# Cover Delivery Report

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<th>Title of the Deliverable:</th>
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<tr>
<td>WP Title and Number:</td>
<td>WP4. D4.3</td>
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<tr>
<td>Date of completion:</td>
<td>31\textsuperscript{st} July 2018</td>
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<td>Date of approval by the Coordinator</td>
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The research was undertaken as part of the project called ‘SYSTEMIC: Systemic large scale eco-innovation to advance circular economy and mineral recovery from organic waste in Europe. [https://systemicproject.eu/](https://systemicproject.eu/)

*This project has received funding from the European Union’s H2020 research and innovation programme under the grant agreement No: 730400. SYSTEMIC started 1 June 2017 and will continue for 4 years.*
The following dissemination materials have been completed between 1st June 2017 and 31st May 2018 (see below).
- Project website
- Project twitter
- Project brochure

The following dissemination materials have been completed by 31st July 2018.
- The Newsletter
- Video and consumer information sheet
Website

SYSTEMIC ran a temporary website from June 2017 to mid Dec 2017. The final website was launched on 15th December 2017.
Twitter account
Project Brochure

Urgency to close nutrient cycle

In the present economy, many natural resources are becoming scarce, while the human population is increasing significantly. This trend is causing a scarcity of nutrients and resources, which is leading to increased pollution and environmental degradation.

Bioeconomy offers a viable solution by converting waste into valuable resources. Bioeconomy is a system that valorizes waste and byproducts, creating economic and environmental benefits.

Treatment of biowaste

Within the circular economy, biowaste is a valuable resource. By converting biowaste into valuable products, we can reduce pollution and create new economic opportunities. This process is known as the bioeconomy.

Towards a circular economy

A circular economy is an economy that is designed to be sustainable. By moving away from a linear economy, we can reduce waste and pollution, while creating new economic opportunities.

Circular Solutions for Bioeconomy

Graphic representation of the circular economy process.
The Newsletter Letter #1

SYSTEMIC newsletter

ISSUE 1 | JUNE 2018

SYSTEMIC, which stands for ‘Systemic: large scale eco-innovation to advance the circular economy and mineral recovery from organic waste in Europe’, is a European Commission H2020 project which aims to demonstrate the economic viability of recovering and recycling nutrients from bio-waste, animal manure and sewage sludge for agriculture. The project involves 15 consortium partners and was launched in June 2017.

The Demo Plants

At the very core of the project are the demonstration plants. The demonstration plants are all privately owned biogas plants that have invested in nutrient recovery and recycling (NRR) and plan, with support of the SYSTEMIC project, to further invest in and innovate with NRR technologies in order that they may develop fertilising products that meet farmers’ needs and contribute to making nutrient recovery from organic waste a viable business opportunity.

The partners in SYSTEMIC will support the demonstration plants through the development of the nutrient recovery plans, advising them on the implementation and further optimisation and the testing of their products but also on the wider development of the market. The project will also tackle the important policy and regulation barriers that prevent the further expansion of this vital contribution to our circular economy (this will be covered in the next issue).

In this first newsletter, SYSTEMIC presents the demonstration plants and shares the range of drivers which led each of the plants to pursue the investment in nutrient recovery.

To follow the work of SYSTEMIC, please visit the SYSTEMIC website: www.systemicproject.eu or follow us on twitter @systemic_eu.

Acqua e Sole

Acqua and Sole’s plant is set among 1400ha of rice fields and nature zones close to Milan, Italy. The plant was the brainchild of Giuseppe Natta, a highly successful waste entrepreneur who saw the potential of valorising waste for reuse.

Around 50 years ago Natta started working to find new ways to process waste in order to obtain usable products from something that was otherwise seen as a costly nuisance. Natta became aware of the need to improve the characteristics of organic fertilisers and the massive environmental and economic advantages that could be realised by reconnecting the nutrient cycle, especially in an area that was suffering from deteriorating soil quality.

The idea of a nutrient recovery centre was born and subsequently constructed in 2013.

The plant is now run by Giuseppe Natta’s son, Francesco and in 2017 approximately 2000ha were fertilised with the digestate from their plant. By closing the nutrient cycle and by several re-mobilisation measures, soil fertility has increased by 70% and biodiversity, expressed by the number of birds, mammals and insects in the area, increased by more than 100%. They currently process yearly 110kt
of sewage sludge, agro-industrial waste and food waste through thermophilic digestion and use an inline N stripper in order to recover ammonium sulphate fertilizer and to prevent toxic conditions in the digestor. They will invest in an improved N stripper which will allow them to optimize their digestion process and to improve the quality of the produced biogas.

For more information on the plant and how the technology will be developed during the SYSTEMIC project, go to the Acqua and Soie fact sheet.

AMPower, based in Pittrem, Belgium, sits in the middle of one of the most intensive livestock farming areas of the world. Due to regulations regarding the amount of nitrogen and phosphorus that can be added to the soil, and the high level of manure produced in the region, the disposal of manure had become very costly to farmers. The abundance of both agro-industrial feedstocks and manure and favourable investment conditions led to an explosion of growth in biogas plants. AMPower was established in 2011 and now processes over 180kta of feedstock per year (20% of manure and 80% of other biomass) through thermophilic digestion.

In recent years, the agro-industry saw the growing demand by biogas plants for bio waste and started to charge a gate fee for their organic waste. The competition among biogas plants has therefore led to a steep in income for the businesses and a need to find ways to add value to their plants and reduce the costs of transporting the resulting digestate out of Flanders.

As the European Commission rolls out plans to push Europe in the direction of a more circular economy, the owners of AMPower, Stéfan Deldicque and Henk Deldycke, saw the opportunity that nutrient recovery can provide as an extra income stream. As a result, they decided to invest into a novel technological approach producing liquid NPK concentrates through a combination of evaporation and Reverse Osmosis. This allows them to approach the local market with products that are similar to the mineral fertilizers that are now being used by farmers. If the local market can develop, this will substantially reduce transport costs and associated emissions.

For more information on the plant and how the technology will be developed during the SYSTEMIC project, go to the AM Power fact sheet.

Groot Zevert Vergisting B.V. was set up in 2004 in response to the surplus of manure in the region and the profitable conditions for biogas production. It now processes through mesophilic digestion, over 100kt of farm manure and agro-industrial organic waste.

This year, the plant will be extended with a novel nutrient recovery installation converting the digestate into valuable mineral fertilizers and organic soil improver.

In the Netherlands, approximately 26% of the phosphorus produced by livestock farming cannot be applied on agricultural fields and therefore Groot Zevert had to import its digestate to neighboring countries with an demand for phosphorus fertilizers. Meanwhile, farmers in the Netherlands get concerned about decreasing organic matter contents of their soil. Therefore, a Dutch consortium developed a technology called BiOmin ("Biogas Organic Min"), to extract phosphorus from the solid fraction of the digestate in order to produce two valuable products: a nutrient-poor soil improver and a concentrated P-fertiliser to be used as secondary raw material for the fertilizer industry. Moreover, Groot Zevert invested in the so-called GENUS process to separate the liquid fraction of the digestate into a liquid NPK concentrate for the local market and cleanwater.

The construction of the nutrient recovery installation is due to be completed by the end of 2016. The separation of organic matter, nutrients and water is expected to give substantial cost savings for the plant by allowing the local spreading of the digestate.

For more information on the plant and how the technology will be developed during the SYSTEMIC project, go to the Groot Zevert fact sheet.
The Rika Biofuel plant will be located in Kent in the UK. It is currently in the construction phase and will be operational in 2019. The plant will be directly linked to a poultry farm in order to manage its manure. Traditionally, chicken manure has often been incinerated because of the high organic matter content and low water content. However, whilst energy production is high in incineration, it causes valuable nitrogen loss.

Nitrogen stripping and recovery will improve the efficiency of the anaerobic digestion process by removing the toxic ammonia that limits the anaerobic digestion process. As a consequence, a higher biogas yield and a more stable process can be achieved with the added benefit of giving Fridays plant an additional future income stream.

Fridays plant will include an anaerobic digester with a two-step, mesophilic, mixed plug-flow system. The mixed plug flow digester guarantees that the whole feed is treated for about 30 days which will lead to a reduction of 90–95% of the inorganic bacteria. Nitrogen will be recovered as ammonium sulphate and up to 50% of the phosphorus will be recovered from the digestate as organic P fertilizer product through a modified dissolved air flotation step and subsequent squeezing.

For more information on the plant and how the technology will be developed during the SYSTEMIC project, go to the Fridays Plant fact sheet.

The Benas-GNS demonstration plant is located in northern Germany, near Bremen. The plant treats over 800t of corn stover and chicken manure and food waste per year and has the capacity to process up to 760tce per year. Currently, the plant produces biogas, mineral N, calcium carbonate and organic fertilizers. The remaining digestate is spread on the company’s 35,000ha of farmland.

By spreading the remaining digestate on the company’s farmland they not only reduce the disposal costs but also increase the soil quality of their land. However, chicken manure, which is usually available at a low gate fee in the area, has higher nitrogen. The regulations concerning the amount of the nitrogen that can be added with digestate from manure is therefore a limiting factor. By adding a system of nutrient recovery to the plant, GNS can limit the ammonia inhibition of the anaerobic bacteria (which limits the digestion process), recover nitrogen from the end product digestate (thereby allowing more digestate to be spread on the field) and produce a valuable fertilizing product.

With this in mind, GNS has developed a new and novel approach for ammonia recovery without the use of acids. GNS will optimize and demonstrate its novel ammonia recovery unit, which uses gypsum as a sulphate source, during the SYSTEMIC project and will provide technical and economic data on the performance of the lab-scale and pilot-scale HR technologies.

For more information on the plant and how the technology will be developed during the SYSTEMIC project, go to the Benas-GNS fact sheet.