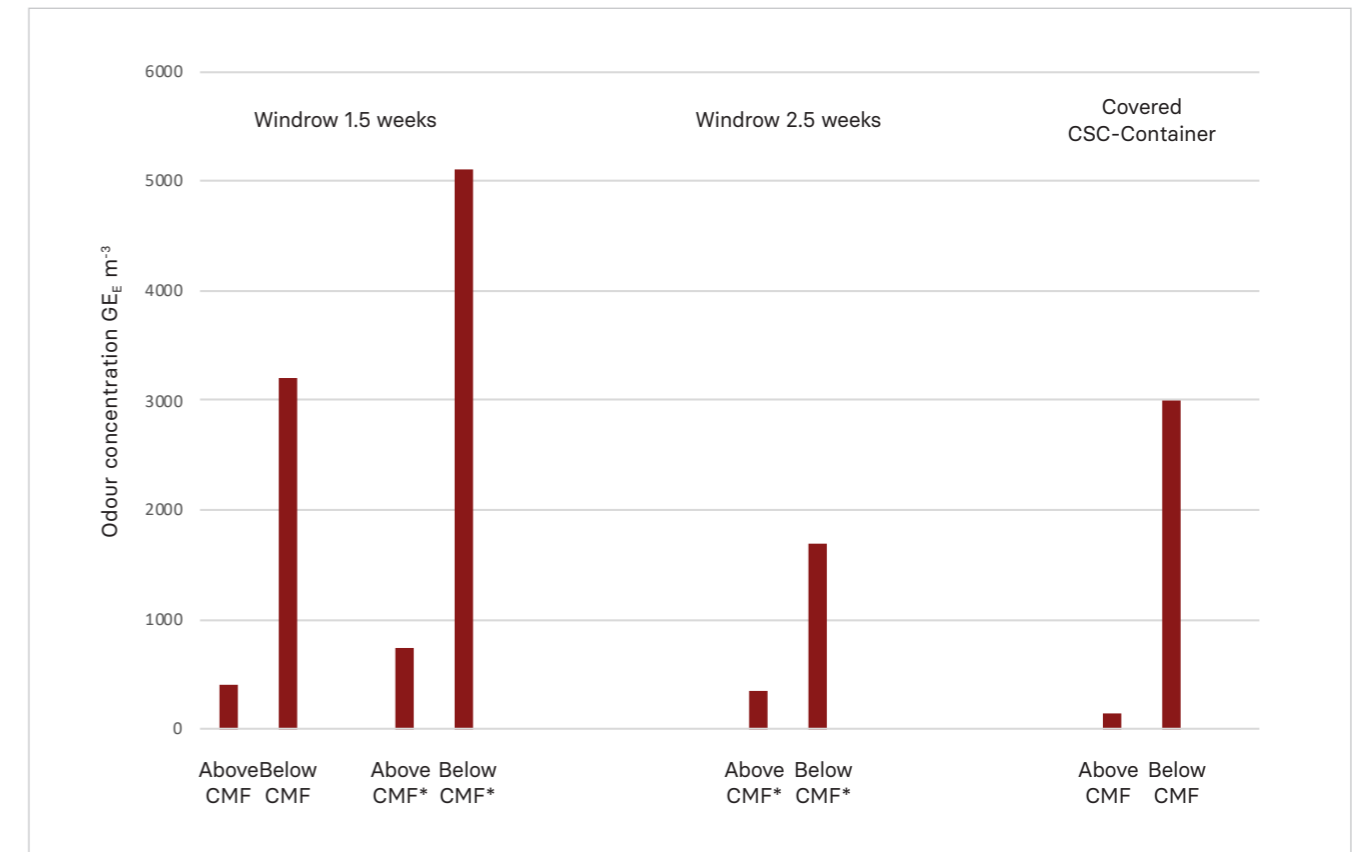
## Measured odour concentrations on open triangular windrow composting

(Same windrow composition – with and without a fleece cover)



## Comparison of odour concentrations above and below the compost membrane fleece (CMF)

(Samples marked with \* were collected shortly after the turning process)



## Membrane cover

A membrane cover, on the other hand, provides significant odour reduction at all times. However, it only works in combination with active aeration. **IMPORTANT:** It is not the membrane itself that retains odour molecules, but the odour-reducing effect is created by the condensate film, which always forms on the inside of the membrane. In contrast to fleece covers, the membrane is therefore a permanent option for odour reduction and does not depend on the weather/rainfall. Membranes are available in different designs, permeabilities and weights.

Based on our practical experience, we know that windrow covers are only used if they are easy to manipulate, ideally by a machine. For both fleece and membrane, the odour-reducing effect can only be expected if they are laid on the windrow surface. We have therefore developed various options to make it easier in practice to manipulate the fleece or membrane. The winding devices can be installed on a wheel loader/tractor front loader or directly on the compost turning machine. In this way, 3 m to 12 m wide fleece or membrane can be easily manipulated.

Only one person and one machine are now needed to place the covers where they belong: namely on the windrow surface.



# The development of new sources of revenue - Trading with CO<sub>2</sub> certificates

Media, politics and of course business are all engaged in the issue of carbon trading. In principle, there is no opposition to the issue of "CO<sub>2</sub>reduction where it is cheapest". And of course, there are plenty of critics from various camps. On the one hand, NGO Base, which refers to certain excesses of carbon trading as greenwashing. Other critics with rather opposed views, who find it difficult to accept that we are carrying out an environmentally important measure "abroad" and paying an operator there for it, if we do not benefit from it in our beloved home country. But first of all, back to the start.

## What is carbon trading with CO<sub>2</sub> certificates?

The basis for the entitlement to remuneration for savings measures is always the guideline of what "OTHERWISE" would have happened with it. So if the basis of my daily trip to the workplace was the journey by car and I produce 10 kg of CO<sub>2</sub> every day, but now I go to work by bike, then the laudable saving per working day is 10 kg CO<sub>2</sub>.

In waste management, the highest savings are therefore made in areas where the previous work was very poor. An example here is an uncontrolled landfill site in which vast amounts of methane were released into the air without strict controls, without a cover and without gas capture. Compared to efficient sorting and treatment, the reduction amounts to up to 1.7 kg CO<sub>2</sub> per kg waste. This extremely high value is due to the fact that methane acts as a greenhouse gas about 25 times more harmful than CO<sub>2</sub>. In a 10-year comparison, methane is even 85 times more harmful than CO<sub>2</sub>.

So once we have discovered a savings potential, various trading platforms allow the saving to be sold to companies, countries or any other organ-

isations that are obliged to save on CO<sub>2</sub> or have voluntarily committed to do so.

## Who decides the level of my savings?

In principle, carbon trading is bound by UNFCCC regulations.

First of all, the question arises as to which methodology I am using to try to reduce the emission of greenhouse gases. If I cannot find a suitable method for me that is already included on the UNFCCC list, each applicant has the opportunity to submit a method and have it listed. But to be honest, we would emphatically warn against doing this because it is a very complex and bureaucratic process, which may extend beyond a weekend hobby. So, the better option is to navigate through the jungle of options on the existing list.

Once I have opted for the methodology, the corresponding application must be written and submitted. In addition to the costs involved, it should also be taken into account that the application must be reviewed and approved. This requires the appropriate persuasive performance and, in addition to the evaluation of the "baseline" (the burden that would occur without my project), the level of savings generated by the project must also be defended.

The negotiated monitoring activities and documentation are then reviewed annually by a third organisation and only then do operators and investors become aware of the actual assessment of the savings.



### The marketing of certificates

In principle, every owner is free to sell their certificates freely on the market. For particularly attractive certificates that appeal to a generous group of buyers on the market, selling as a B2B business is certainly attractive. This occurs primarily if, in addition to the CO<sub>2</sub> savings, other special benefits for society or the environment could also be achieved.

A quite attractive, but also more difficult customer class can be found in the state sector. By selecting the right programmes, countries and methods, the savings can be sold as a certificate to a country that compensates for the required emissions from the national industry and energy supply. However, the prospect of a better revenue situation runs in combination with a not inconsiderable additional administrative burden and other expenses.

### Can I forecast the revenue?

Without exact knowledge of the project location, project, baseline, climatic conditions, etc., it is very difficult to determine even an approximate number. In fact, it is necessary to carry out a preliminary review for each individual project in order to explore the project possibilities.

### May we introduce?

As is readily apparent above, the topic of trading CO<sub>2</sub> certificates is a complex minefield with swamps and deserts, storms and all kinds of other challenges that make it rather impossible for JOE PUBLIC to do himself, alongside the other challenges of everyday life. That is why, due to several nudges and demands from our customers, we have initiated a cooperation that offers the element of certificate trading as a one-stop shop.

Here we can introduce our *cooperative relationship with Paul Voithofer and partners*. In technical, commercial, administrative and content coordination, future operators of our plants can have their investment certified and audited here and they do not need to take care of the marketing of the certificates, but can focus on their causal activity, the operation of a composting or waste treatment plant.

It is important that the "climate-friendly process" is not only adhered to, but also documented at the end of the year. The documentation should be generated as far as possible from the process, instead of demanding the creativity of the holiday interns at the end of the year.

If well planned, the coordination can take place in the planning phase and the necessary process data can be recorded by IT-based systems that are already automated.

In this way, we try hand in hand and in coordination to ensure a coherent system from plant planning to operations and documentation, which enables the operator to use the large universe of certificate trading for themselves with little additional effort.



# A stork at the composting plant

📍 Saxen, Austria



© Michel Risse

That's Franz. Franz is a stork that lives in Austria all year round. Franz has a troublesome history. As a result of an injury, Franz cannot fly to the south every year like the other storks. Contrary to his "wife", (it should be noted that storks enter into a lifelong partnership) Franz remains in Austria in winter, strictly speaking in Saxen, Upper Austria, at the local *composting plant run by the Kaltenböck family*. Franz has been living there for several years now. Every spring there are heartbreaking welcome ceremonies when Franz can finally greet his female mate again after a long winter. In fact, compost is vital for Franz. The heat from the windrow works

as the underfloor heating for Franz's winter living room. An ornithologist who has been involved only recently confirmed that Franz would probably not survive the winter in the Mühlviertel region without the warmth from the windrow. The situation is different with possible foods that are delivered to the composting plant. They are immediately buried in an active windrow and covered with fleece so as not to make the windrow the food source for Franz. And although, contrary to the stories we tell children, storks do not bring babies, Franz brings at least a little joy to the Kaltenböck family composting plant. We wish Franz all the best!



Get stronger together!

# Compost Systems and Green Mountain Technologies – technology & innovation partners



Managing Director Aurel Lübke with Michael Bryan-Brown, Rik Langendoen and Betsy La Force from Green Mountain Technologies at USCC 2024 in Florida, USA.



It is not a particularly hidden secret that the American market cannot be conquered by European companies without a certain basic complexity. In particular from the point of view of an engineering company with issues of liability, insurance, standards and other requirements, the market on the other side of the big pond is not exactly straightforward with very tough competition.

It is a fact that Compost Systems can offer special advantages for the North American market. Not only in the field of mechanical engineering, in which several manufacturers in the USA already offer special services, but also in the engineering sector, Europe is clearly ahead of the development curve in many areas. For example, the emission management directives in Europe have been much stricter than in the United States for decades. In view of the climate crisis and a general tightening-up with respect to environmental protection, especially in California, where environmental protection is quasi-programmed for the USA, there is a wealth of experience that wants to be developed from potential into success. Conversely, American technology drivers are typically very practical and/or demand-oriented.

*In short, after a familiarisation phase, Compost Systems and our new partner Green Mountain Technologies have decided to work together in various areas of technology transfer.*

As a starting point, we were able to get our first company onboard with the Earth Flow project. Green Mountain Technologies has decades of experience in operating small automated composting systems. An area recently developed by Compost Systems.

The Earth Flow system is produced in Europe for the European market. The first systems have already been completed and put into operation. A market segment in the capacity range of 1 to 20 tons per day, which has previously only been served by Compost Systems in the agricultural sector.

Conversely, Compost Systems supplies expertise and products for the American market to Green Mountain Technologies. There is still plenty of scope in the US market, especially in the area of emission-reduced processes. But the cooperation is also being intensified in the area of agricultural technology and mechanical engineering.

Under the motto "Strengthening strengths", we try to combine the best of both worlds into an overall concept. Together, Compost Systems and Green Mountain Technologies can draw on well over half a century of experience.

We are pleased that the initial successes are emerging. The desire for more develops like hunger when we eat. We look forward to jointly offering new services and products in both markets.



# Presenting Compost Systems



1



2



3



4



5



6



7



9



8



10



1. EuroTier Hanover 2022
2. Waste Expo Brazil 2022
3. IPT Compost Vienna 2023
4. IGEM Kuala Lumpur 2023
5. WACEE Nigeria 2023

6. Waste-to-Resources Tunisia 2023
7. BIOodpady Slovakia 2023
8. Waste Convention Montpellier 2023
9. USCC Florida 2024
10. Croatian Chamber of Commerce Workshop Osijek 2024



# Engineering from the Kamptal valley

📍 Gars am Kamp, Austria

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Since January 2023, Compost Systems' office in Gars am Kamp has been located in Dreifaltigkeit-platz square in the Waldviertel district in the heart of the beautiful town.

The market town of Gars, located in the picturesque Kamptal valley and often referred to as its "pearl", is considered a health resort and has numerous scenic beauty spots as well as a number of cultural attractions to offer. Amongst other things, the opera festival takes place every summer at Babenberg Castle in Gars am Kamp. The wonderful acoustics ensure that the ruins and the Church of St. Gertrude are not only visible from the office, but that in the warm summer months, the sounds of the rehearsing opera singers often reach the employees' workplaces.



Currently, a team of 6 motivated and experienced employees in the office in Gars is working on various projects, plant planning, container solutions, the process optimisation of composting processes, the sale and despatch of measuring devices and much more.

The generously appointed premises now also allow workshops to be held directly on site. We have already welcomed a number of international guests and have been able to impart our composting expertise as competent contact partners.



For us, compost is not just a business, but also a matter dear to our hearts. We created a raised bed next to the office with much love so that we can enjoy our own fresh tomatoes, peppers and herbs in the warm summer months with a snack in the garden. And they thrive in the good compost soil, of course!



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You want to know about it?

# CMC Compost Seminar



Composting is a biological process that produces a product from microorganisms by adding bacterial feed, water and oxygen, which we generally call humus. Actually, the topic is adequately explained in 4 seconds. How we manage to talk about this topic for 5 days in a compost seminar is an interesting question.

In fact, many complex correlations are behind the topic, which open up a closely intertwined area of activity and in the 5 days we are only able to reveal the tip of the iceberg.

From the selection of raw materials, mixing ratios, process management, process control, plant planning and quality assurance to the somewhat more complicated topics such as emission management, measurements, water and energy footprints, we try to explain the topic to the participants in more detail, always in practice at a composting plant.

At the last seminar we were able to welcome interested parties from 18 countries and gladly share our knowledge on composting, which we have accumulated in Austria over the past 35 years, with other parts of the world.

In addition to plant operators, the target audience here are planners, users and personnel working in operations and quality assurance.

**Next date:**

**7 – 11 October 2024**

Please register as soon as possible as the number of participants is limited!



[Click here for the programme](#)







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