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Modelling ammonia emissions from agriculture

Task Force on Integrated Assessment Modelling
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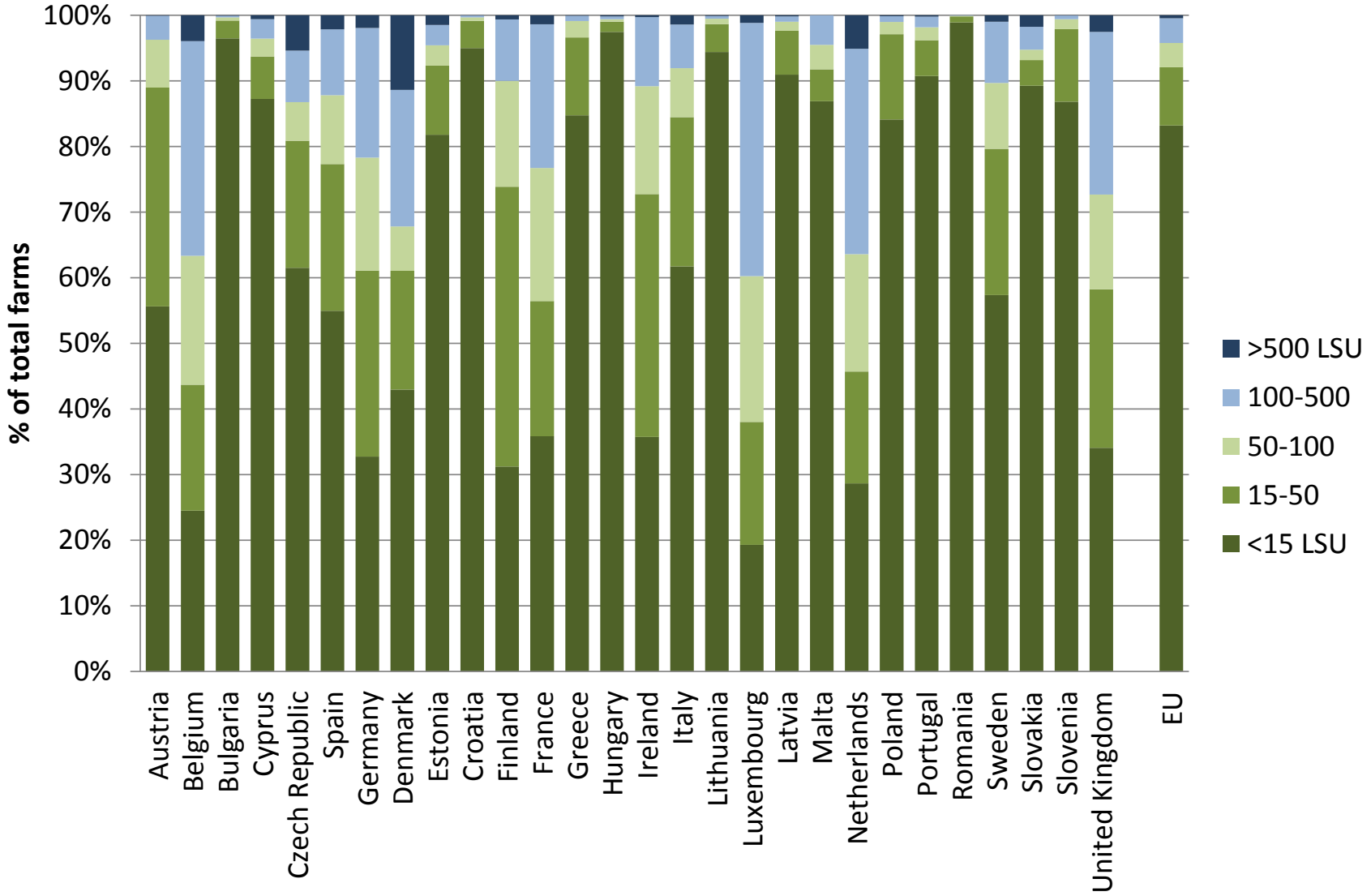
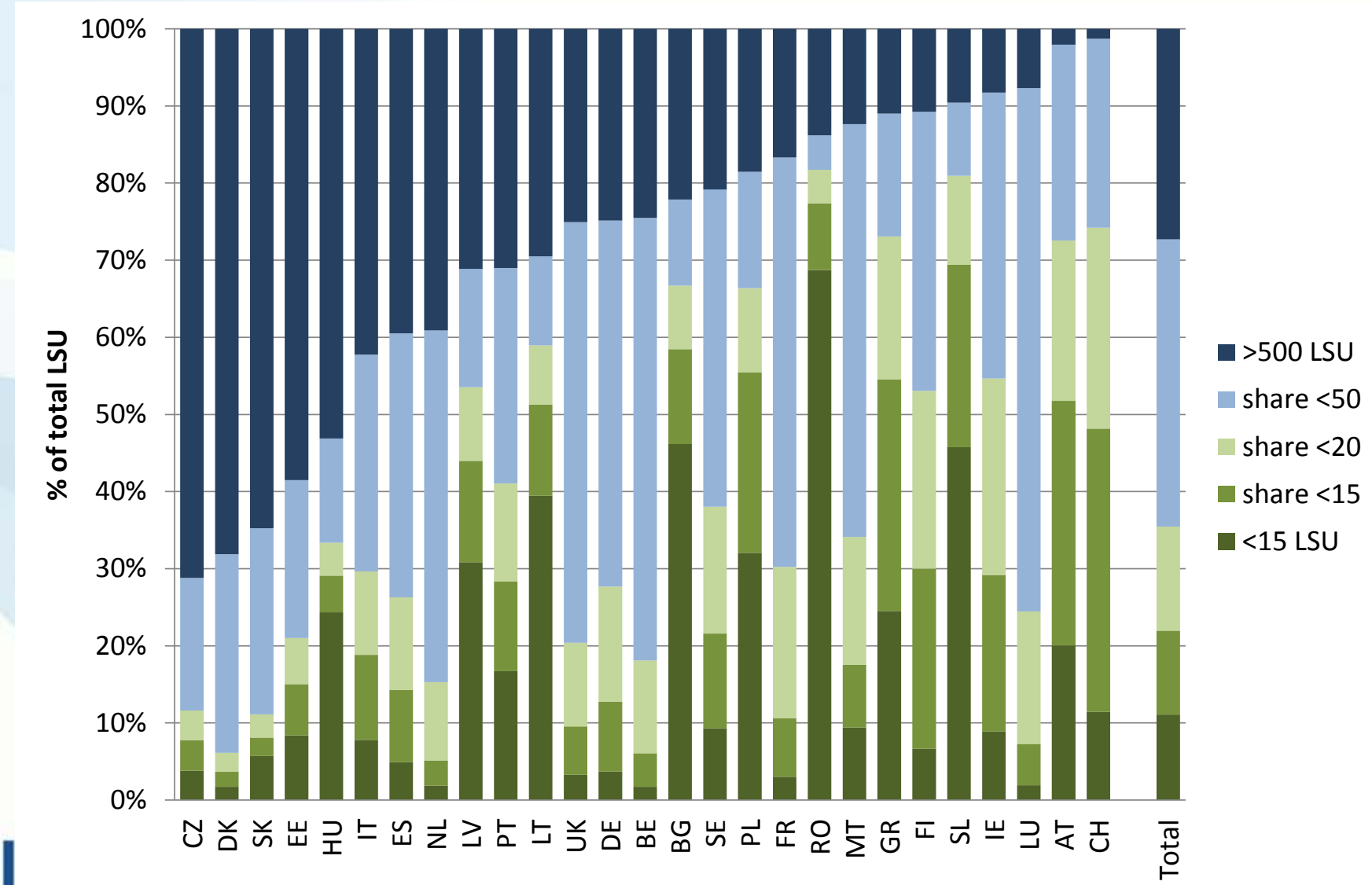
Distribution of farm sizes – 2010

(excl. farms without animals) Source: EUROSTAT



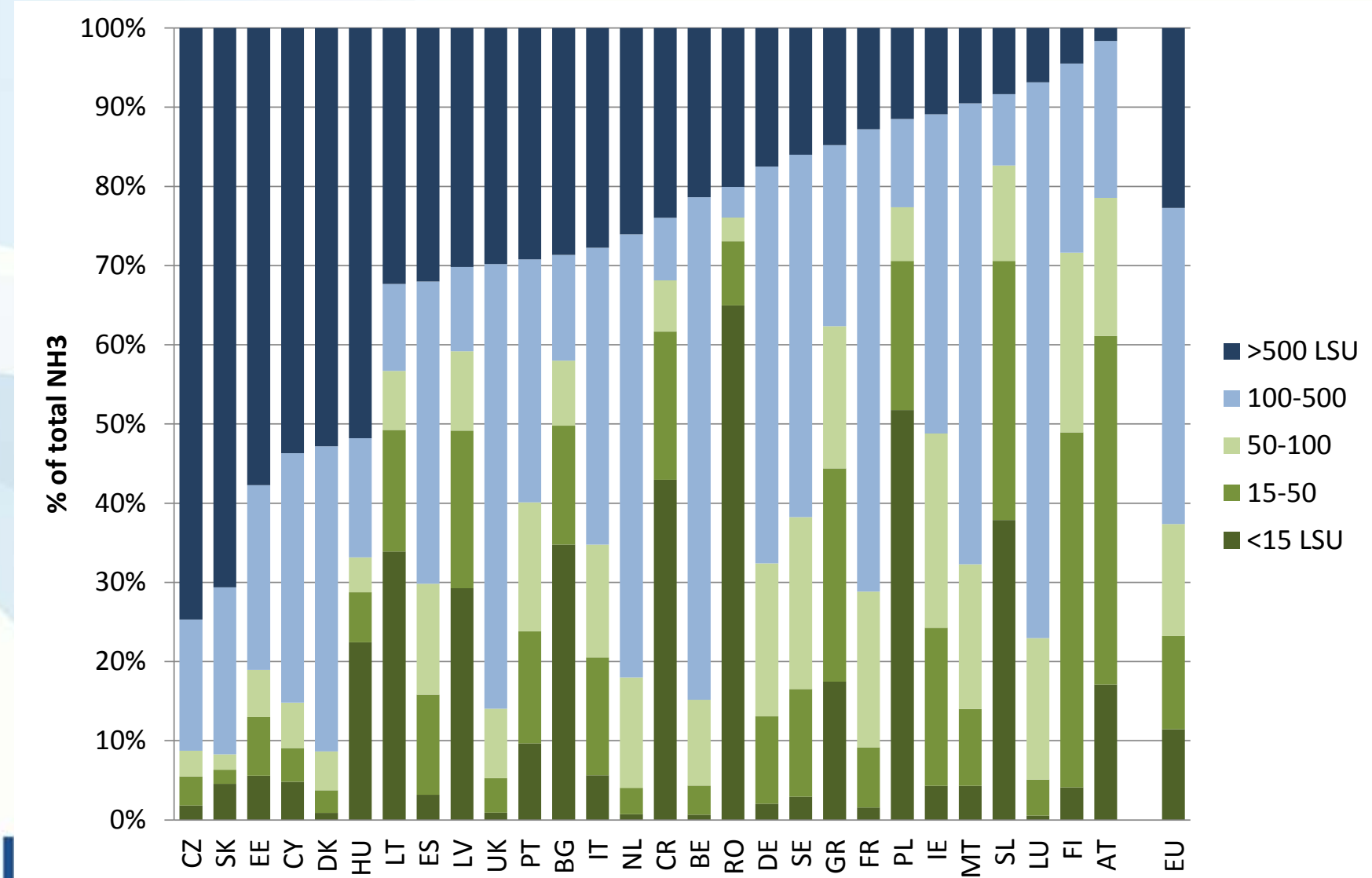
Animals by farm size - 2010

Source: EUROSTAT



NH_3 by farm size – 2005

Source: GAINS



Key measures for achieving the proposed NECs in 2030: Agriculture

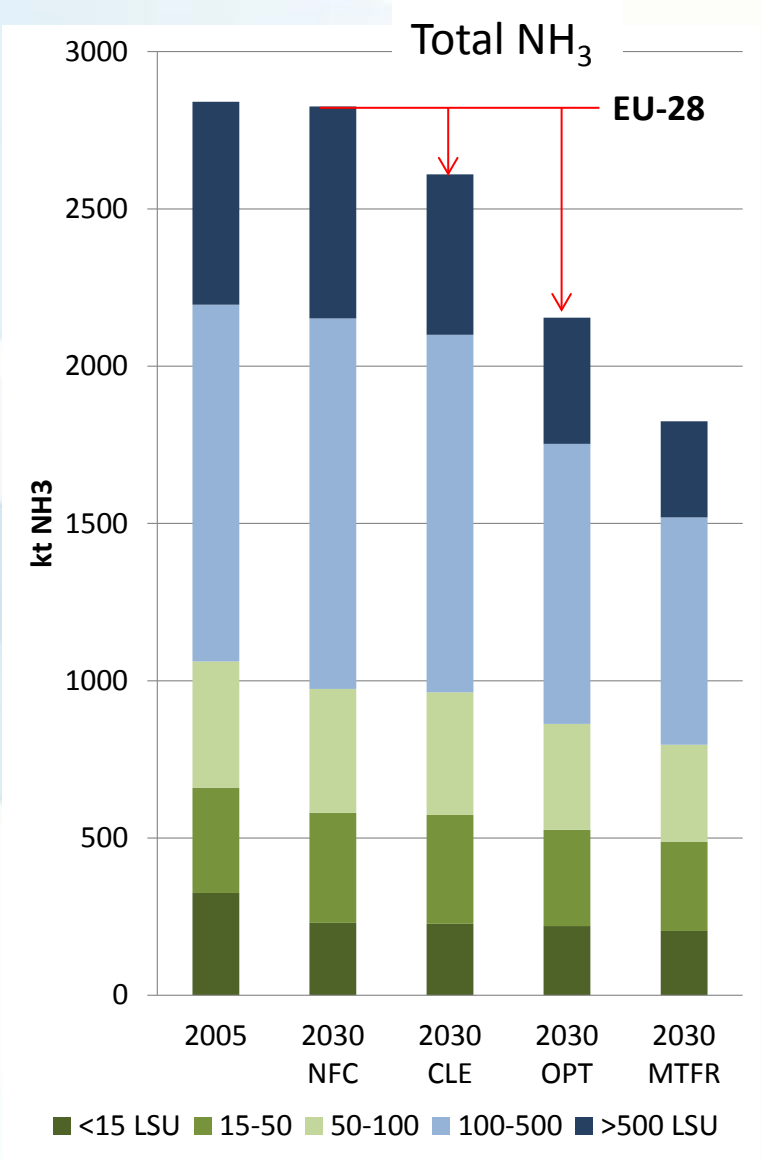
Improved storage of manure
(e.g., closed tanks)
+ anaerobic digestion at large farms

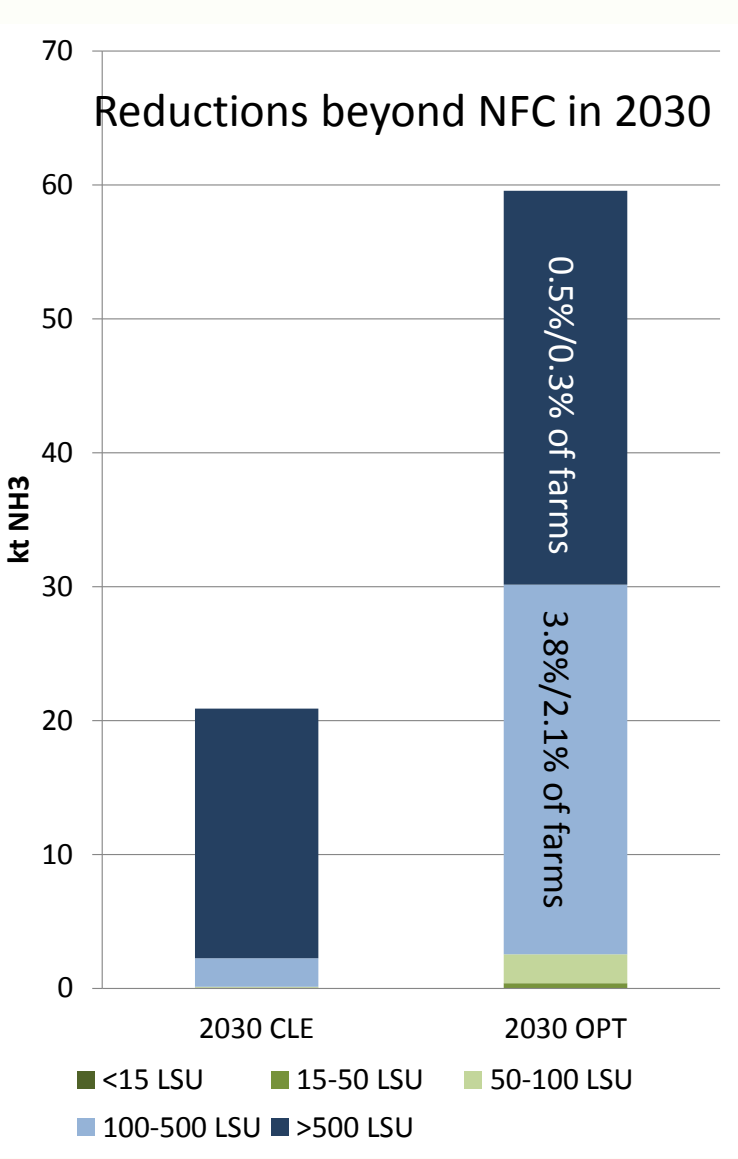
Improved application of manure on soil, e.g., trailing hose, slot injection (only at large farms)

Improved application of urea fertilizer or substitution by ammonium nitrate

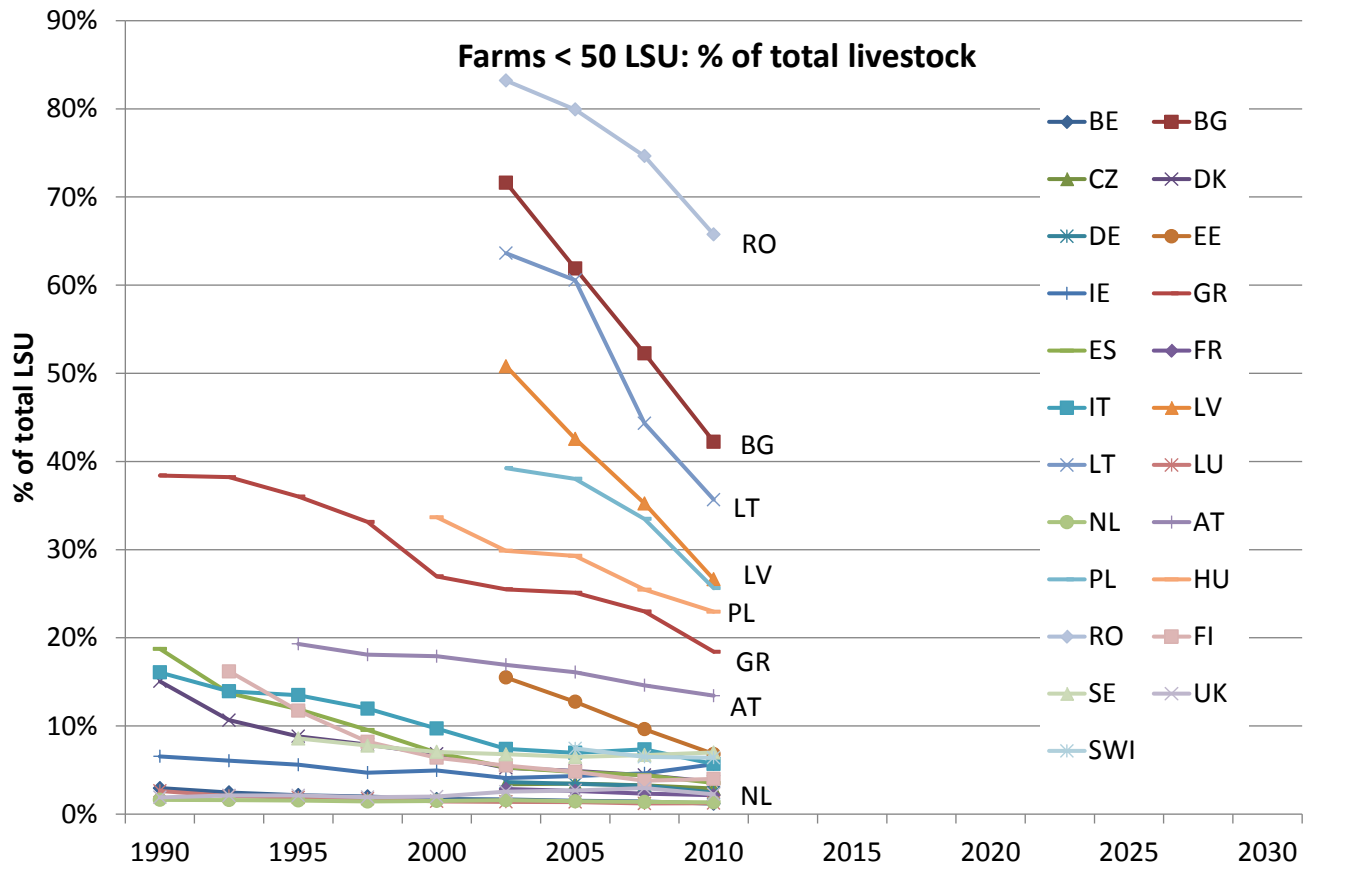
TSAP 2030

Assuming farm size distribution of 2010





Farm sizes have changed rapidly in the past – Prospects for 2030 not included in TSAP analysis



In Switzerland, continuation of the trend towards larger farms – assuming CLE legislation - would lead to 5% lower NH_3 emissions in 2030

Additional options for NH_3 reductions not yet considered in GAINS

Breeding with the dual objective of enhanced productivity and sustained animal health and fertility

- Increased milk yield/cow led to more unproductive animals in the stocks due to poorer health and fertility of the high-productive cow breeds.
- Conscious breeding for both productivity and reproduction traits, the Danish, Finnish and Swedish Holsteins and Red cow types have successfully increased milk yield to top levels in the EU, while preserving fertility and animal health.
- In the EU, this could contribute 17% to MTFR CH_4 mitigation; potential for NH_3 needs to be explored

Extended grazing periods (where applicable)

- Could deliver additional 6% NH3 reductions in Switzerland

Conclusions

- Large differences in the farm size distributions in the EU
- In 2010, 80% of NH_3 emissions emerged from <10% of the farms
- The NEC proposal would require measures at the largest industrial farms, i.e., about 3% of all farms in the EU, assuming no further changes in farm sizes
- However, farm size distributions changed rapidly in the past; e.g., in CH, continued trend would imply 5% lower NH_3 in 2030
- Breeding for more healthy cows could offer 17% CH4 reduction potential – NH3 need to be explored
- Longer grazing periods could reduce NH_3 in CH by up to 6%