GRA Flagships – guiding principles



ON AGRICULTURAL GREENHOUSE GASES

# **Existing Flagships**

General approach:

- Quantification of GHGs
- Development of mitigation
- Promoting adoption



## **GHG** inventories



#### Enhancing *inventory structure*

Regional and source-specific **guidance** for the development of advanced inventories

Tier 2 **inventory development** – utilise expertise and experience of GRA Members

Guidance for development and adoption of **modelling approaches** (i.e. Tier 3) for specific sources within inventories.

### Acquisition and administration of data

Incorporation of **improved emission estimates** in emissions databases (e.g. IPCC-EFDB, GRAMP, SAMPLES, MAGGnet) and activity databases.

National and regional **research projects** that validate existing measurements and identify and validate approaches (measurements and modelling methodologies) to reduce the emissions intensity of food production and ensuring that those gains can be captured in inventories.

**Dissemination** of improved estimates of GHG emissions developed from regional and national projects to inform the **development and verification of methodologies** by the IPCC and other inventory support mechanisms

## Demonstrating *mitigation* in NDCs

Provide **targeted support** for countries for designing agricultural **monitoring, reporting and verification** (MRV) within NAMAs or Low Emissions Development pathways based on improved inventories

### Building *capability*

**Analyses** of current methodologies for estimating GHG emissions adopted in national GHG inventories by source, **barriers to adoption** of advanced methods and **experiences of countries** in adopting advanced methods (networks and reports from international workshops, technical and summary papers)

Identification of **training needs**; country-specific guidance and training needs developed jointly with countries.

Delivery of **targeted technical training** to improve emission factors and design inventories that work with existing national and regional data sources.

# Soil Carbon Sequestration



Online collaborative knowledge hub		
Developing solutions	Monitoring solutions	Adopting solutions
<ul> <li>Decision support toolbox</li> <li>Maps of SCS potential (e.g. to reach the 4 per 1000 aspirational target)</li> <li>Maps of crop and pasture practices suited to reach SCS targets</li> <li>Implications of SCS practices for <ul> <li>yields,</li> <li>drought tolerance and climate change adaptation</li> <li>N<sub>2</sub>O and CH<sub>4</sub> emissions, energy use</li> </ul> </li> <li>Costs and benefits of transitioning to SCS practices</li> </ul>	<ul> <li>Methods to certify SCS</li> <li>Tiered methodologies for monitoring, reporting and verifying (MRV) soil organic carbon (SOC) stocks in crop and pasture systems</li> <li>Handbooks and guidelines for project scale MRV adapted to regional contexts and agricultural systems</li> <li>Technologies for rapid SOC stock verification</li> <li>Modelling of SOC stock change in crop and pasture systems</li> </ul>	<ul> <li>Enabling environment</li> <li>Regional stakeholder workshops on SCS</li> <li>Criteria for sustainable SCS projects supporting livelihoods</li> <li>Assessment of barriers to the adoption of SCS practices</li> <li>Value chains, business models and policy options</li> <li>Research funding strategy and international research cooperation</li> </ul>
Capacity building, knowledge transfer and training		

## Low emissions rice

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GLOBAL RESEARCH ALLIANCE ON AGRICULTURAL GREENHOUSE GASES

### **Developing** solutions

- Water management conducting multi-country experiments on commercial size farms to assess the effects of AWD as a mitigation solution
- Organic matter management

   identification, testing & quantification of improved management of crop residue and manure as a mitigation solution
- Cultivar selection identification, testing & quantification of high yielding rice cultivars with low CH<sub>4</sub> emission

## Improving *quantification*

- **Database compilation** sharing experimental information and emission data among members
- Improved 'emission factors' improving emission and scaling factors for CH<sub>4</sub>/N<sub>2</sub>O emissions and soil C stock changes in country/region by analysing emission monitoring data
- Modelling development and inter-comparison of processbased models to simulate CH<sub>4</sub>/N<sub>2</sub>O emissions soil C stock changes

### **Adopting** solutions

- Identification of areas where AWD can be applied and optimized to reduce yield loss risks, water and carbon footprints of rice systems
- MRV guidelines measurement, reporting, and verification (MRV) guidelines for implementing the solutions to GHG mitigation actions
- Promotion of solutions by communication of tested mitigation solutions with stakeholders to support NAMAs and NDC

### **Building** capabilities

- Workshops to enhance the technical and institutional capacity to conduct relevant GHG research in the Group
- Coordinated networks of scientists and extensionists, private-sector, and farmers for accelerating the wide-scale adoption of best-fit management options

## **Enteric fermentation**

#### Development of solutions

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- Animal selection data sharing & analysis to facilitate development of genetic/genomic markers (microbial & animal) for low emission traits
- **Feeding** identification, testing & improved quantification of low emitting feeds suitable for incorporation into the diverse range of animal husbandry systems found in GRA member countries
- Microbiome Improved understanding of the processes involved in enteric CH<sub>4</sub> formation, characterisation and direct manipulation of the microbial populations
  - **Animal health** improved understanding how animal health has an impact on the enteric microbiome functioning in relation to methane production
  - **Manure management** exploring the options to improve the quality of manure from a fertilizer or energy source by fostering the enteric microbiome

### Improved quantification of livestock emissions

- **Improved 'emissions factors'** the determination of methane yield (Ym) in temperate, tropical, rangelands/semi arid feeding systems and in by-product dominated diets
- **Improved activity data l**ow cost innovative generation of data on animal performance, populations, feeding systems
- Livestock Tier 2 inventory development utilise expertise and experience of GRA Members

## Identification, testing and *implementation* of mitigation solutions to support NDC/INDC

- **Identification** of locally appropriate mitigation actions –e.g. feeding, breeding, animal health, reproductive performance
- **Pilot testing** of solutions impact on mitigation, economics, food security, adaptation-mitigation synergies
- Implementation at scale communication & promotion of tested mitigations, mainstreaming mitigation actions into existing development projects, support for NAMA development

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# Future Flagships?

Decision in GRA Council in Sept.

- Need elaborated proposal
- Concrete project ideas



# Some examples of successful resource mobilisation



## Rice

 APEC Agricultural Technical Cooperation Working Group funding to support regional activity in Asia and Latin America

## **Enteric Fermentation**

 Extension of ERAGAS project CEDERS - Improved quantification of the effects of feed and nutrition on enteric methane emissions from cattle managed under a wide range of production conditions and environments

## Soil carbon

EU funded CIRCASA to coordinate activities

## Nitrous Oxide proposal



#### Development of *solutions*

- Nitrogen management: rate, formulation, timing and placing –Improved Nitrogen management to improve crop yield while minimizing reactive nitrogen losses including N2O emission.
- BNI-enabled staple crops and pastures -Improve/introduce BNI-capacity into staple crops and pastures to reduce nitrogen losses and improve NUE. Develop novel production systems that are low-nitrifying and with reduced N<sub>2</sub>O emissions - Integrate high-BNI capacity pastures (e.g. Brachiaria sp) with low-BNI-capacity annual crops (e.g. maize or rice)in agro-pastoral systems for low-nitrifying and low-N<sub>2</sub>O emitting
- *Microbiome* Improved understanding of the processes involved in Nitrous Oxide formation, improve nitrogen fixing symbiosis
- Soil quality and resilience Improved indices of soil quality and resilience to enhance soil Carbon sequestration to mitigate greenhouse gas emission
- **Biomass management** Improved biomass management strategies to mitigate emissions and sequester soil carbon.

Improved *quantification* of nitrous oxide emissions and mitigation

- Improved 'emissions factors' the determination of nitrous oxide emission and yield scaled-emission
- Improved activity data low cost innovative generation of data on crop performance, nitrous oxide emission and soil carbon sequestration
- Cropland Tier 2 inventory development – utilise expertise and experience of GRA Members

*Implementation* of mitigation solutions to support

- Identification of locally appropriate mitigation actions
- **Capacity building** e.g. hands on workshops on N2O measurements and calculations



# Benefits of circular agriculture:

- use land suitable for crop production to sustainably produce food to be eaten by humans;
- livestock feed from products that humans cannot or do not want to eat (coproducts from the food industry, food-waste), grass and forage from land not suitable for crops, and crop residues.
- feed livestock additional high quality feed (grains) only when it increases the overall production of human edible food or other services;
- Efficient use of manure in integrated nutrient management;
- crop improvement, both for food and feed (e.g improve digestibility);
- avoid or minimize losses and waste, and recycle inputs as much as possible in the food system.

## Task Force workshop – Berlin, Germany (Sunday 9 September)

- Workshop ahead of the Council meeting.
- Discuss the concept Flagship Circular Food Systems to develop a proposal.

# **GRA Flagship projects - list**



## **Enteric Fermentation**

- Adaptation in ruminants for increased productivity and lowered environmental impact
- Improved quantification of the effects of feed and nutrition on enteric methane emissions from cattle managed under a wide range of production conditions and environments
- Relating ruminant diet, methane output and animal production to the rumen microbiome

### Rice

- On farm assessment of multi-beneficial improved water management techniques, reducing costs, water use and gas emissions in America's rice systems.
- Multi-country on-farm assessment of multi-beneficial integrated management techniques in the rice sector of Asia
- Identification of high yielding rice cultivars as related to low methane (CH4) emissions

# **GRA Flagship projects - list**

### Inventory

- 'Best practice' guidelines for incorporation of mitigation into national inventories.
- Guidance on Inventory Tiers
- Developing guidance for good implementation of higher Tier methods in national inventories
- Developing guidance for good implementation of Tier 3 models in national inventories
- Database and Inventory Refinement for GHG Emissions associated with Manure and Nitrogen Management
- Developing guidance for improving emissions from manure management in national inventories
- Towards a national livestock methane database project
- Identifying emissions and mitigation options by mapping analogous production systems
- Establishment of GHG measurement, mitigation, adaptation and inventory Centre in West Africa.

### **Soil Carbon Sequestration**

- Crop and pasture practices for SCS: potential and agronomic implications
- MRV for strategies for SCS
- Adoption of practices and socio-economic barriers