ResidueGas DELIVERABLE NO. 7.3

ResidueGas plan for dissemination, communication and exploitation of results

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1. Introduction

1.1 Project content

The nitrogen (N) content of crop residues is used in national GHG emission inventories to estimate nitrous oxide (N_2O) emissions from agriculture. Crop residues also make a major contribution to sustaining or enhancing soil carbon (C) stocks. Recent studies suggest that concurrent C and N transformations are critical for N_2O emissions from crop residues. Depending on the amount of C and N in crop residues and their contributions to N2O emissions or to the soil C and N balance, residues might increase or decrease the GHG footprint of agricultural systems. In the EU, current emission methodologies identify crop residues as the third largest source of direct N2O emissions from agricultural soils. Yet the quantification of this source is largely neglected, resulting in large uncertainties in national GHG inventories. These uncertainties relate to: 1) the amount and N concentration of residue returned to soil; 2) the magnitude of N2O emissions associated with application of crop residues of different quality; and 3) how N2O emissions and uncertainties differ with crop species, soils, climate and management practices.

The ResidueGas project addresses the estimation of N_2O emissions from soil amended with crop residues, including cover crops and incorporation of grassland swards. Preliminary hypotheses in the ResidueGas project illustrate the importance of critical moments during crop management cycles for N2O emissions from crop residues. High N_2O emissions have been associated with low residue C:N ratios; however, residue C and its degradability are also important for emissions, and in some cases may be a greater driver than total N input. This indicates that crop residue properties, beyond N supply, such as chemical composition, and the mode of residue application influence N2O emissions, and that C and N availability in residues as well as management need to be considered.

1.2 Expected results

The project will deliver the following results and plan for communication, dissemination and exploitation of results is focused on these results:

- Documentation of an improved methodology to quantify N_2O emissions from agricultural crop residues management, thus providing a basis to identify targeted measures for reducing these emissions. This includes a standard methodology for estimating the amount of N in residues, improved emission factors for different crop rotation systems in different soils and climates, and identification of the effects of residue quality and management on emissions.
- Quantitative information about crop residue management strategies with respect to their net greenhouse gas effect in terms of N2O emissions, radiative forcing and soil C storage, which will be used to identify best practices for residue management.

1.3 Communication objectives

The overall objectives of the communication in ResidueGas is to stakeholders are adequately informed of the results in ResidueGas in order to achieve four major impacts:

- Reduced uncertainty of inventories of N_2O from residues
- Incorporation of mitigation of N_2O from residues in inventories
- Quantified mitigation potential for crop residue management
- Barriers identified for mitigation through crop residue management.

2. Plan for achieving impact

The relationship between project outputs, actions, stakeholders and impact is illustrated in Fig. 3.1

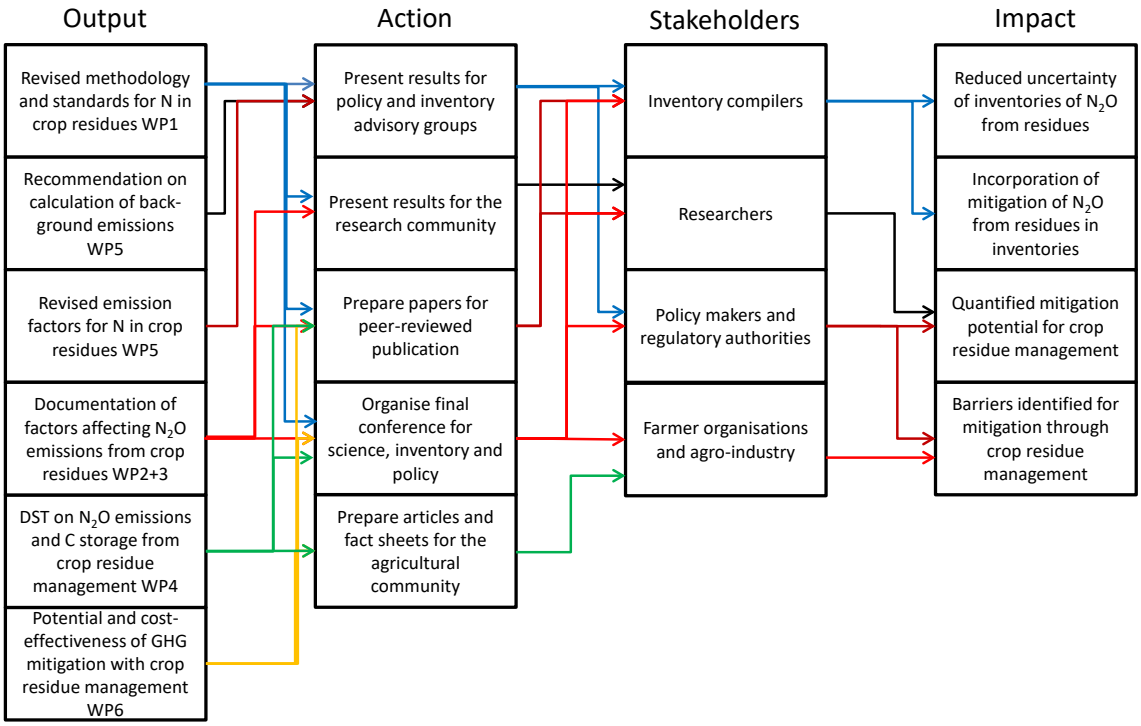

Figure 3.1. Overview of project outputs and actions on communication and stakeholder interactions leads to the anticipated impacts.

2.1 Dissemination

The main channel of dissemination of ResidueGas will be through interaction with relevant stakeholder groups in the following categories: 1) national inventory compilers, 2) farmers, farmer organisations and farm advisory, 3) agro-industry, 4) Policy makers and regulatory authorities, and 5) researchers. Stakeholders will partly provide guidance to the project, and selected stakeholders will be invited for the kick-off and mid-term meetings to guide on approaches and needs for information. For the final conference a broader range of stakeholders will be invited as part of the dissemination of project results. Stakeholders will also be involved in the specific activities of refining emissions inventories and identifying mitigation options. A range of stakeholders in partner countries have been identified to take part in these activities.

National inventory compilers from all partner countries have been identified and agreed to participating with advice and recommendations on the development of improved methods for accounting N_2O emissions from crop residues. They will also provide guidance on how to ensure that new inventory guidelines can be approved and implemented.

The organisation of farmers and advisory services vary greatly among the partner countries, and a number of these have been identified to participate as stakeholders representing the breadth of agricultural systems and cropping practices. This includes as main categories with examples: Farmer organisations in general (Danish Agriculture and Food Council, Gartnerhallen in Norway, The Federation of Swedish Farmers), organic farming (Organics Denmark, Swedish Organic Farmers Organisation), conservation tillage (FRDK in Denmark), farmer and technology networks (RMT in France, Farming for Better Climate Programme in UK) and farm advisory (SEGES in Denmark, NLR in Norway, Hushållningssälskapet in Sweden). These stakeholders will be involved in identifying mitigation options and aspects related to their implementation.

There are a number of relevant agro-industries that are also of potential importance for promoting mitigation in agriculture, and to which the partners have ongoing collaboration. These include for example 1) the dairy industry, where an example is ARLA that operate in several of the partner countries, and which has an ambitious plan for reducing the climate footprint of dairy products, 2) the chemical industry, where an example is BASF in Germany that produces and markets nitrification inhibitors, and 3) networks involving research and agroindustry, where an example is UMT Alter'N in France focusing on environmental impacts of cropping systems. These stakeholders will contribute with insight on how mitigation can best be incentivized.

Policy makers and regulatory authorities will be included to explore options of regulation and support for mitigation options related to residue management, and which barriers apply from a regulatory perspective. The relevant stakeholders vary among partner countries, but the following have been identified initially: Ministries of Agriculture and Environment in France, Danish Ministry of Environment and Food, and Norwegian Agriculture Agency.

Relevant researchers in the area can be identified through their involvement in European and global research networks such as GRA, GACSA, MACSUR as well as participation in advisory bodies such as IPCC guidelines working group, TRFN and TFEIP. Also researchers participating in other ERA-GAS projects will be identified as research stakeholders. These stakeholders will be consulted on results of the research aspects of the project and on the proposed guidelines resulting from the project.

2.2 Exploitation

ResidueGas aims to develop a methodology that can be readily integrated in the IPCC inventory methodology for N_2O from crop residues as a tier 3 method. We also expect that the results generated in ResidueGas will lead to more general revisions of the IPCC inventory methodology for crop residues, and we will provide results and documentation to the IPCC to feed into this process. We will work with the inventory compilers the in partner countries to encourage the use of the revised methodology in these countries as a starting point for the wider application of the revised methodology. We will further encourage the application of the revised methodology in other contexts such as farm-scale accounting and LCA approaches, e.g. the ARLA farm-scale climate-proofing tool. Policy makers and farmer organizations will be informed about the progress throughout the project to encourage the uptake of the revised methodology at the various scales, so that incentives for crop residues mitigation can be put in place as soon as possible.

The IPR of external data contributors and of partner organizations will be respected (according to the Consortium Agreement), but within ResidueGas all protocols, model outputs, decision support tools and datasets will be made public at the latest at the end of the project. Publications from the project will be given green open access and the same applies in general to datasets and models. Where possible, golden open access will be applied by preferring journals with data repositories. This will also allow the results of the project to be exploited in future research to further develop and refine methodologies for inventory of N_2O emission from crop residues and the application of integrated models and DSTs on measures to reduce net GHG emissions in cropping systems.

2.3 Communication

The routes of communication of project outputs towards achieving impacts are illustrated in Fig. 3.1. There are distinctly different communication routes depending on target groups:

- Inventory compilers in the participating countries will be informed directly on the progress and the recommended new methodologies for inventory compilation.
- Farmer organizations and agro-industry will be informed through direct contact and ongoing dialogue. The project will produce fact sheets directed to this target group (to be translated to national languages where appropriate and also used for articles in farmer magazines):
    - Crop residues as source of N_2O and how this can be included in national inventories
    - Hotspots of N_2O from crop residue management and how these can be mitigated
    - Mitigation of GHG from crop residue management – how to maximize effects
- Policy makers and regulatory authorities will be informed on progress throughout the project by participation in project meetings, newsletters and the final conference. In addition a policy brief on improved inventory methods and options for mitigating agricultural emissions will be made available ahead of the final conference.
- Researchers will primarily be informed through published scientific papers (including materials made available on ResearchGate) and through international conferences such as on Climate Smart Agriculture, Global Research Alliance meetings, International N Workshop, European Society of Agronomy, and European Grassland Federation.

All project stakeholders will be informed on project progress and results through newsletters issued three times during the project period. At the end of the project a conference will be organized in Paris for communicating results to science, inventory and policy within Europe and beyond.

3. Communication matrix

COMMUNICATIONS MATRIX			Projects of FACCE ERA-GAS		
Project Acronym:		ResidueGas			
Communication contact person of the Project:		Jørgen E. Olesen			
Communicaction activity	**Target Audience**	**Description of Purpose**	**Date / Frequency**	**Responsible**	**Comments**
Presentation of revised methodology for N2O in residues	Inventory compilers and persons working with LCA tools	Ensure uptake of revised methodology in emission inventories	Annual	Bob Rees	Meetings will be organised at the kick-off, mid-term and final project meetings and separately for some countries
Fact sheet on source of N2O and how to account for this	Inventory compilers; persons working with LCA tools; policy makers; farmer organisations	Inform key stakeholders on how to better account for N2O from crop residues	2020	Bob Rees	Possibly articles in magazines targeting policy makers
Fact sheet on hot spots of N2O from crop residues and how to mitigate	Farmers and farmer organisations	Inform farm managers on how to avoid N2O emissions from residues can be avoided	2020	Sissel Hansen	Translated to national languages and to articles for farmer magazines
Fact sheet on mitigation of GHG from crop residue management	Farmers and farmer organisations	Inform farm managers on how to maximize use of residues with minimal GHG	2020	Jørgen E. Olesen	Translated to national languages and to articles for farmer magazines
Farmer meetings	Farmers and farmer organisations	Ensure uptake of revised methodology in emission inventories	2019 and 2020	All	Identify suitable meetings at national levels
Policy meetings	Policy makers; Farmer organisations	Increase awareness on GHG from crop residues and barriers for improvement	2020	All	Identify suitable meetings at EU and national levels
Policy brief	Policy makers	Enhance policy awareness of GHG and fertility issues related to crop residues	2020	Jørgen E. Olesen	On web-site and targeted dissemination
Scientific papers	Researchers, Inventory compilers, LCA workers	Document research findings	2018-2020	All	Open access
Scientific conferences	Researchers and other stakeholders	Present research findings for feedback	2018-2020	All	Identify key conferences for presentations
Scientific networks	Researchers	Discuss findings and knowledge gaps	2018-2020	All	Profile on Research Gate. Identifiy relevant networks such as GRA
Final conference	Inventory compilers; Farmer organisations; Researchers; Policy makers	Present findings and recommendations	2020	Jørgen E. Olesen	Consider co-organising with other ERAGas networks