The James Hutton Institute

11 February 2016

Dear Sir/Madam,

The James Hutton Institute (http://www.hutton.ac.uk) welcomes the JPI FACCE Implementation Plan for 2016-18, believing it to summarise many of the main threats to agriculture and sets out mechanisms to improve the relevant knowledge bases and its interpretation. However, the extent of the knowledge gaps is not clear and in some topics further consideration should be given to specific items.

Some specific observations are:

- The inclusion of social and economic considerations is welcome. However, there is a need to understand the acceptability and potential barriers to uptake of changes which may be required from both economic and environmental perspectives, the conditions for payments and specific economic benefits for farmers. An example is that of Joint Action Topic 6 (*Agricultural Soil Functionality with a focus on carbon Sequestration)* which is an issue that crosses all the topics listed.
- In sections relating to GHGs there is mention of Nitrous Oxide and methane but that they are less significant than CO2. Whilst this is true on a molecule to molecule basis, in terms of equivalents, N2O and CH4 are more important in relation to agriculture.
- There is a focus on climate change adaptation, particularly in relation to breeding. However, given that agriculture is responsible for a significant proportion of GHG emissions, there should be a similar focus on mitigation.
- Joint Action Topic 14 (*Explore and exploit refinery concepts for the multiple use of biomass under climate change, taking economic and environmental implications into account)* would be consistent with the transition to a more circular economy, in line with International European and national public policies. The topic should include consideration of human waste and not only plant and animal waste streams.
- Many of the potential opportunities are limited in scope in terms of the organisations that can form consortia. Some thought should be given to the inclusion of relevant experts from across the subject community to reduce barriers to participation.

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Should you wish further clarifications, or details for the relevant scientific contacts within the James Hutton Institute, please do not hesitate to contact me by email grant.davidson@hutton.ac.uk or by phone +44 (0) 1224 395058.

Best Wishes

Grant Davidson

With specific reference to the table of Core Themes, the James Hutton Institute has expertise in, and is willing to provide inputs to, the following areas:

Core Theme	Joint action topic	
CT 1- Sustainable food security under climate change	1) Climate change risk assessment for value chains, prices, international trade and food security, including changes in consumer behaviours and wastes	This Joint Action Topic aligns closely with work scheduled to be carried out by the James Hutton Institute as part of the Scottish Government Strategic Research Programme http://www.gov.scot/Topics/Research/About/EBAR/StrategicResearch (2016-21) in relation to sustainable supply chains, scenarios exploring the issues listed in the topic area, and the circular economy pertaining to agricultural/regional economies.
	2) Identification of the impact of food losses in the whole chain, and identifying interventions to decrease the waste	
	3) Assembling existing (and emerging) technologies for primary production, fostering the adoption of improved technologies that are (on the edge of) being mature but not yet widely adopted	This Joint Action Topic aligns closely with work to be carried out scheduled to be carried out by the James Hutton Institute as part of the Scottish Government Strategic Research Programme (2016-21). It also aligns with several ongoing EU (FP7 and H2020) and Innovate UK projects in which the Institute is a partner.

	4) Coordinating policies to support food and nutrition security in the context of climate change	
CT 2- Environmentally sustainable intensification of agriculture	5) Sustainably increasing productivity, resilience and resource use efficiencies (including soil and water) at the agricultural system scale, across regions in Europe, based on improved use of genetic resources and advanced management technologies ('management by measurement') in the context of climate change	This Joint Action Topic aligns closely with work currently being carried out scheduled to be carried out by the James Hutton Institute as part of the Scottish Government Strategic Research Programme (2016-21), of which the following areas are of particular relevance: o improved use of genetic resources (optimising plant with soil) and management technologies for soil with respect to resource use efficiencies and resilience; o grassland productivity at field to the agricultural landscape scale; o understanding the mechanisms that regulate productivity, resilience and resource use efficiency (including for example the role of crop mixtures which links to the focus on genetic resources); o work on the resources for delivering this sustainability that might be available in ancient crop races (e.g. barley land races); o work on our research demonstration farms and experiments with Greening measures and other measures to deliver multiple benefits; as part of a proposed 'Farm Biodiversity Initiative'.
	6) Agricultural soil functionality with a focus on carbon sequestration	Under Joint Action Topic 6.1 our interests are related to our existing research capacity in: • remote sensing • work on the development of a

	To be considered: *6.1) Increasing economically viable input use efficiency by improving water quality and soil function, and better use of fertilisers* *6.2) Alternative land use systems (agroforestry, hedges, mixed farming systems) and land and soil management systems (soil conservation, legumes and soil biology) for building above and below ground carbon stocks and increasing biomass production for food and non-food uses* *6.3) Technical and economic potential of GHG abatement, including enhanced soil carbon storage, in livestock and crop systems and in integrated systems*	natural asset register. Under Joint Action Topic 6.3 our interests are related to our existing research capacity in: • improvement of soil multi-functionality with the objective of providing access to improved and new information, developing user friendly tools, and support for decision making in land management and policy • understanding and visualising the trade-offs and opportunities with alternative land management to enhance soil multi-functionality across landscapes to address multiple goals i.e. food, carbon, water, energy, biodiversity • estimating and validating soil GHG abatement under alternative scenarios of management change.
CT 3- Developing synergies and reducing trade-offs between food supply, biodiversity and ecosystem services	*Although there are no actions entirely dedicated to this Core Theme, the issues of biodiversity and ecosystems services will be considered in joint actions, as needed*	This Core Theme matches several areas of current and research by the James Hutton Institute as part of the Scottish Government Strategic Research Programme (2016-21), and in EU funded projects. We would welcome foresight of any actions if/when they are planned.
CT 4- Adaptation to climate change	7) Identifying constraints to adapting agricultural land, soil and water management for a variety of local farming systems	This Joint Action Topic aligns closely with work currently being carried out by the James Hutton Institute as part of the Scottish Government Strategic Research Programme (2011-16), of which the following areas are of particular relevance: • soil resilience to change under different farming systems (arable, grassland compare to other ecosystems) and across landscapes with consideration of soil biological, physical and chemical components and the soil as a functional unit. • modelling soil resilience under climate change and other drivers building on existing data and knowledge with key experiments

		to improve key aspects of this understanding. • soil and water relationships, in particular the recharge of groundwater and waterways from soil water capture and movement across landscapes.
	8) Increasing economically viable input use efficiency by improving water quality and soil function, and better use of fertilisers	
	9) Adapting specific value chains to climate change from the field to the fork with special emphasis on nutritional quality, food safety and stability accounting for consumer preferences	
	10) Phenotyping, genotyping, breeding and reproduction for adaptation to climate change with crop, pasture and livestock species and evaluating alternative species	This Joint Action Topic aligns closely with work to be carried out as part of the research planned by the James Hutton Institute as part of the Scottish Government Strategic Research Programme (2016-21). It also aligns with several ongoing EU (FP7 and H2020) and Innovate UK projects to which the Institute is contributing.
CT 5- Mitigation of climate change	11) Alternative land use systems (agroforestry, hedges, mixed farming systems) and land and soil management systems (soil conservation, legumes and soil biology) for building above and below ground carbon stocks and increasing biomass production for food and non-food uses	This Joint Action Topic aligns closely with work currently being carried out by the James Hutton Institute as part of the Scottish Government Strategic Research Programme (2011-16), of which the following areas are of particular relevance: • research exploring new options for biodiversity conservation • development of a regional land use decision support tool.
	12) Technical and economic potential of GHG abatement, including enhanced soil carbon storage, in livestock and crop systems and in integrated systems	As Joint Action topic 11

	13) Animal health and disease and GHG mitigation	
Cross-cutting topics	14) Explore and exploit refinery concepts for the multiple use of biomass under climate change, taking economic and environmental implications into account	This Joint Action Topic aligns closely with work currently being carried out by the James Hutton Institute as part of the Scottish Government Strategic Research Programme (2011-16), of which the following areas are of particular relevance: • exploring waste valorisation plans and aims to develop the Circular Economy. Our membership of the Biobased Consortium (biconsortium.eu) can facilitate work in this topic, and such collaboration would be beneficial to all parties.
	15) Identifying the potential role of big data for food security with a focus on collecting data, translating data into information, and promoting and facilitating use of information by end-users. *Considering: Integrated animal health management under climate change with focus on emerging pests and diseases, interactions between wild and domesticated components at landscape scale*	This Joint Action Topic aligns closely with work currently being carried out by the James Hutton Institute as part of the Scottish Government Strategic Research Programme (2011-16), of which the following areas are of particular relevance: • improving and extending soil data sources to produce new and improved information resources that reflect soil functions associated with food security (alongside other issues e.g. water, energy biodiversity, climate change). For example the updating of national mapping of the Land Capability for Agriculture to reflect contemporary soil conditions under current and future climates and increasing the spatial resolution of soil information and data for to support decision makers. This includes greater use of remote sensing and spatial modelling, in-situ spectral analyses of soils and integrating multiple data sources.
	16) Plant and animal production systems for better human nutrition and resilience to climate change	
	17) Climate change risk assessment for agricultural	

	production systems (plant and livestock), and food supplies	
	18) Climate change induced transformation of farming systems towards alternative types of production and links with changes in logistics and relocation of industries, investments. Scale of production is also an issue that we need to link to social and economic dimensions	This Joint Action Topic aligns closely with work currently being carried out by the James Hutton Institute as part of the Scottish Government Strategic Research Programme (2011-16) and EU funded projects (FP7, H2020), of which the following areas are of particular relevance: • modelling work to address the delivery of multiple benefits under Scottish Rural Development Programme and Areas of Natural Constraint • indicators and monitoring of the net effects of Rural Development Programmes on public goods, such as climate stabilisation (FP7 ENVIEVAL).
	19) Valorisation of FACCE-JPI results to stakeholders and policymakers – Conference	The James Hutton Institute is a participant in the Centre of Knowledge Exchange and Impact of the Scottish Government Strategic Research Programme (2016-21), which will have a remit to facilitate the engagement of stakeholders with researcher teams in the Programme. The Institute would welcome the opportunity to contribute to engagement activities between the FACCE-JPI and stakeholders, and assisting to facilitate a conference or similar types of event.