



Nutri2Cycle

D.8.4 Endterm meeting report

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Glossary

Agro-typology: Agricultural system as a wider term which emphasizes on the functional attributes which be a single farm or a group of inter-related farms having similarities of agricultural attributes.

Cost benefit analysis: A cost-benefit analysis is the process of comparing the projected or estimated costs and benefits (or opportunities) associated with a project decision to determine whether it makes sense from a business perspective.

Life cycle assessment: Life cycle assessment or LCA is a methodology for assessing environmental impacts associated with all the stages of the life cycle of a commercial product, process, or service.

Lighthouse demo: Illustration and demonstration of the move from theory to practice to experiment innovative solutions.

National task force: A network of relevant local Operational Groups, local farmers/farmer organisations, other stakeholders at national/regional level interested in nutrient recovery and recycling and operating in the target countries.

Solution: A Nutri2Cycle solution is a proposed optimized farming system, aimed at closing nutrient loops and efficient mitigation measures.

Technology readiness level: Technology readiness levels are a method for estimating the maturity of technologies during the acquisition phase of a program.





List of abbreviations

CBA:	Cost Benefit Analysis
D:	Deliverable
DBI:	Dash Board Indicator
EC:	European Commission
ESNI:	European Sustainable Nutrient Initiative
EU:	European Union
LCA:	Life Cycle Analysis
NTF:	National Task Force
PM:	Person Month
TRL:	Technology Readiness Level
WP:	Work Package
WTP:	Willingness To Pay





Introduction

The last short partner meeting took place on 19/09/2023 in Ghent and was co-organised within the 3 day final event of Nutri2Cycle (19-21/09/2023). Details on the final conference can be found in Deliverable D7.8. The aim of the final partner meeting was to establish the final timeline for reporting and discuss the most important conclusions and impacts of the project.

The following delegates attended the meeting:

	Institute	Participant
1.	Ghent University	Erik Meers Evi Michels Çağrı Akyol Margherita Genua
2	Universita Degli Studi Di Milano	Giuliana D'Imporzano
3	Politechnika Czestochowska	Krystina Malinska Danuta Drozd
4	United Experts	Lies Bamelis
5	Fundacion Cartif	Francisco Corona Francisco Verdugo
6	Johann Heinrich Von Thuenen Institut	Jorg Rieger
7	Soltub	No representative
8	Stichting Wageningen Research	Jan Peter Lesschen
9	Instituto Superior de Agronomia	Catarina Esteves
10	Kobenhavns Universitet	Lars Stoumann Jensen Miriam Beyers
11	3-R-BioPhospate	No representative
12	Chambre d'Agriculture	Mathilde Blanc
13	Zuidelijke Land- en Tuinbouw organisatie vereniging	Peter Pree
14	Institut De Recerca I Tecnologia agroalimentaries	August Bonmati Miriam Cerillo Marta Ruiz Zein Kallas (CREDA)
15	Teagasc	Elizabeth O'Caroll
16	European Biogas Association	Marina Pasteris Lucile Sever
17	IPS Konzalting	No representative
18	Inagro	Sander Vandendriessche
19	Consorzio Italbiotec	No representative

As the project is in its final stage the meeting was seen as an open forum discussion moment with one plenary presentation by the lead partner Ghent University to guide participants throughout specific topics rather than individual work packages. In this paying attention on both the achievements as well





as the way forwards, in frame of continued collaborations and in terms of how the achieved output could enjoy maximum impact and implementation. The following meeting topics were handled:

Meeting topics	
19/09 – 10.00-12.00	Project overview – Amendment
	Status of final deliverables
	Final report (content reporting-financial reporting -Impact)
	Major results of technical work packages
	Outlook on the future

1. Minutes of the meeting

The outcomes and further agreements are listed point-wise below and reflect what has been presented, discussed and agreed on during the meeting (“key points”).

1.1. Project overview - Amendment

UGent provided a status overview of the project, including the status of the requested amendment. From a global point of view the following achievements were reached:

- Review of the Intermediate report
- Second Amendment submitted & accepted
- Deliverables (D) D3.4, D3.5, D5.3, D5.4, D6.2 have been submitted
- Webinar towards Central/Eastern Europe
- Participation to European Commission (EC) events
- Inclusion to the EC’s Results Pack on Fertilisers
- Dedicated work package (WP) leader meeting in Ghent in March 2023
- Third summer school in Barcelona in June 2023
- Publications reached 47 in total at this moment in time
- First draft of the final report

Project partners were pointed to the fact that the requested amendment has been approved. This implies the following changes with respect to deliverables and milestones

- New deliverable - D1.7 Modelling of nutrient flows at farm scale (M60)
- New deliverable - D3.6 Cost Benefit Analysis (CBA) report – final update (M60)
- D4.2 Report on effects of innovations at regional, national and European Union (EU) level - new submission date (from M55 to M60)
- D4.3 Policy report – new submission date (from M56 to M60)
- Milestone 4 – new achievement date (from M56 to M60) – linked to D4.2 and D4.3





1.2. Status of final deliverables

The table below shows the status of the final deliverables by the time the end-term partner meeting took place.

Deliverable	Responsible	Status
D1.7	Wageningen Research	Expected to deliver +/- 2 weeks late
D2.5	University of Milan	Under review by Krystyna Malinska (PCz) & Barbara Dukic (IPS)
D3.6	United Experts	Expected to deliver +/- 2 weeks late
D4.2	Thuenen Institute	Under review by Lars Stoumann Jensen (UCPH)
D4.3	Thuenen Institute	Under review by Erik Meers (UGent) and Lucile Sever (EBA)
D7.6	Ghent University	Reviewed – awaiting final corrections
D7.7	Ghent University	Expected to deliver +/- 2 weeks late
D7.8	Ghent University	Expected to deliver +/- 2 weeks late
D8.4	Ghent University	To be drafted following the meeting

1.3. Final report

An important part of the meeting was dedicated on the final reporting and the main messages of the project. The lead partner has already compiled a draft version of the end reporting in mid July 2023, built on the intermediate report (M37-M44), the dedicated WP leader meeting (March 2023 Gent) and input from the WP leaders. This document will form a very strong base for the final report.

Partners were pointed to the following:

- The reporting period comprises M37-M60 of the project
- All reporting, accomplishments and deviations should be weighed off against the amended Grant Agreement. The legal data as shown in the portal are the only correct ones. When in doubt, please consult the lead partner

Specifically for the **content reporting** the following was agreed:

- The main sections of the report are a group effort. The lead partner and WP leaders will take a frontrunning role, but expect input/feedback from all partners.
- Input is required from all partners, but is channelled through the WP leaders that will update their work package reporting
- Input for the general reporting section at the portal will be collected through email to all partners by the lead partner





The following timeline was agreed on:

Final report	
WP leaders collect info from their WP partners	Upon agreement with WP leader
WP leaders provide an update to the lead partner	11/10/2023
The lead partner compiles draft version of the final report	30/10/2023
All partners revise the draft final report and provide feedback	30/10-10/11/2023
The lead partner compiles final version of the report	20/11/2023
All partners perform a final check	20-24/11/2023
Submission of the report by the lead partner	30/11/2023

Specifically for the **financial reporting** the following was agreed

- The lead partner reminds all partners that a certificate on the financial statement is necessary and eligible if a beneficiary or third linked party requests a contribution of 325.000 euro or more. In all other cases these kinds of costs are not eligible. All partners should keep this in mind while reporting and if applicable reserve a budget for this.
- The lead partner once more reminds the partners that subcontracting costs are only allowed when this was previously requested and approved on in the Grant Agreement.
- All deviations in finance and person month reporting should be reported as soon as possible to the lead partner. If deviations occur these should be carefully explained in relation to the performed work, tasks and goals. This should be provided to the lead partner for evaluation and integration in the final report.

The following timeline was agreed on:

Final report	
All partners check the need for a certificate on the financial statement and make arrangements	Asap
All partners submit their final financial report in the portal	30/10/2023
All partners provide an explanation (if applicable) to any deviation from the budget or PM effort	30/10/2023
The lead partner checks the input and requests extra information when necessary	30/10-15/11/2023
Submission of the financial report by the lead partner	30/11/2023

The partners are reminded that following the submission of the final report also a final review meeting will need to take place. The project officer already proposed this would take place between 11-15 December 2023 or 8-12 January 2024. Several partners indicate these data are not feasible due to examinations and/or holiday period. The lead partner will therefore propose alternative dates in the week 2 or 3 in January to the project officer and will come back on this. All partners and in particular the WP leaders should however reserve time in December to carefully prepare this meeting together with the lead partner. Further guidelines will be circulated by the lead partner in October 2023.

A discussion was also held on the **impact** of Nutri2Cycle and the means to verify the impact. Below a comprehensive overview is given.



Expected Impact	Key performance target	WP	Lead Beneficiary	Status	Verification
Effective solutions for C-, N- and P efficient agro ecosystems	Implementation technologies (TRL 6-8) at 12-16 prototypes at lighthouse farms	WP6	TEAGASC	Done	D6.1, D6.2
	Options for enhancing C, N & P use efficiencies defined in regional case-study reports	WP6	TEAGASC	Done	D6.1, D6.2
	List of priority measures for a comprehensive decrease at farm level of CNP losses	WP3	UGent	Done	D3.2
	List of measures for enhancing soil carbon	WP1	WUR	Done	D1.7 (new deliverable), D4.2
Improved overall sustainability and innovation capacity of the farming systems	Active interaction with 15 EIP Operational Groups	WP2- WP7	UGENT	Done	To do: UGent will ask all partners (WP2-WP7)
	Scientifically test and scrutinize 24 measures	WP2- WP4	UMIL	Done	D2.3, D2.3, D2.4, D2.5, D2.6, D4.2
	Actively collaborate with & give support to 12-16 Lighthouse farms	WP6- WP7	TEAGASC	Done	D6.2
	Develop a “White book on sustainable farming”	WP3	UMIL	Done	D3.5
	Mobile friendly digital page with guidance and links	WP7	UGENT	Done	Website, CBA webtool
	Develop and advocate strategies for increasing soil organic stock	WP2	ISA, WR	Done	Work under RL2, RENURE, soil health consultation, D1.3, D4.2
	12 new farmers’ groups - system of National Task Force	WP7	UGENT	Done	NTF activities (D7.1, D7.2, D7.3, D7.7)

	Operational Groups and EIP Focus Groups involved in NTFs	WP7	UGENT	Done	To do: UGent double checks
Reduction of environmental impact: reduced GHG emissions, protected and enhanced soil carbon stocks, improved ground- and surfacewater quality	Reduction of N fertilizer use from fossil resources in Europe by 5-10 %	WP4	THUENEN	Done	D4.2
	Reduction of P fertilizer use from import in Europe by 10-30 %	WP4	THUENEN	Done	D4.2
	Reduction of NH3 emissions from livestock farms by 25%	WP4	THUENEN	Done	D4.2
	Reduction of N2O emissions from agricultural land by 40%	WP4	THUENEN	Done	D4.2
	Reduction of CO2 eq. emissions from manure storage	WP4	THUENEN, UCPH	Done	D4.2 (storage), D3.4 (transport)
	Reduction of N leaching losses at farm level by 25 to 50 %	WP2-WP4	THUENEN	Done	D4.2 , D2.6 (field trials data)
	Quantified reduction potential	WP4	THUENEN	Done	D4.2
	Increase of N use efficiency at farm level by 10 to 40%	WP2-WP4	THUENEN	Done	D4.2 , D2.6 (field trials data)
	Increase of P use efficiency at farm level by 10 to 40%	WP2-WP4	THUENEN	Done	D4.2 , D2.6 (field trials data)
	Integrated assessment of the economic impacts	Wp3-WP4	THUENEN	Done	D3.3, D4.2
	Integrated scientific support for relevant EU policies (e.g. Common Agricultural Policy, Water	Active engagement in EU and national commissions	WP7	UGENT	Done
Identification of synergistic and antagonistic effects of measures		WP3	UCPH, THUENEN	Done	D3.1, D3.4, D4.2

Framework Directive, sustainable use of pesticides, climate change objectives)	Policy oriented workshops in Brussels with key outcomes	WP4-7	UGENT	Done	ESNI, ManuREsource workshop
	A policy brief with recommendations for overcoming imbalances in nutrient supply	WP4	UGENT, THUENEN	Done	Policy briefs published, D4.3
	A policy brief with recommendations on EU regulations	WP4	UGENT, THUENEN	Done	Policy briefs published, D4.3
	Impact assessments reports, with policy recommendations	WP4	THUENEN, UGENT	Done	D4.3
	Targeted information for specific EU Working Groups	WP7	UGENT	Done	To do: UGent will ask the partners
	Assist the EU in its strive to reduce P-import by 30%	WP4	THUENEN	Done	D4.3, D4.2 - ESPP presentation (June 2022)
	Strengthened transdisciplinary research for longlasting implementation of results	Joint cooperation of 'C, N and P cycle' communities	WP7	UGENT	Done
Setting up a community of young researchers		WP7	UGENT	Done	Re-resource.com, Joint PhD network
Creating a joint PhD / Dual degree system		WP7	UGENT	Done	Joint PhD network
Agro-industry uptake of 12-16 solutions		WP6	TEAGASC	Done	D6.2
Implementation of a 'learning by doing and doing by learning approach'		WP6-WP7	UGENT	Done	Workshops, demo days, living labs, co-creation...
Strengthening of EIP Focus and Operational Groups		WP7	UGENT	Done	Start of the project (EIP focus group), OGs, closed EC meeting in the Netherlands
New technologies and practices tested in practice		WP2-WP6	UMIL, TEAGASC	Done	D2.3, D2.4, D2.5, D2.6, D6.1



	Increased awareness among farmers	ALL	UGENT, CREDA	Done	D7.6, NTF events, Focus Groups (D5.4)
	Mobile friendly digital pages with guidance and links	WP7	UGENT, UE	Done	Project website, CBA webtool
	Development of a digital platform	WP7	UGENT, UE	Done	BCE website, CBA webtool

2. Major results of technical work packages

During the final meeting the major results and outcomes for the six technical WPs were formulated:

WP1 Mapping current CNP flows in European farming systems: Baseline determination & toolbox development

- Alignment of Nutri2Cycle project in terms of terminology, modelling approach and indicators
- Provided a basis for the further impact assessment of the Nutri2cycle solutions in WP3 & WP4
- Development of a farm model to assess nutrient flows and emissions for different farming systems in EU countries
- Comprehensive overview of current CNP flows and nutrient use efficiencies in European agriculture
- Providing baseline data for other studies beyond Nutri2Cycle and policy development related to circular agriculture

WP2 Innovation Funnel for optimizing* farm systems: *reducing GHG and nutrient losses via innovative management systems and technologies to better close C, N, P cycles in the investigated farm systems

- Creation of an inventory of innovative solutions for closing C, N, and P cycles (76 investigations/studies) compiled and described according to the bottom-up approach
- A final list of 45 single studies, grouped in 24 sub-research lines, resulted from selecting and prioritizing the initial inventory long list.
- Set-up of experimental trials to monitor the effectiveness of the solutions in closing the CNP loops.
- Collection of quantified data from experimental fieldwork to feed WPs 3 - 5 for further modelling and data elaboration .
- Conclusions for each research line and effect of solutions on the environment based on the data collected during experimentation

WP3 Impact assessment: Determining environmental, economic and agronomic impact of innovative solutions for closing C, N, P loops and benchmarking these against the current baseline

- Qualitative assessment of a rigorous set of environmental indicators (categories resource use, emissions, resilience) for all innovations (LCA light)





- In general, positive environmental impact, but caution remains necessary, especially resource use can push the balance negatively
- Development of Dashboard Indicators info-graphics which prove to be useful for end user engagement
- Full environmental-LCA conducted for a range of shortlisted innovations. This showcased that more circular does not always mean more sustainable, resource use and up/down stream effects may outweigh positive impacts
- DBI and full LCA do not always add up, a more refined approach may be necessary, especially experts over enthusiasm and definition of boundaries are crucial.
- Development of a social-LCA methodology development for a range of shortlisted innovations; which can be beneficial for other projects in the future
- Economic feasibility of solutions depends on regional nutrient surplus, but also very volatile energy and mineral fertilizer prices. The creation of the CBA tool which is a very hands on tool for end-users (farmers) can take these factors dynamically into the equation.

WP4 Macro-economic impact: Extrapolating potential farm level impact to regional and European impact in comparison to baseline

- Understanding Regional Context is key to assess the transferability of agricultural technologies
- TRL in itself does not guarantee Transferability, practical considerations and real-world implementation challenges can outweigh the technical readiness of a technology.
- Familiarity Influences Transferability: Technologies that were better understood or more familiar to experts and participants received higher transferability rankings. This suggests that clear communication and education about innovative agricultural practices can positively impact their adoption. This also implies that market uptake of novel concepts and innovative technologies in agriculture, follows more of a gradual percolation of the market rather than sudden step-wise adoption by farmers. Incentivizing policy instruments such as the Common Agricultural Policy (CAP) can help speed up this process.
- The proposed Nutri2Cycle technologies contribute to a net reduction in agricultural greenhouse gas (GHG) emissions in the European Union (EU), based on modelling simulations the adoption “Farm-scale anaerobic digestion of agro-residues/pig manure to increase local nutrient cycling & improve nutrient use efficiency” in particular emerges as a high-potential Technology to promote throughout Europe.
- N-sensors can significantly reduce mineral fertilizer use in the EU. Sensory technologies as well as other key enabling technology towards precision fertilization can contribute significantly towards reconciling the desired reduced overall fertilizer use (-20% by 2030 in accordance with the EU Green Deal) with maintained Food productivity. Not only will precision agriculture allow reduced overall fertilizer use, but it will also help in better utilization of heterogeneous fertilizing products from biobased origins (which are more variable than formulated chemical fertilizers).
- One of the spearpoints of the Nutri2Cycle project has been the potential of biobased fertilizers that can replace mineral fertilizers from primary resources. Amongst others, the adoption of the Fertilizing Product Regulation (FPR) have been at the foreground over the duration of the





project. In this, also the high potential of Recovered Nitrogen from Manure (RENURE) has been recognized as a high potential principle to (i) upgrade the Nutrient use efficiency of animal manure with (ii) reducing our dependency on synthetic nitrogen fertilizer produced from natural gas.

- Nutri2cycle has provided policy recommendations answering public consultations from the EC on items related to the integrated nutrient management, fertilising product regulations and has drafted Joint policy briefs together with other projects on items related to these topics.

WP5 The human factor: Understanding (and influencing) consumer behaviour, perception and acceptance

- Legislation needs to move forward along with the development of solutions to promote the market uptake of such solutions. The existence of a wide range of ecolabels can create on the one hand a more competitive market but can also confuse and mislead consumers,
- Meta-analysis showed that the Willingness to pay (WTP) depended significantly on variations of the REGION and the food CATEGORIES. The overall WTP valuation was calculated as 33%, that is, consumers are willing to pay about a 33% MORE FOR SUSTAINABLE attributes.
- For the products categories analysed under the different Circular farming innovation proposed in Nutri2Cycle project the global average rate of WTP a premium for the 3 products categories is 27,24%
- All the obtained results should be seen in the light of the economic situation at the moment of study
- Circular farming was clearly perceived as environmentally friendly in a close position to the organic systems. Reducing the consumption of meat (flexitarian diet) was considered as environmentally sustainable Diet according to more than 50% of respondents.
- Consumers participants highlighted that labelling is not always clear. Standardized labels are really important
- The combination of the EAT-Lancet recommendations for dietary changes and the implementation of a carbon tax to trigger the adoption of mitigation technologies showed the highest reductions in all emission types and was the most positive for the environment. Policies that support the adoption of the EAT-Lancet diet and mitigation technologies in the agricultural sector could be useful tools for achieving national or EU-wide mitigation goals.

WP6 Theory to action: demonstration and validation of selected innovations at relevant (farm) scale

- 14 lighthouses have been set up with a dedicated strategy to showcase their potential at relevant scale. Within the 14 lighthouse demos eight agro-typologies were represented, with 12 of the 14 demos representing more than one agro-typology.
- These lighthouses have demonstrated innovative mitigating measures for a farmer audience, executed at relevant scale. Moreover the lighthouses were geographically spread across the 12 member states involved in the Nutri2cycle project, and content-wise also spread across the 5 overarching research lines of the project.
- Individual monitoring reports and the advancement on TRL level of each lighthouse demo have been reported in D6.2, together with the recorded dissemination activities that were





undertaken for each lighthouse demo throughout the duration of the project. The approved final TRL ranking data confirms that the initial aim of lifting at least one demo per agrotypology to a minimum TRL of 6 or 7 has been achieved.

- National Task Forces have been set up (WP7) in the 12 member states represented by the partnership, aiming at disseminating results towards local audiences in local language and taking into account local contexts. These national task forces will strive towards continuation – for some of these this will occur through follow-up CSA-type projects (see further).
- The transferability and potential uptake of lighthouse prototypes have been reported in D4.1 based on expert assessment, stakeholder surveys and NTF feedback. The results from these sources followed a qualitative format of discussing the benefits and challenges associated with implementing a given technology within a given region, and, provided a quantitative numerical transferability rankings from low to high based on the expert and NTF participant feedback.

3. Outlook on the future

During the wrap up the future post-project was shortly discussed. These were the most important conclusions:

- The partnership proved to be an interesting mix with a good cohesion.
- Some of the partnerships will be continued within novel approved European projects. Nice examples are the projects “Horizon-RIA NutriBudget”, “Horizon-CSA Novafert” and “Horizon-CSA FER-PLAY”. NutriBudget will create a Mitigations Measures Catalogue comprising of three different categories of agronomic measures according to the Nutri2Cycle triangle approach. Novafert and FER-PLAY on the other hand will perform a mapping exercise of fertilizing products based on the work done in (amongst others) Nutri2Cycle and will build further on the national task forces that were established under Nutri2Cycle.
- The consortium has published an impressive amount of scientific papers (47 by the end of September 2023). For the coming period there will also be a focus in finishing any papers that might still result from the project. The engagement in the open access view guarantees that the data can be consulted and re-used.
- The policy work will continue grace to the firm engagement of several of the partners in the Nutrient Recycling Community. Nutri2Cycle has officially transferred the lead of the policy group to the European NEW project Renu2Cycle. This way we can ensure that the messages are not lost and will be continuously communicated to the policy makers.
- The project has established some great results within the frame of “strengthening interdisciplinary research”. The consortium is convinced that the communication tools and the community work (both in terms of the joint PhD network as well as the nutrient recycling community (ESNI)) is guaranteeing the long-life of the project results.

