OPPORTUNITIES FOR 1.5˚C CONSISTENT METHANE MITIGATION: AGRICULTURE SECTOR

(Key Messages)

- Agricultural sector methane emissions in 2010 were 140 Mt which was approximately 43% of total anthropogenic emissions.
- Agricultural sector methane emissions are expected to increase to 155 Mt by 2030 without additional controls
- 2030 methane emissions could decrease by 24 Mt (16%) under IIASA's maximum technically feasible scenario, where the largest reductions come from paddy rice (-12 Mt).
- However, substantially more mitigation could be possible in the sector through changes in dietary practices and behavioural change measures.
- To be consistent with 1.5˚C scenarios, by 2030 methane from the agricultural sector should be reduced by **20% (0-40%)** compared to 2010 levels.
- Maximum technically feasible mitigation could achieve a **7% reduction** compared to 2010 levels by 2030. It indicates that technological measures in the agriculture sector are not sufficient to achieve 1.5˚C-consistent reductions and additional behavioural change measures should be considered (MTF scenario provided by IIASA GAINS).
- Maximum technically feasible reductions will result in multiple-benefits for climate, air quality and public health. By 2030 reductions from the agricultural sector could **avoid 0.03˚C** of additional warming and **prevent 31,100 premature deaths** due to reduced exposure to tropospheric ozone. However, **additional best practice measures could achieve an additional 0.18C of avoided warming and 201,361 avoided premature deaths by 2050**. (benefits calculated based on unpublished results of the CCAC Global Methane Assessment)
- The main co-pollutants from the agricultural sector are: Ammonia and NMVOCs from rice paddies and manure. Agricultural burning co-emits CO, NOx, SOx, NMVOC, Ammonia, PM2.5, PM10, BC, OC

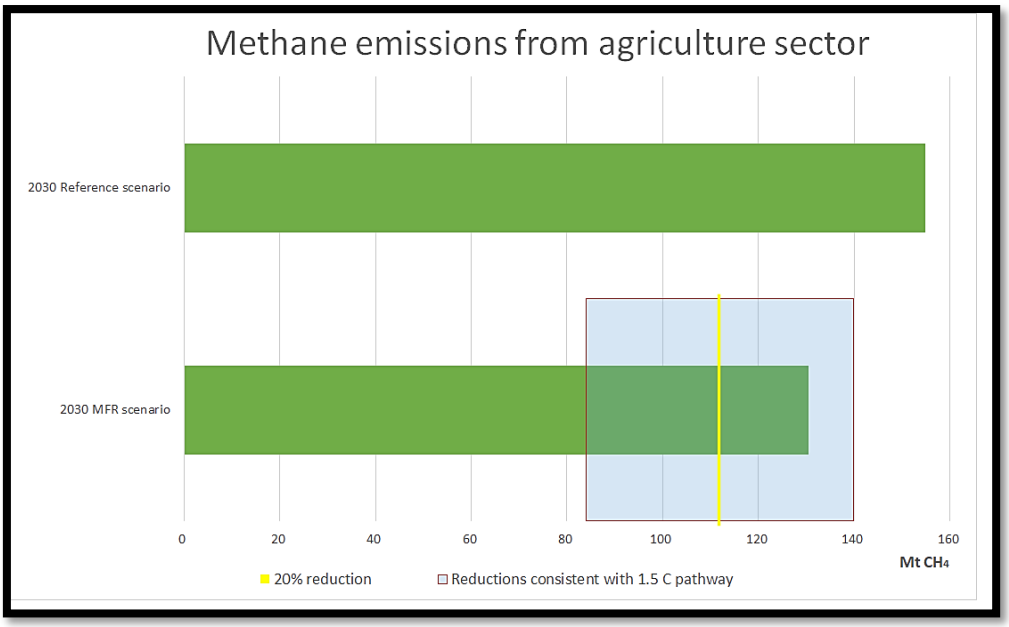

Figure 1: The upper bar shows projected 2030 methane emissions without additional mitigation. The lower bar shows projected 2030 methane emissions after maximum technically feasible reductions. The yellow line illustrates the average 2030 methane reduction in 1.5˚C consistent scenarios reported in the IPCC 1.5˚C Special Report (2018). (Reference and MTF scenarios provided by IIASA GAINS)

Table 1 - Key Agricultural Methane Sources, Mitigation Potentials and Multiple-Benefits

Sources	Emissions in 2030 (Mt)	MTF abatement in 2030 (Mt)	Warming Avoided (10-40 yr) (C)	Avoided Premature Deaths (annual)	Key Co-Pollutants	% reduction in 2030 compared to 2010
Agriculture (All)	**155**	**24**	**0.033**	**31100**		**-7%**
Dairy cows	26	1	0.002	1810	Ammonia	8%
Non-dairy cattle	58	5	0.007	7740	Ammonia	3%
Pigs	5	2	0.003	3080	Ammonia	-39%
Sheep, goats & other livestock	30	0.1	0.000	200	Ammonia	21%
Agricultural Waste Burning	4	4	0.005	5380	CO, NOx, SOx, NMVOC, Ammonia, PM2.5, PM10, BC, OC	-100%
Paddy Rice	32	12	0.016	18270	NMVOC	-38%

(Source: emissions and mitigation potentials calculated from IIASA GAINS scenarios. Benefits calculated based on unpublished results from the forthcoming CCAC Global Methane Assessment)

Table 2 – Additional Agricultural and Food Waste Measures (in 2050)

	Methane be abated in 2050 (Mt)	Warming Avoided (10-40 yr) (C)	Avoided Premature Deaths (annual)
Additional Agriculture/Food Waste	**134.24**	**0.18**	**201,361**
Feed supplements (Hristov et al)	22.41	0.030	33,611
Dietary shift/healthy diet in 2050 based on Stehfest et al	74.00	0.099	111,000
Management best practices: cattle 10th % from GLEAM (FAO), scaled to match Gerber et al	27.70	0.037	41,552
Food waste: cattle (meat + dairy) from 30% to 15%, Stehfest et al (2013)	10.13	0.014	15,198
TOTAL	376.23		

(Sources given in table. Benefits calculated based on unpublished results from the forthcoming CCAC Global Methane Assessment)