

Introduction

The Danish Ministry of Food and Environment hosted an AgriClimate Workshop on 26 October 2017, inviting ministries and agencies of the EU Member States (MS), the European Commission (EC) and selected experts. The purpose of the workshop was to facilitate interaction between policy-makers from agricultural, environmental and climate change ministries, and to support co-development of ideas on how to promote the development and scaling-up of mitigation practices and technologies in a manner that is cost-effective and creates opportunities. The ideas should take into account the multiple purposes of the agricultural sector, the different conditions of the sector in the MS, and the need for flexible solutions and policies across the MS. The workshop focused on challenges and opportunities, as well as regulatory options and incentives within three key areas of the EU agricultural and LULUCF sector:

1. Livestock;
2. Soil and Land management; and
3. Biobased economy.

Prior to the workshop, the Ministry shared discussion starters on each of the three focus areas with the aim to foster a deeper insight and initiate discussion in preparation for the workshop. Presentations were given by MS and experts, while subsequent discussions were undertaken under Chatham House Rules¹.

The workshop was structured according to the three key areas with three plenary sessions and thematic track sessions. This summary is structured according to these tracks.

Plenary session 1: Setting the scene

Plenary session 1 included presentations from both the scientific and the political arena within agriculture and climate, with the aim to establish a common ground for the workshop, as well as to enhance the interplay between climate change science, the agricultural sector, and EU climate change and agricultural policies.

Agriculture and climate changes - from challenges to solutions

A presentation given by Jean-Francois Soussana (INRA) centered on climate change adaptation measures in the context of reducing GHG emissions from agriculture. He highlighted the expected increased frequency of extreme weather events and climate hazards in Europe by the end of the century. Further, he highlighted the need and options for mitigation in the agriculture and land use sector, and stated among other things that soil carbon sequestration can counter some of the negative impacts of mitigation policies by increasing the technical and economic agricultural production potential in Europe through improved soil fertility. In addition, he emphasized that without dedicated measures, agricultural GHG mitigation in Europe is not cost competitive; in contrast, with dedicated action, agricultural mitigation could become cost-competitive and synergistic with adaptation actions (presentation available [here](#)).

Mainstreaming Smart Farming – farmers perspective – "and how big data, behavioural science and holistic policy making play a role

A presentation by Mr Tamme van der Wal (Wageningen University) focused on how big data, behavioral science and holistic policy-making can contribute to GHG emission reductions in the agricultural sector. He

¹ The program, discussion starters and presentations can be found here: http://en.mfvm.dk/focus-on/climate-change/via_mfvm@mfvm.dk.

highlighted the benefits of modern technology in reducing footprints, increasing productivity, and generating "social profits", and presented the barriers preventing farmers to invest in modern technology. He emphasized that a new policy approach is necessary to realize the full potential of precision farming techniques and IACS². That being said, he stressed that it is important to take into consideration that GHG targets cannot be reached with technology alone without considering behavior. He also touched upon monitoring of farmers' activities and suggested that farmers will be more motivated to adopt technologies if it is also good for business (presentation available [here](#)).

The CAP post-2020 and the Climate Change

Mr Tassos Haniotis (DG AGRI, European Commission) focused on the CAP post-2020 in regards to climate change and agriculture. He discussed the evolution of CAP and the agricultural sector, and emphasized the role of the CAP payments in the development of the agricultural sector. For example, the analysis depends on whether the agricultural sector is valued based on its share of the EU-budget (40%), of GDP (0.5%) or of total agricultural area. He stated that the future CAP reform needs to address several political tensions, such as economy versus environment, and to turn these tensions into synergies that can help redefine the balance between EU, MS and farm responsibilities in order to simplify and avoid policy failures (presentation available [here](#))³.

Land use and forestry in the 2030 Climate and Energy Framework

Mr Peter Wehrheim (DG CLIMA, European Commission) highlighted the importance of mitigation actions in the agricultural sector related to the EU emissions reduction commitments under the Paris Agreement and the contribution of the agricultural sector to the EU climate policy. This included, among others, the ETS⁴ and biomass as a replacement for the use of energy and materials derived from fossil fuels, as well as the agricultural sector's contributions to emission reduction targets in the Effort-Sharing sector by decreasing methane and nitrous oxide emission from use of fertilizers, livestock, etc. A special emphasis was given to bioeconomy and the opportunities it provides for agriculture and new bio-based markets. Lastly, climate-smart agriculture (CSA) was highlighted as a farming strategy providing several options to reduce GHG emission from the agricultural sector (presentation available [here](#)).

Session 1.1: Livestock

Challenges and opportunities for GHG mitigation in the livestock sector

To enhance the understanding of challenges and opportunities for GHG emissions mitigation in the livestock sector, a case example was given on Irish initiatives to curb livestock emissions by Mr John Muldowney (Government of Ireland). He presented Irish efforts to improve the GHG efficiency of livestock systems and the agricultural sector which have provided multiple environmental (incl. climate change mitigation) and economic benefits using cost-effective mitigation actions. This included the Smart farming programme and its new digital initiatives in cooperation between farmers' association and industry lead stakeholder groups, as well as *Origin Green*⁵, the Food-Wise 2050 program for the Irish agri-food industry, and breeding strategies for ruminant livestock farming. He highlighted the need to focus on cost-effective options in livestock- and land management systems and recognised that cost-effectiveness improves over time, as does the energy efficiency of agricultural systems (presentation available [here](#)).

² Integrated Administration and Control System

³ On November 29th 2017 the Commission released a message on "Future of Food and Farming"

⁴ Emission Trading System

⁵ <https://www.origingreen.ie/sustainabilityreport2016/>

Discussion

In the discussion following Mr Muldowney's presentation, several participants asked clarifying questions. Three main tiers of discussion emerged:

1. The use of data and digital tools
2. The role of innovative partnerships
3. Efficiency of options and measures

In response to the questions, it was explained how a smartphone app helped estimate farmers' GHG saving and economic benefits using emission factors. One lesson learned was that while the smartphone app had to use average values instead of developing new ones for each specific project carbon footprints vary with local conditions, depending on climate, soil, applied technology, etc. The impact of specific versus standard emission factors had been tested and was found to be significant.

It was further debated how to clarify the active role of farmers and ensure their involvement in innovative livestock management. The presenter clarified that innovative partnerships with several stakeholders within different management schemes could be set up via the CAP. However, one of the big challenges with this is that such programmes could become too complex. In addition, participants discussed the options for, and benefits of, breeding based on the Irish experience.

Session 2.1: Soil and Land Management

Challenges and opportunities for GHG mitigation in soil and land management

This session intended to initiate a deeper discussion on how EU and its MSs can jointly promote sustainable, cost-effective, and flexible soil and land management strategies that can foster GHG mitigation and environmental benefits.

A presentation of the '*4 pour 1000*' (4 per 1000) initiative was given by Miss Marine de Talhouët and Miss Marion Dominiak (French Ministry of Agriculture), as an example of an initiative aiming to increase the quantity of carbon in soils by 0.4%/year using specific soil and land management practices (presentation available [here](#)). The presentation highlighted the agri-environment climate measures (AECMs) implemented under the pillar II of the CAP, which can support improvement of current practices, but also the maintenance of existing beneficial practices where these are likely to be abandoned. The AECMs covered in the French initiative aims to address multiple environmental issues by creating and maintaining permanent grassland and cover crop under orchards, among others. A particularly interesting issue highlighted by the presenters was that the AECM can support integrated crop-livestock farming systems (implemented in France since 2015). This novel measure bundles activities that covers the entire production system and promotes development of integrated farming practices at farm level. In this context, 'integrated' means e.g. coordinating training, maintenance obligations, thresholds setting (for e.g. forage composition and pesticide use) and regionally specific support amount per ha/year.

Discussion

In the subsequent discussion, in particular three issues received much attention:

1. How to enhance farmers' motivation and participation in the AECM?
2. How to promote emission reductions and carbon sequestration?
3. How to monitor increases in carbon content?

The participants debated how to **motivate farmer participation** to adopt the voluntary AECMs, and the measures to become self-sustaining after five years. This included locally organised meetings to introduce measures, which helps create a positive buzz that spreads via word-by-mouth. One participant mentioned that municipal-level common measures were found to be better and more successful than individual farmer measures. It was stated by several participants that social motivation is sometimes stronger than financial motivation. Taking a managing authority point of view, a participant mentioned that it was important for policy makers to focus money and attention on measures that would be likely to be taken up by farmers. Locally defined and organised measures that also deliver social capital benefits and meet the needs of farmers are most likely to be successful.

The abovementioned discussion also covered **how to protect carbon pools** in organic soil, including the state of agricultural soil degradation in EU. The CAP was mentioned as a policy that can address the issue and there was a discussion on how to improve the conditions of agricultural soils, e.g. under greening measures and cross-compliance or support schemes under pillar II. The main points raised were that 1) income compensation is not a sufficient incentive for farmers to stop draining agricultural areas (with large carbon pools), and 2) the value of conserving carbon pools is relatively larger for the society than for the individual farmer. In terms of ways forward, one participant mentioned compensation beyond the loss of income as a necessary precondition, and as a response it was stated that income compensation does not compensate for the foregone value to society of reduced production. In addition, the administrative conditions on support to this issue and the opportunities to establish EU carbon credits from the agricultural sector on top of CAP payments were debated.

Breaking out from the carbon protection talks, the participants discussed the issues of **monitoring changes in the carbon content** due to the initiative. It was highlighted that due to the relatively short existence of the initiative, the AECMs do not yet link with the national GHG inventories. It was stressed by multiple participants that there is a need to invest and improve the national GHG inventories in order to improve the monitoring of the changes in organic carbon storages. However it was also mentioned, that the benefits from improved monitoring should be balanced with the costs.

Lastly it was mentioned that nutrient policies (e.g. the Nitrate Directive) and climate mitigation policies should be designed in a coherent way and impose mutually consistent and supporting thresholds and incentives as N₂O emissions, fertilizer application and the soil carbon are closely linked, and one cannot manage one without implications for the other.

Session 3.1: Bio-based economy

Challenges and opportunities for GHG mitigation in the bio-based economy

The bio-based economy track session aimed to initiate a deeper discussion on how EU and its MSs can jointly promote a sustainable, cost-effective, and cross-state flexible bio-based economy in EU and the MS. A presentation by Claus Felby (University of Copenhagen) highlighted the need to reduce N and P emissions from land use, and to replace fossil carbon with bio-carbon, while at the same time taking into account ecosystem resilience and biodiversity maintenance (presentation available [here](#)). In order to do so, Mr Felby stated that there is a need to de-couple protein production and land use through applying new technologies (e.g. protein from fermentation processes) and to use protein from e.g. perennial crops and algae (combined with CO₂ capture). He emphasised the need for sustainable intensification where environmental benefits can be coupled with increased production of biomass.

Discussion

The discussion following the presentation, developed along two different, albeit linked, thematic headlines, namely:

1. *Farm level incentives*: Establishing bio-based markets and incentives at producer level;
2. *The local Bio-based economy*: The role of biomass and land use strategies and regulation;

On **market establishment and producer incentives**, a point made emphasised that market pull for bio-based products must be adapted to local conditions and that the incentives for farmers to produce new/additional bio-based value streams must take the situation of specific farmer groups and their conditions into consideration. The critical precondition for the success of farm level incentives is that in order for farmers to start producing certain goods there needs to be a market for their products (i.e. farmers will supply the goods demanded by the market).

Further, it was recognized by several participants that, currently, bio-based products in many cases cannot compete with fossil alternatives on the same market. It was brought up that taxation and support schemes for fossil fuels currently distort competition. It was recognized that mandates are underway or existing, such as for biofuel blending, and one participant mentioned that similar positive market incentives could be established, e.g. a percentage of chemicals, fuels, etc. has to be derived from certain pathways, platforms or feedstock. One participant added that mandates can push industry development, but comes at a cost up-front at farm level, mainly in the form of market risk. This means that calculations are necessary at farm level to promote adjustments, and to prepare and explain the envisioned change to farmers beforehand.

The other theme covered was the **role of strategies, policies and regulation in driving the bio-based economy**, and in particular the role of the local and crop specific approaches. It was mentioned that the CAP could be able to support a bio-based economy, but the same participant explained that the CAP is currently facing challenges when moving from food to bio-based economy, because of the perceived more diverse and complex value chains of the bio-based economy as compared to the straight value chains of the food economy focussed on a limited number of end products. The participants then brought a number of views on possible strategies to promote the bio-based economy, including with reference to the abovementioned debate on taxation and support schemes. A prominent and repeated point was that strategies should be developed with the aim of optimising supply chains and to minimise loss and utilise biomass in an efficient way. It was stressed that different crops are suitable to different areas and likewise the role of the location of facilities to process feedstock. The point in making was that the geography (e.g. location relative to industry clusters and facilities) and crop selection (what bioeconomy platforms are fed into and supported) are decisive factors for building the bio-based economy, a point resounding with the abovementioned need to analyse incentives at farm level. On a different note, it was mentioned that the development of the bio-based economy is still relatively new and that there is a need for regulation to safeguard against e.g. nutrient depletion in soils and optimised use of nutrients downstream in the light of new and expanding markets and uses of biomass.

Plenary session 2: Working with the agricultural sector

In plenary session 2, two presentations were given on working with farmers in the agricultural sector. This was followed by a plenary discussion with the keynote speakers, based on key findings from the thematic track sessions and the challenges and opportunities identified here.

Presentation by the European Environmental Bureau

A presentation by Faustine Bas-Defossez (European Environmental Bureau) (presentation available [here](#)) highlighted the importance of both mitigation and adaptation actions in the agricultural sector, as the sector is both a “contributor to and a victim” of climate change. It was emphasised that there is a need to promote a move away from untargeted Direct Payment towards more targeted payments for ecosystem services in the future CAP. It was recognised that the post-2020 CAP reform should focus on a transition towards sustainable farming using a systemic approach targeting both CO₂ and non-CO₂ emissions, and that there should be a focus on sustainable food consumption, including promoting measures on reduction of food waste, and consumption of less animal products, among others.

Presentation by COPA-COGECA? - What do farmers envision and how can we move forward?

A presentation was given by Mr Evangelos Koumentakos (Copa-Cogeca), who highlighted the importance of a holistic approach to mitigation (and adaptation) actions in the agricultural sector – something, he stated, is often missing in agricultural policies. A holistic approach is necessary in order to reduce the conflicts between existing and new regulations and incentives, for example in addressing soil or technological improvements to enteric fermentation. Furthermore, he argued that the farmers are the ones who feel and see the changes in climate, agricultural production, and from regulations and incentives first-hand, but also the first to identify low-hanging fruits, which can increase yield or reduce erosion. He stated that this experience and knowledge, as well as farmers active role is often not recognised and must be built upon when designing mitigation and adaptation actions.

Discussion

A plenary discussion on challenges and opportunities for agriculture and CAP post-2020 related to climate change followed the presentations. The talks centred on a few topics, including suggestions for the future of CAP and European agriculture, in particular in relation to 1) *precision farming*, 2) *farm level mitigation incentives*, 3) *monitoring, data production and protection*, and 4) *innovation*.

Across the four topics, a recurrent point raised by several participants concerned the many technical barriers that hinder policy-induced productivity improvements in the EU. Therefore, the contributions often commented on removing barriers or changing approaches, but without necessarily proposing solutions or concrete alternatives.

Regarding **precision farming**, a number of open questions were raised, mainly on the handling and sharing of the data obtained by farmers or producers of tools and instruments. It was mentioned that many decision-tools will start to be deployed, such as data platforms, but that the legislation is not in place to handle this. One intervention outlined a problematic scenario very similar to the situation in the US, where large corporations own environmental, weather, and soil data, and not the farmers or governments. In such a scenario, many market actors produce their own data, and owning their own data and deciding how to share and for what purpose can increase their leverage and market value. Several participants pointed to the increasing importance of farm data and the lack of procedures and clear regulation on ownership and sharing, which can have profound future implications for the digitization of agriculture and agricultural policy.

Other interventions concerned **farm level incentives and payments**, most often mentioning carbon credits, payment for environmental services, and the role of WTO compliance. On the latter, in between other statements, several concerns were raised on whether the targeted payments are WTO compliant. One participant mentioned that results-based payments are an important and increasingly used concept that should be considered further. Building on this statement, a participant commented that the current EC

interpretation of WTO rules might be too rigid and strict, arguing that payments for public goods are allowed, which allows for compensating farmers for more than just foregone income (this is the basic principle behind current CAP payments).

Entwined between the contributions on WTO rule implementation, a discussion on **carbon crediting schemes** developed. One participant explained how the Australian *Carbon Farming Initiative* allowed for farm level incentives and payments tied to GHG and environmental performance in a fully WTO compliant way, because the money involved for payments were not state budget, but private money. The precondition is a contract between farmer and government, which allow for generating credits. These are then traded and can bring additional income to the farmer. It was argued that pilot programs are needed at this stage, and that scaling up in the EU of such a scheme would be difficult, e.g. due to monitoring and compliance. In response to this statement, it was mentioned that private and public schemes must be considered apart, and that the commitments and inventories critical to such a setup is still set at national level. The intervention pointed to the opportunity to support national schemes with CAP money.

Monitoring and documenting climate performance in agriculture was also discussed. One participant suggested to look into the effect of certain types of (default) activities at farm level, and not always assess the situation at national level building on crude data and maps of growing conditions. Farmers should provide proof that they comply at activity level, i.e. that they undertake certain actions instead of having to meet a certain GHG intensity, emission level, or emission reduction in % targets. Such farm-level activities would leave the initiative in the hands of farmers. One comment suggested that monitoring using remote sensing (RS) has a huge potential, but also that this partly is a hype and not as easy to implement as sometimes claimed. It was explained how RS might not be the best option for all actors and in particular farmers and NGOs, as analysis of remote sensing data might be expensive and complicated. It was emphasised by several participants that EU MS in any case need to invest in national inventories to improve GHG monitoring and reporting, and offer reliable data and projections for non-public users.

Further, a series of interventions and statements concerned **innovation and flexibility in policies** as a precondition for innovation were discussed. One participant highlighted that there is a need to allow for innovation in and during the policy process of the EU. It was also mentioned that regulation should not stifle innovation, as it often does. The pillar II of the CAP was exemplified as an innovative policy, supporting low-carbon innovation on voluntary basis. As part of the debate on this matter, one participant mentioned that the carbon saving potential of different technologies can be used as an indicator to measure climate relevance of innovative technologies. A response to this statement mentioned that support for innovation should be technology neutral. Lastly, several participants supported the point that innovation requires investments and time, and that agricultural investments often has long cycles, which should make it a sector well suited for innovation. It was highlighted that in general it is important that agriculture, environment, and climate legislation make it very flexible for the MSs to decide on and design innovation policy.

Breakout sessions, second part: Regulation and incentives

Session 2.1: Livestock

The session started off with a question to the group: How to reduce Livestock GHG emissions?

One speaker remarked that there is a **need for pilot schemes** to test approaches, technologies, and impacts, and a need to explore possibilities for certification of GHG efficiency in livestock that is tailor-made to the EU. One commenter proposed that such pilot schemes should test RDP payments per head for

livestock targeted measures and not only per hectare. Changing this would change the incentives and motivations and rule out a number of unfortunate, but logic rationales for speculation in some farm system (i.e. perverse incentives). It was mentioned, however, that livestock heads and direct payments do not fit well.

The remark on testing new ideas and schemes with pilots sparked a number of responses that guided the talks in new directions, one of which concerned getting **smaller farmers, with low technology-adoption levels** activated. For example, it was stated that there was too much focus on front-runners, and that there is a need to get those actors not performing well involved and activated as well. One important aspect of this lack of involvement which was highlighted by some speakers was the administrative burden combined with perceived regulatory uncertainty beyond 4-5 years. Entry-level interventions with low admin burdens are needed to allow smaller farmers to build knowledge in a low risk setting. To support this statement, a comment was made on diversity and size of farms: In some MSs, there are very small farms, subsistence-oriented, with very low total emissions, whereas in other, large-scale industrial farming plays a significant role. One participant explained how the European Innovation Partnership (EIP) on agriculture⁶ could work better in linking MSs and share experiences.

Other comments addressed the need to **improve data gathering and management** as a way to support better and more suited climate policy-making on agriculture. The question asked was what actions are most cost effective in realising GHG reductions in the livestock sector? The participants discussed the user rights of data collected by farmers versus government agencies. Another question was raised, though not answered - *can the CAP buy data?* If so, who owns it and what can it be used for? The ensuing debate emphasised that clarity is needed on the legal and rights aspects, but also that measurements and access to the right data will be critical going forward. A couple of participants mentioned that IACS⁷ holds a huge potential, highlighting that in this system the managing authorities can be said to pay farmers for data.

In addition, participants suggested a need to also focus **on behaviour**. Using e.g. nudging approaches and making sure that climate-friendly alternatives are easy and attractive. Further, it was stated that there is a need to look at consumption in order to reduce waste and loss, and at dietary needs and ways to reduce meat consumption. It was suggested that there is a lack of tools to change what farmers feed their animals with and what is consumed.

Further debated was the need to support open-ended and risky innovative ideas, and the importance of being able to try something that may not deliver, without being penalised. It was stated that risk aversion could be mitigated using insurance schemes and increased spending of RDP money on addressing technology needs

Session 2.2: Soil and Land Management

The track session aimed to discuss what can be done in soil and land management in regards to regulations and incentives. The discussion included statements mainly on policy response and policy development.

On **policy response**, some participants mentioned the usefulness of a Soil Directive similar to the Water Framework Directive⁸ and the Nitrates Directive⁹, and at the same time emphasised simple policies focused

⁶ <https://ec.europa.eu/eip/agriculture/en/european-innovation-partnership-agricultural>

⁷ Integrated Administration and Control System (of the Common Agricultural Policy): [link](#)

⁸ http://ec.europa.eu/environment/water/water-framework/index_en.html

⁹ http://ec.europa.eu/environment/water/water-nitrates/index_en.html

on one objective as important. The '4 pour 1000' served as inspiration as the initiative is simple - yet potentially effective. One participant made the remark that the worst outcome of this workshop would be to conclude that climate change is all too complicated to act on.

Further on **policy development**, issues related to temporal delay in action and effect, when making policies on soils, was further discussed by the participants. A recurring observation was that the common 3-5-7 year policy cycle does not facilitate long-term carbon soil incentives. This is because the slow response of soils to management changes makes it difficult for short-term incentive schemes to promote substantial change in practices at scale in a short timeframe. In this regard, one participant mentioned the necessity of giving farmers credits for inter-generational actions.

Session 2.3: Bio-based economy

The track session aimed to discuss policy possibilities and ideas on regulations and incentives promoting a sustainable bio-based economy in EU. The debate touched upon preconditions and enablers of the bio-based economy as well as cost sharing and market building.

Several participants gave inputs that specified various **preconditions for the successful transformation** of society into a bio-based economy. A repeated point concerned the need for tailor-made local or farm system specific solutions. In general, there was a request for more MS and regional flexibility in the future CAP, and in particular in order for it to promote the transformation to a bio-based economy. Another point made was that some countries have sufficient supply of some raw materials, while others lack the same raw material, hence there is an element of trade and exchange of resources to the successful development of the bio-based economy. Further, it was emphasized by several participants that some countries have the knowhow and industrial system to make this transformation, others not, and therefore the bio-based economy is a transnational case.

Adding to the list of preconditions, some of the participants emphasized aspects of the **economic enablers** that will be needed to drive the transformation. One participant explained that some support activities for the bio-based economy are expensive now, but will pay back later. Some suggested that, in general, tax incentives for replacement of fossil products by bio-based products could help build a market for bio-based products. This could, for example, be to lower VAT on products based on bio-based materials. This led to the participants discussing who are to carry the costs of the bio-based economy transformation, mentioning research programmes, government expenditure, and the market and consumers. As concerns consumer goods, the market is already under way, but it was suggested that there is a need for financial incentives, frontrunners (companies), and clear policy signals. It was highlighted that targets exist for energy and decarbonisation, but not for the bio-based economy or agriculture (understood as emission reductions in the sector and as a provider of bio-materials to the bio-based economy, *edt.*). Depending on the approach taken to enforce compliance, costs can be divided between actors, incl. industry, farmers, governments, and consumers. One participant reiterated that there is a need to revise the CAP so that it supports the bio-based economy as a whole and the transition to it.

The exchange of views on the cost of the transition and sharing of costs led to further consideration among the participants on how to enable or **foster markets for bio-based product** (through consumer (B2B and B2C) demand), and it was mentioned by some participants that this would be the ideal driver of the transition. It was suggested that there is a need to learn from the development of organic agriculture, where demand from consumers has incentivized farmers to change. It was discussed that currently there is no/few incentives to stimulate the bio-based economy (other than bioenergy, *edt.*). Some reiterated that financial institutions and governments, etc. need to work together to create incentives. Also there may be a

need to raise awareness among consumers by showing and promoting long-term benefits of bio-based products and the transition to an economy mainly relying on such means and products. For example, attention could be given to educational measures and information to society, as well as to showing what opportunities are associated with the use of bio-based products compared to the real costs of fossil resources used in agriculture. Towards the end, the discussion focussed on the regional and local aspect of the bio-based economy. It was mentioned (as in the first session) that building markets will depend on local conditions and different regional priorities. To contrast this perspective, one participant mentioned a specific, global opportunity to build markets, namely bio-based fuels for aviation and shipping – an area where other types of fuels or technologies (e.g. electric engines) will not be available any time soon.

Addressing a broader scope of barriers one participant brought up the issue of governance, namely that ministries and agencies in most countries are sectoral or thematic, and that the bio-based economy transverse these by nature and hence requires a very coordinated and cross-ministerial approach.

Plenary session 3 - Closing remarks and the way forward

Plenary session 3 aimed at summing up on the break-out sessions and articulating potential solutions that can scale up mitigation technologies and practices to reduce emissions and increase agricultural productivity. Further, it aimed to present ideas on how the EU should move forward with the CAP reform and seek to ensure a sustainable agricultural sector in a changing climate. While the track discussions went off in many directions, the presentation of the track discussions revealed that many of the issues were overlapping and interlinked. Therefore, the sections below summarise the key findings according to specific themes identified.

Creating a holistic approach while ensuring flexibility

Ensuring policy coherence and breaking down silos were repeatedly discussed throughout the workshop. For example, it was argued in the soil and land management track that soils and land management are crosscutting issues, and that there exist multiple inter-linkages between various areas in and outside the agricultural sector. Further, it was mentioned several times during the bio-based economy discussion that ensuring policy coherence to avoid that policies contradict with other objectives is highly important. This includes the importance of taking note of other European targets and policies already in place, as well as considering international cooperation and knowledge sharing.

Technology and measurements

During the workshop, presentations were given on how technological improvement and the use of data can improve the performance of the agricultural sector while reducing GHG emissions and providing environmental and economic benefits. In order to improve the use of technology and data, and scaling-up such, there is a need to look into further possibilities to use technology to improve performance, as well as to ensure that data are available to farmers.

Several participants voiced a concern that there is too much monitoring already, and that we as society should strive to keep monitoring and control as simple as possible. For example, the '4 pour 1000' initiative and the AECMs developed under the French RDP illustrate the importance of not getting stuck in technical or governance complications if the knowledge exist on what should be done. It was stated by multiple participants that there is a need to make more simple fit-for-purpose measures and start implement right away. As a response, a few participants highlighted a need to invest in and improve inventories in order to monitor changes in for example soil organic carbon.

Greening

All three tracks discussed the issue of greening and its performance under the CAP reform, including its effectiveness and flexibility. Despite the fact that greening provides environmental benefits (depending on the actual implementation of the greening measures), some issues with the greening policy were identified and discussed throughout the workshop. This includes, for example, lack of monitoring on whether the greening is in fact additional, unsolved questions with cross-compliance, as well as problems with the direct payment that should support the greening transformation.

CAP and compensation

Throughout the break-out sessions participants often mentioned the concern that the Common Agricultural Policy is a barrier as long as it is based on compensation for lost or foregone income. This is not supportive of the implementation of otherwise cost effective measures, if these entail that at farm level foregone income is not compensated. Furthermore, the fact that drained land must remain drained and kept in rotation in order to receive direct support is counterproductive from a climate change mitigation point of view. It was discussed by the participants that drained land with low productivity should be eligible for some sort of retirement compensation so that draining could be reversed and land re-wetted.

Local and case specific

A crosscutting issue mentioned in all tracks and repeatedly so, was the need for enabling local policies and measures. With examples from the French soil initiative, the local bio-based economy systems, and regional differences in livestock and farm systems debated in the livestock track, it appears that many participants saw a potential in promoting flexibility in regulation and support schemes to allow for local solutions and close local involvement. In relation to this, it was further recognized several times that the agricultural sector and the emissions profile (and sources), as well as socio-economic conditions are different across the EU countries, and thus that there is a need for flexibility in order to address the issues relevant in the specific context.

The way forward

Throughout the track sessions, the future of CAP was discussed, including how to design and implement, and how to make climate and agricultural regulations and incentives simple, but still workable? First, the participants emphasized that there is a need to recognise that for any action to happen, EU countries will have to come together and find common ground on the agriculture in a climate change perspective and the future of CAP. The participants continued stating that there is a need to acknowledge that agricultural mitigation practices already exist, and that one can build on these. This includes ensuring synergies between mitigation and adaptation policies, and policy coherence between different actions and regulations. Further, there is a need to ensure that policy-making is knowledge-based to avoid wrong directions, as well as to ensure that progress can be measured, verified, and reported (MRV). Lastly, multiple participants highlighted the need to make guidelines that are tailored to our ambition in the EU as a common unit, as well as in each of the MS.

Closing remarks from the Estonian Presidency

The presidency expressed a wish to bring countries together and find common ground, and that a main priority is digitalisation and sustainability. The recent soil conference in Tallinn (*'Soil for sustainable food production and ecosystem services'*, 4 October 2017) was given as an example, and selected findings from here were mentioned, as were the main lines of discussion:

- CAP shall ensure effective support for the sustainable use of agricultural land and soil.
- There is a further need for better solutions to help improve the conditions of soils in agriculture.

- The use of soil data should be increased in policy-making and in land use decisions.
- There is a need to modernise soil maps
- Increasing awareness of environmental needs and benefits to be addressed by the CAP
- Harmonised measurement and continuous monitoring of soils.

After the closing remarks from the Estonian Presidency, the key moderator thanked the speakers, moderators and participants for the huge efforts made in coming together to discuss the development and scaling-up of mitigation practices and technologies on agriculture and climate change in Europe in a manner that is sustainable, flexible, and cost-effective.