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Compost and climate

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STØTTET AF
Promilleafgiftsfonden for landbrug

Emissions from agriculture

Denmarks national emissions

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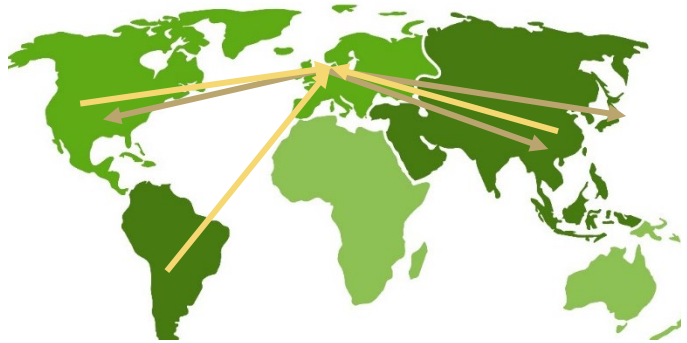
Foto: Tove Mariegaard Pedersen

Emission inventory methods

National inventories

Lifecycle analysis (LCA)



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Adapted after figure from SEGES Innovation

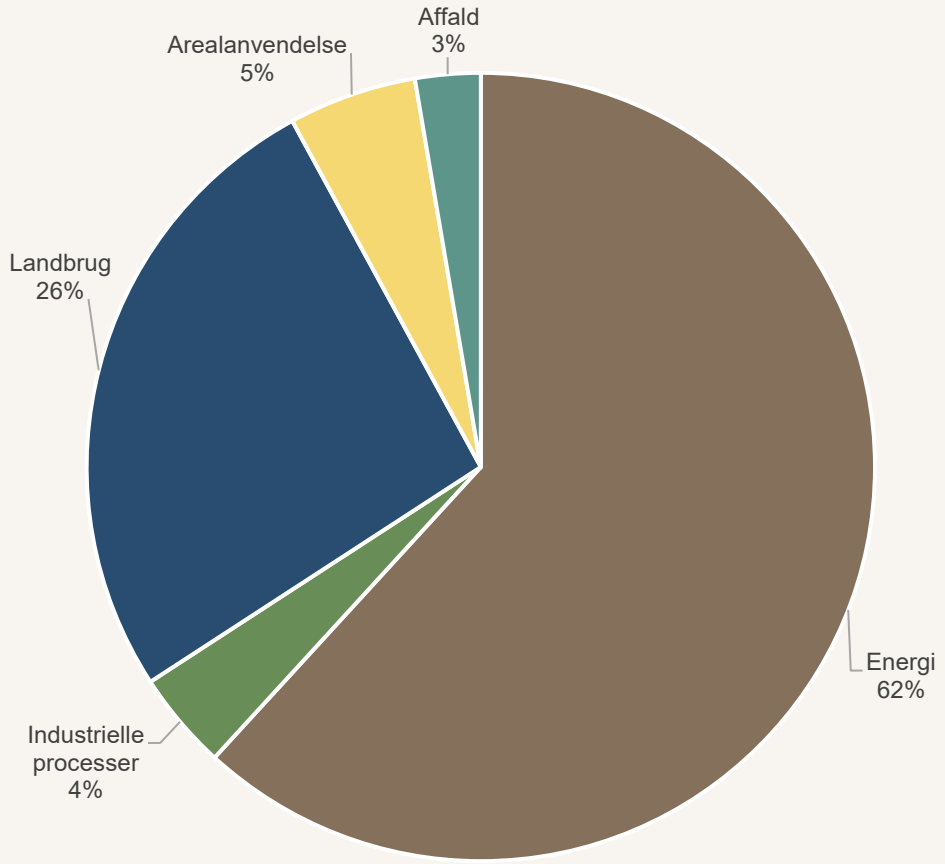
Denmarks GHG emissions

Peat soils are a part of LULUCF

Energy used in agriculture is a part of the energy sector

Incl. peat soils and energy, agriculture is responsible for 39 % of Denmarks national emissions

Composting of garden-park waste is a part of the waste sector



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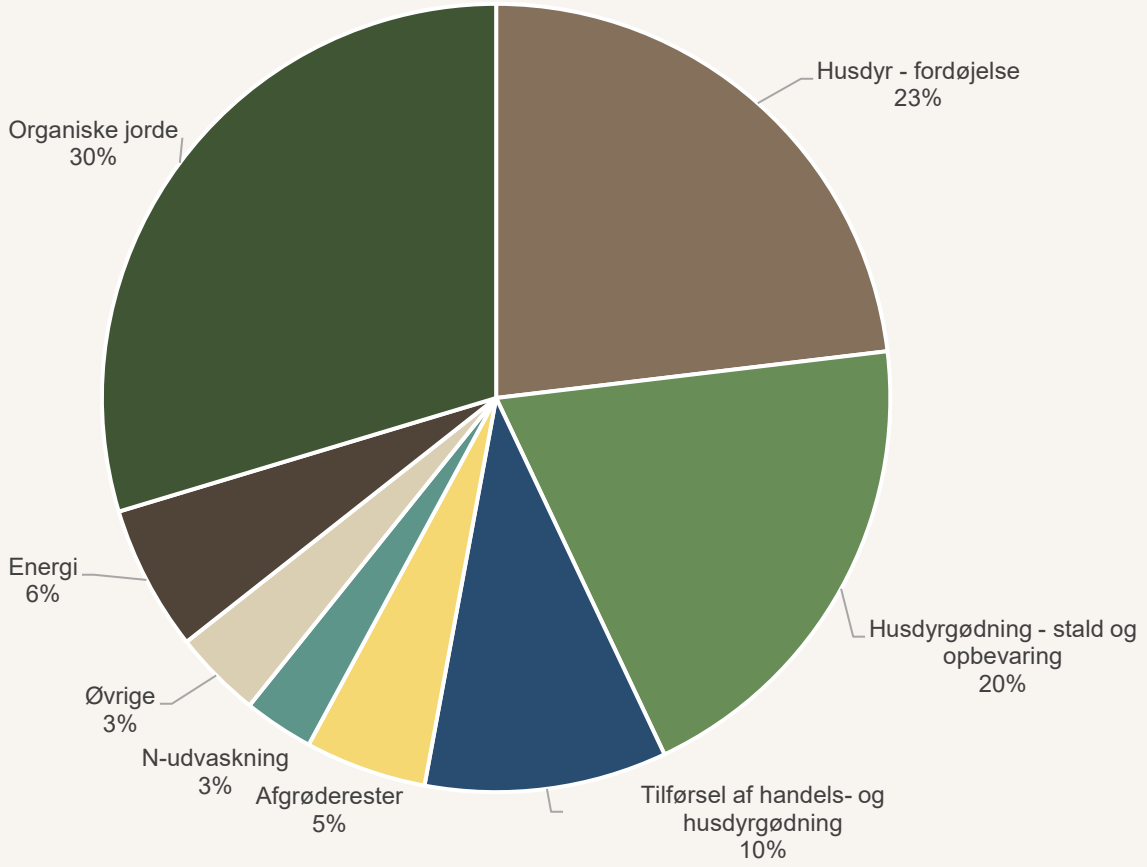
Kilde: DCE rapport 541, Denmark's National Inventory Report 2023

GHG emissions from agriculture

Including emissions from
peat soils and energy



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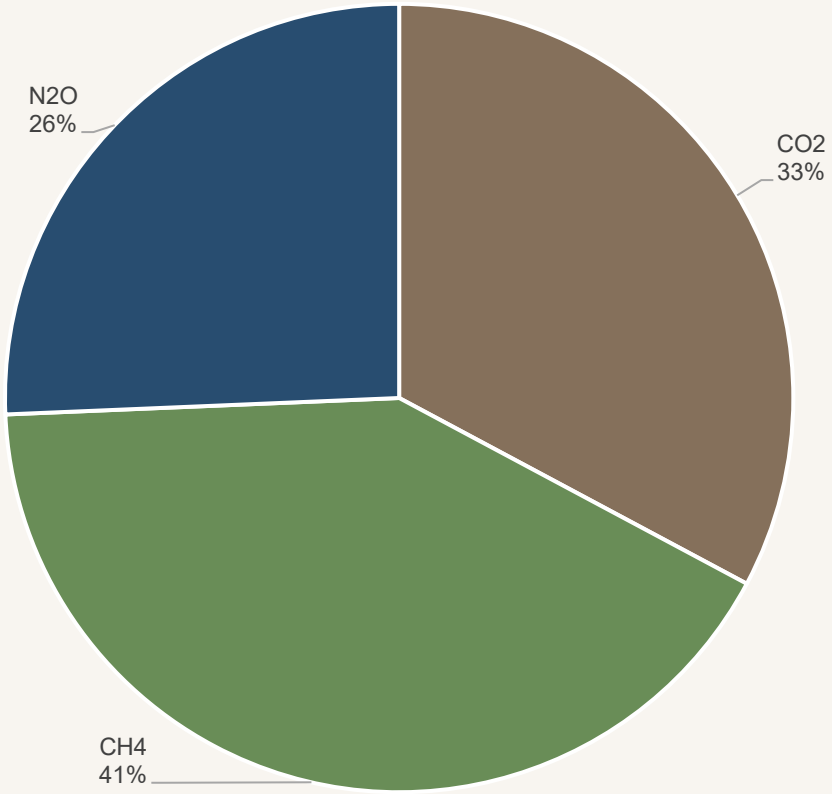
Kilde: DCE rapport 541, Denmark's National Inventory Report 2023

GHG emissions from agriculture

CO_2 is primarily from peat soils

CH_4 is mainly from enteric fermentation and manure handling

N_2O is mainly from manure and fertilizer in the field



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Kilde: DCE rapport 541, Denmark's National Inventory Report 2023

Carbon sequestration

A climate mitigation measure?

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Foto: Jesper Truelsen

Carbon sequestration and mitigation of loss of soil organic carbon

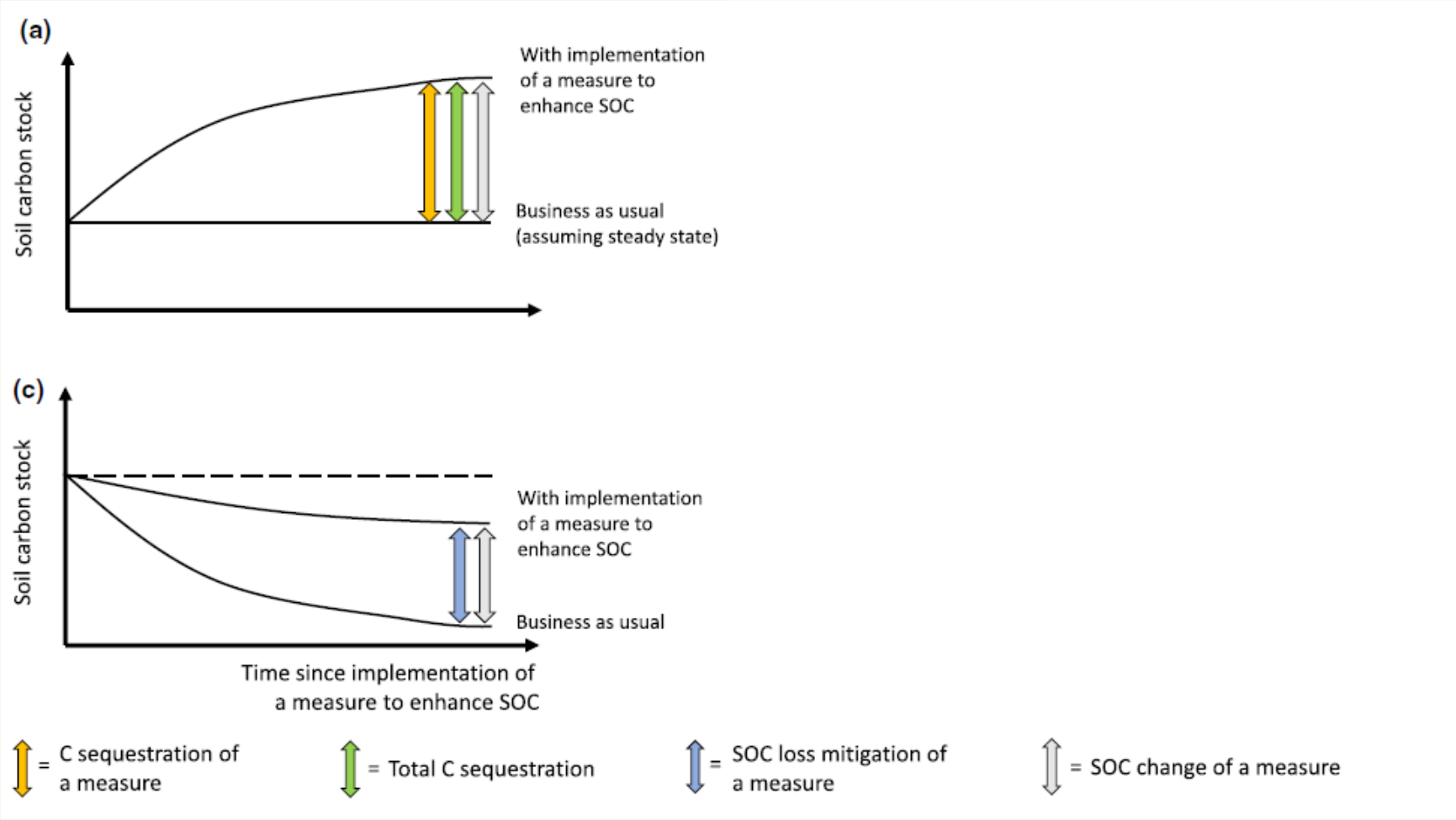
Carbon sequestration

- Transfer of carbon from the atmosphere to the soil, where there is an increase in soil carbon content
- Climate mitigation when there is a net removal of CO_2 from the atmosphere

Mitigation of loss of soil organic carbon

- ”Avoided emissions”
- Measure to avoid or reduce loss of carbon from the soil

Carbon sequestration and mitigation of loss of soil organic carbon



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Source: Don, A., Seidel, F., Leifeld, J., Kätterer, T., Martin, M., Pellerin, S., ... & Chenu, C. (2023). Carbon sequestration in soils and climate change mitigation—Definitions and pitfalls. Global Change Biology, e16983.

Carbon sequestration does not always mean climate mitigation…

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GHG emissions

After field application

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Foto: Linda Rosager Duve

Nitrous oxide – where does it come from?

Direct emissions

- Applied fertilizer or manure
- Crop residues

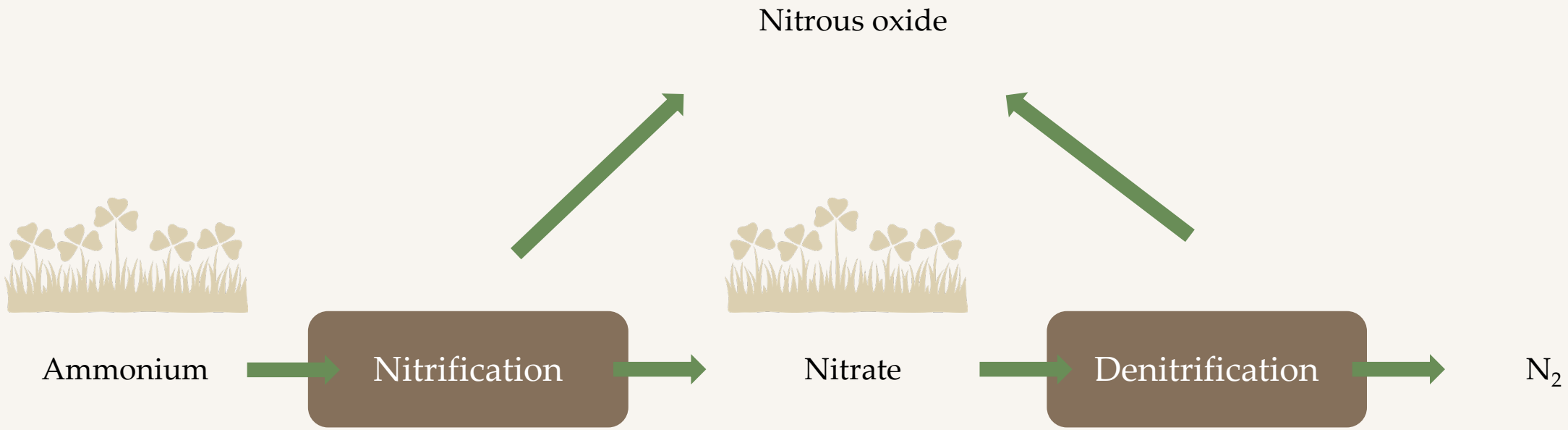
Indirect emissions

- Ammonia volatilization
- Nitrate leaching

In calculations it is assumed that 1% of applied N is emitted as N2O

However, this varies alot…

Nitrous oxide – where does it come from?



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Simplified illustration of the nitrogen cycle in soil.

Utilization requirements

	Pig slurry	Compost
N quota/ha	65 kg utilized N	65 kg utilized N
Utilization requirement[1]	80 %	15 %
Applied total N/ha	80 kg total N	430 kg total N
Kg CO_2e/ha from applied N	340 kg CO_2e	1800 kg CO_2e

EF for N_2O of 1 %

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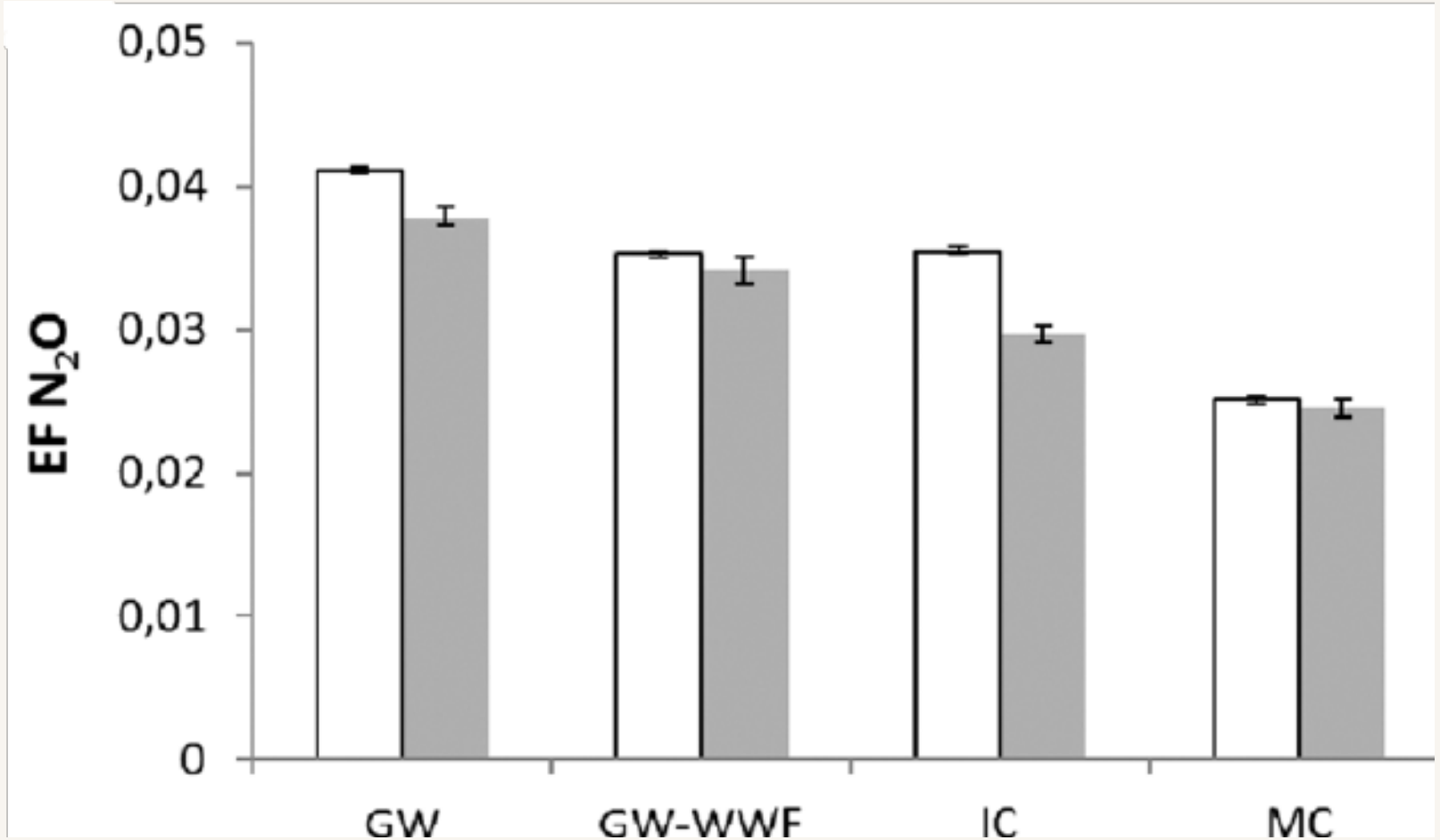
[1] Udnyttelseskrav fra Vejledning om gødsknings- og harmoniregler
Planperioden 1. august 2023 til 31. juli 2024

Emissionfactor is potentially higher

Lab study

EF N_2O given as kg N_2O-N/kg N



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Kilde: Nielsen, M. P., Yoshida, H., Raji, S. G., Scheutz, C., Jensen, L. S., Christensen, T. H., & Bruun, S. (2019). Deriving environmental life cycle inventory factors for land application of garden waste products under Northern European conditions. Environmental Modeling & Assessment, 24, 21-35.

…or lower

A meta-study by Charles et al. (2017) found an emissionfactor of app. 0,27 % for compost

Questions?