SUMMARY OF SCIENCE-BASED ASSESSMENT OF THE POTENTIAL TO ACHIEVE FERTILIZER EMISSIONS REDUCTIONS

Potential reduction (%) Total emissions (direct, indirect-volatilization, indirect-leaching)	Corn (East)	Wheat (West)	Canola (West)	Potatoes (East)
Scenario A (Implementation of a suite of BMPs[4])	26%	13%	15%	22%
Scenario B (BMPs & 10% less applied)	34%	22%	24%	30%
Scenario C (BMPs & 20% less applied)	37%	26%	28%	34%

See Annex for details

- **The strategies and the level of effort required to achieve the 30% reduction objective will vary across the country** as the emissions reduction potential is impacted by biophysical factors (soil type, soil humidity, climate), crop types, and climate change impacts[5].

- **Overall it will be more challenging in Western Canada** to reduce both direct and indirect fertilizer induced N_2O emissions, due to a combination of lower N application rates, as well as drier conditions, particularly in the semi-arid regions of Alberta and Saskatchewan (soil moisture is a critical factor impacting N emissions).

- **Fertilizer application rate reduction without impacting yield** is possible for corn grown in Ontario and Quebec given the high fertilizer application rates and use of BMP's to reduce N losses. The same cannot be said about wheat and canola in the West, where reducing application rates is likely to reduce yields given the total N applied is much closer to the N removed (i.e. what is needed by the plants).

- **Two fundamental challenges will need to be addressed, in all regions**: the resistance from producers to changing practices (perceived risks of yield reduction, cost of implementation, added complexity); and the need to adapt strategies to the wide range of crops and local conditions.

[4] Example of Beneficial Management Practices (BMPs): soil N testing, better crop rotations, use of inhibitor, fertilizer placement, timing of application, precision agriculture, use of cover crops, zone tillage, use of slow release fertilizers, etc.

[5] Many studies have shown that N_2O emissions will increase in the future due to increased decomposition and denitrification under higher temperature, given the same crops and management.

To: Miller, Rebekah <rebekah.miller@AGR.GC.CA>; Léger, Andréanne <Andreanne.Leger@AGR.GC.CA>
Cc: Norris, Kevin <kevin.norris@AGR.GC.CA>
Subject: RE: FOR REVIEW - Meeting note for FPT MInisterial meeting - environment

Thanks! I think this can be considered approved! Where does it go next??

Michelle

From: Miller, Rebekah <rebekah.miller@AGR.GC.CA>
Sent: October-26-21 4:00 PM
To: Morrow, Michelle <michelle.morrow@AGR.GC.CA>; Léger, Andréanne <Andreanne.Leger@AGR.GC.CA>
Cc: Norris, Kevin <kevin.norris@AGR.GC.CA>
Subject: RE: FOR REVIEW - Meeting note for FPT MInisterial meeting - environment

Hello!

Revised version attached (in track changes) with points to address Matt's comments.

Rebekah

From: Morrow, Michelle <michelle.morrow@AGR.GC.CA>
Sent: Tuesday, October 26, 2021 1:51 PM
To: Léger, Andréanne <Andreanne.Leger@AGR.GC.CA>
Cc: Miller, Rebekah <rebekah.miller@AGR.GC.CA>; Norris, Kevin <kevin.norris@AGR.GC.CA>
Subject: RE: FOR REVIEW - Meeting note for FPT MInisterial meeting - environment

Passing on Matt's comments –

Overall looks good with two comments:
-think it would be useful for key messages to acknowledge that all provinces and territories are taking action on climate change (but Government looking to increase ambition and formalize commitments through/in NPF)
-we should note expected criticism from Alberta regarding fertilizer emissions reduction target

Michelle

From: Léger, Andréanne <Andreanne.Leger@AGR.GC.CA>
Sent: October-26-21 8:59 AM
To: Morrow, Michelle <michelle.morrow@AGR.GC.CA>
Cc: Miller, Rebekah <rebekah.miller@AGR.GC.CA>; Norris, Kevin <kevin.norris@AGR.GC.CA>
Subject: FOR REVIEW - Meeting note for FPT MInisterial meeting - environment

Salut Michelle,

Here is the note for the Minister – it is due to ADMO by noon, DG-approved – Kevin approved it already.

Thanks a lot to Rebekah for this! I left a note in there for PPI, as nobody in EPD seems to have this information.
Happy to discuss,

Andréanne

- Saskatchewan: Are you in a position to start sharing some of that prelimary analysis so that we can look at it and help you refine it and get a sense of how practical this is for our producers
- Alex: Maybe Donald can correct me if I'm wrong but the idea is for us to integrate that analysis and the assumptions in a more comprehensive discussion paper at which point then everyone gets the information and can react to it and make sure our assumptions and estimates are correct.
- BC: Can you please expand on how progress on this target will be quantified? I'm assuming it will be based on the NIR but will there be any improvement to the 2020 baseline that we can improve upon? Are we expecting to see these farm-level changes reflected in the inventory in the near term?
- Alex: Yes, the approach to capture emissions is the same as the NIR but we calculate these emissions for them. There is a need to desire those estimates. We are aware of a number of the shortcomings, mainly as it relates to activity data and transferring this data into emissions factors. It is a topic that is raised by stakeholders when we have this discussions because most of the efforts of adopting beneficial management practices are not reflected in the NIR currently.
- BC: BC works to refresh it's Clean roadmap by 2030 so learning how to capture these reductions would be very helpful for us.
- MB: Do you see a role for increased legumes in crop rotations. Pulses in monocultures but also growing winter crops with non-legumes, or legumous cover crops or are we just looking a synthetic nitrogen applications?
- Alex: We want to reduce nitrous oxide emissions which would mean looking at ways to tackle emisions across farms beyond just what is associated with fertilizer. It will be a challenging target to meet, especially in 8-9 growing seasons. We need to have all possible, realistic options on the table
- SK: When we are looking at the production and growth targets, there is going to be production increases and when we look at production increase there will be an increase in fertilizer use. Can you help us understand what was the basis to pick an absolute emissions reduction versus intensity?
- Jordan: The deicion to focus on absolute reductions rests in part with the broader federal goals on absolute emissions reductions which can't be achieved by a goal on emissions intensity reduction. The Agriculture sector has made progress reducing emission intensity but the conversation has to shift to make sure the sector can help meet Canada's emissions reduction targets.
- Alex: The only thing I would add is that the fact that the baseline for that target is 2020 and not 2005. Which is in part to encompass into account that production has significantly increased since 2005. It's not the same baseline that is normally considered for a Paris accord. This is a comment we hear often. Of course, we want productiveity to increase which makes the challenge even more challenging.
- SK: This is about the bigger picture. We are trying to get to the Paris accord and reduce national emissions. We have an opportunity to look at offset programs developed by ECCC and then AAFC is trying to look at increasing the BMPs. How are you working with ECCC so that we can