Cover Delivery Report

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First Author:	**Annabelle Williams**
Co-author(s):	**Elisabet Nadeu, Oscar Schoumans, Inge Regelink, Jochen Frocbrich, Erik Meers, Ludwig Hermann, Evi Michels, Marieke Verbeke and Emilie Snauwaert**
Name of the responsible WP Leader:	**Annabelle Williams**
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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/

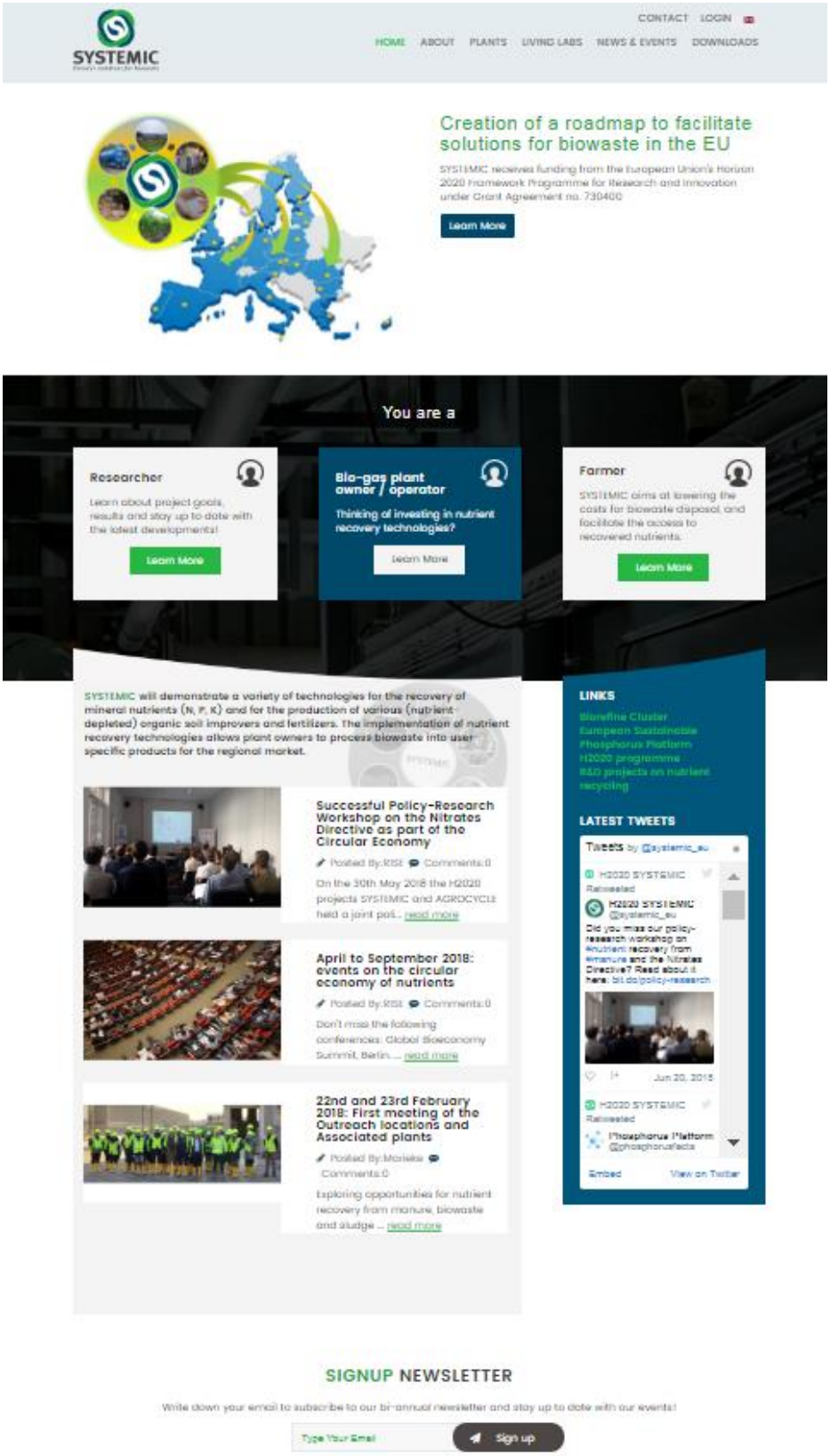
This project has received funding from the European Union's H2020 research and innovation programme under the grant agreement No: 730400. SYSTEMIC started 1 June 2017 and will continue for 4 years.

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

The Newsletter Letter #1

SYSTEMIC newsletter

ISSUE 1 | JUNE 2018

SYSTEMIC
Circular solutions for biowaste

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 shows 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.

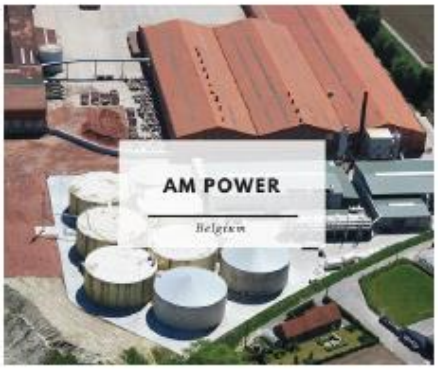
Acqua and Sole's plant is set among 1400ha of rice fields and nature zones close to Milan, Italy. The plant was the brainchild of Giuseppe Natta, a highly successful waste entrepreneur who saw the potential of valuing waste for reuse.

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 2016.

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 renaturalization 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 120kt

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 digester. 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 biosolids.

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



AMPower, based in Pittem 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 levels 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 180kt of feedstock per year (20kt of manure and 160-180kt of other biomass) through thermophilic digestion.

In recent years, the agro food industry saw the growing demand by biogas plants for biowaste and started to charge a gate fee for their organic waste. The competition among biogas plants has therefore led to a drop in income for the businesses and a need to find a way 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 AM Power, Stefaan Delabie and Henk Dedeyne, 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 NK 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 factsheet.

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 tonnes per annum of pig 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 improvers.

In the Netherlands, approximately 25% of the phosphorus produced by livestock farming cannot be applied on agricultural fields and therefore Groot Zevert had to export its digestate to neighbouring countries with an demand for phosphorus fertilisers. Meanwhile, farmers in the Netherlands got concerns about decreasing organic matter contents of their soil. Therefore, a Dutch consortium developed a technology called Re-P-eat ('recovery P to eat') 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 fertiliser industry. Moreover, Groot Zevert invested in the so-called GENIUS process to separate the liquid fraction of the digestate into a liquid NK concentrates for the local market and clean water.

The construction of the nutrient recovery installation is due to be completed by the end of 2018. The separation of organic matter, nutrients and water is expected to generate 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 factsheet.

The **Rika Biofuel's** biofuel plant, Fridays 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 with a poultry farm and support the farm 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 limit 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 20 days which will lead to a reduction of 90-99% of the intestinal bacteria. Nitrogen will be recovered as ammonium sulphate and up to 90% of the phosphorus will be recovered from the digestate as organic P fertiliser 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 factsheet.

The **Benas-GNS** demonstration plant is located in northern Germany, near Bremen. The plant treats over 80kt of corn silage, chicken manure and food waste per year and has the capacity to process up to 170kt per year. Currently the plant produces biogas, mineral N, calcium carbonate and organic fertilisers. 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 readily available at a low gate fee in the area, is very high in 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), remove nitrogen from the end product digestate (thereby allowing more digestate to be spread on the field) and produce a valuable fertilising product.

With this in mind, GNS has developed a new and novel approach for ammonia recovery without the use of acids. GNS will optimise 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 full-scale and pilot scale NR technologies.

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

Horizon 2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 730400.