

Cover Delivery Report

Title of the Deliverable:	Dissemination Materials (year 1)
WP Title and Number:	WP4. D4.3
Date of completion:	31st July 2018
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Date of approval by the Coordinator	

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

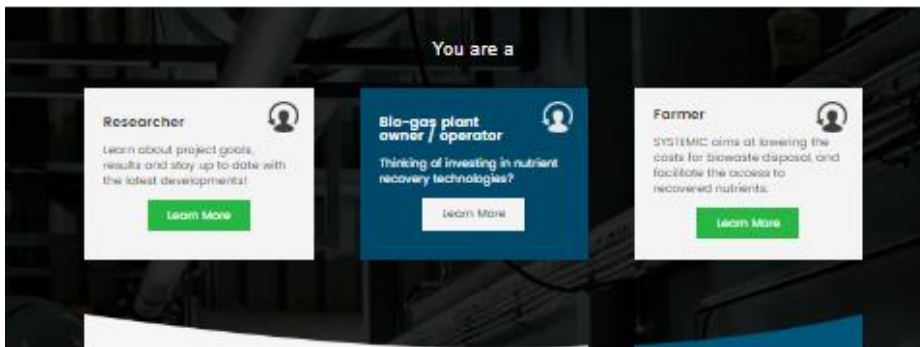
SYSTEMIC ran a temporary website from June 2017 to mid Dec 2017. The final website was launched on 15th December 2017.



Creation of a roadmap to facilitate solutions for biowaste in the EU

SYSTEMIC receives funding from the European Union's Horizon 2020 Framework Programme for Research and Innovation under Grant Agreement no. 730400

[Learn More](#)



SYSTEMIC will demonstrate a variety of technologies for the recovery of mineral nutrients (N, P, K) and for the production of various (nutrient-depleted) organic soil improvers and fertilizers. The implementation of nutrient recovery technologies allows plant owners to process biowaste into user-specific products for the regional market.



Successful Policy-Research Workshop on the Nitrates Directive as part of the Circular Economy

Posted By: KSE | Comments: 0
On the 30th May 2018 the H2020 projects SYSTEMIC and AGROCYCLE held a joint pol... [read more](#)



April to September 2018: events on the circular economy of nutrients

Posted By: KSE | Comments: 0
Don't miss the following conferences: Global Bioeconomy Summit, Berlin... [read more](#)



22nd and 23rd February 2018: First meeting of the Outreach locations and Associated plants

Posted By: Marika | Comments: 0
Exploring opportunities for nutrient recovery from manure, biowaste and sludge... [read more](#)

LINKS

[Bioefine Cluster](#)
[European Sustainable Phosphorus Platform \(ESPP\) programme](#)
[H2020 programme](#)
[H2020 projects on nutrient recycling](#)

LATEST TWEETS



SIGNUP NEWSLETTER

Write down your email to subscribe to our bi-annual newsletter and stay up to date with our events!

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Twitter account

The image shows the Twitter profile page for H2020 SYSTEMIC (@systemic_eu). The profile header includes the account name, handle, and bio: "An @EU_H2020 project implementing circular solutions for biowaste, manure and sewage sludge". It also lists the location as Europe, the website as systemicproject.eu, and the join date as June 2017. The profile statistics show 68 tweets, 70 following, 120 followers, and 54 likes. The main content area displays two tweets. The first tweet, dated June 20, is a retweet of a tweet asking if users missed a policy-research workshop on nutrient recovery from manure and the Nitrates Directive, with a link to a report. The second tweet, dated June 29, is a retweet of a tweet about a cost review of dairy manure nutrient recovery routes, listing several related accounts. The right sidebar features a "Who to follow" section with accounts like INCOVER, H2020 SMART-Plant, and RichWater project, and a "Belgium trends" section with hashtags like #BRABEL and #RW18.

Home Notifications Messages Search Twitter Tweet

SYSTEMIC

Circular solutions for biowaste

Tweets 68 Following 70 Followers 120 Likes 54 Following

H2020 SYSTEMIC

@systemic_eu Follows you

An @EU_H2020 project implementing circular solutions for biowaste, manure and sewage sludge

Europe systemicproject.eu Joined June 2017

Tweet to Message

13 Followers you know

16 Photos and videos

Tweets Tweets & replies Media

H2020 SYSTEMIC Retweeted

H2020 SYSTEMIC @systemic_eu · Jun 20

Did you miss our policy-research workshop on #nutrient recovery from #manure and the Nitrates Directive? Read about it here: bit.do/policy-research



H2020 SYSTEMIC Retweeted

Phosphorus Platform @phosphorusfacts · Jun 29

Cost review of #dairy #manure nutrient recovery routes

phosphorusplatform.eu/scope-in-print... @newtrients_ucc @NutrientP @dpp_ev @BSAG_ @Phosphorus_je @SustainP @AgroCycle_EU @systemic_eu @European_Biogas @EIPAGRI_SP @ENRD_CP @COPACOGCECA @IFOAMEU @Danone @FriesIndCampina

H2020 SYSTEMIC @systemic_eu · Jun 28

Thinking of applying for a new #EU_H2020 bid for the 2018 Information Day on the

Who to follow Refresh View all

INCOVER @INCOVERproject Follow

H2020 SMART-Plant @s... Follow

RichWater project @Rich... Follow

Find people you know

Belgium trends Change

#BRABEL 14.8K Tweets

#RW18 @Rodekruis is Tweeting about this

#corplenary

#musictechbe

#BEAlert

tielt

Claude Lanzmann 34.2K Tweets

Thaise

Europees Parlement

Rock Werchter 2,591 Tweets

Project Brochure

Demonstration plants

SYSTEMIC will demonstrate circular solutions for biowaste at five large-scale demonstration plants in the EU.

Demonstration plant	Products
Groot Zaventem, The Netherlands 100 ton pig slurry	Biogas Ammonium sulphate N, K-concentrates Calcium phosphate Organic soil amendments
AM-Power, Belgium 180 ton manure and food waste	Biogas M, K-concentrates Organic fertilizer
Acqua & Sole, Italy 120 ton Sewage sludge	Biogas Ammonium sulphate Organic fertilizers
Oseltende, United Kingdom 50 ton poultry manure	Liquid biogas Liquid CO ₂ Ammonium sulphate Organic fertilizer
GMS, Germany 60 ton corn stilage and 18 ton poultry manure	Biogas Ammonium sulphate Calcium carbonate Organic Fertilizer



Our Partners



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Horizon 2020



SYSTEMIC

Circular solutions for biowaste

Urgency to close nutrient cycles

In the present economy many natural resources are becoming scarce while on the other hand waste disposal is increasing. Large amounts of nutrients are lost through incineration of waste, accumulation in soils and through harmful nutrient emissions to water and air.

Biowaste contains many valuable nutrients that can be recovered and reused to close the nutrient cycle. SYSTEMIC facilitates the transition towards a circular economy by demonstrating new approaches for the recovery of nutrients from animal manure, sewage sludge and food waste.

Recovery of nutrients from biowaste is essential to sustaining our future food production with a decreasing environmental impact.

Treatment of biowaste

Within the circular economy, biowaste is a source of energy, organic matter and nutrients. The recovered nitrogen, phosphorus and potassium from biowaste can either be used as a direct substitute of fertilizers, or as a resource for the production of mineral fertilizers. The remaining organic matter with a reduced mineral content is a valuable soil improver that can be applied in the local region. This treatment approach of biowaste will:

- reduce the energy consumption and CO₂ emissions associated with synthetic nitrogen production,
- reduce Europe's dependency on external and finite phosphate reserves,
- reduce CO₂ emissions of biowaste transport, and
- reduce the nutrient losses to water and air due to the increased nutrient utilization

Towards a circular economy

At five large-scale demonstration plants throughout Europe, SYSTEMIC demonstrates new approaches for the valorisation of biowaste into green energy, mineral resources, fertilizers and organic soil improvers. Existing biogas plants will be enhanced with novel nutrient recovery technologies. These pioneering plants play a pivotal role in the evaluation of the performance of our new circular solutions. The composition and quality of the products will be tuned to meet the requirements of regional markets. This market-driven approach is needed to develop a viable and sustainable industry.

The wider uptake of our approaches and transition towards a circular economy will be stimulated through:

- creation of business opportunities for ten outreach locations,
- dissemination of economic and environmental benefits,
- policy recommendations

SYSTEMIC will boost the implementation of circular solutions for biowaste in Europe.

Circular Solutions for Biowaste



The Newsletter Letter #1



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 Dedeeyne, 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 Zevent 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 Zevent had to export its digestate to neighbouring countries with a 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 Zevent 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 Zevent [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](#).



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

