

Thematic Assessment Report on Ammonia

Rob Maas @ TFIAM – 8 May 2018

*Request Executive Body of the UN Air Convention, Dec 2017
to TFIAM/TFMM – with WGE & TFRN input*

Request

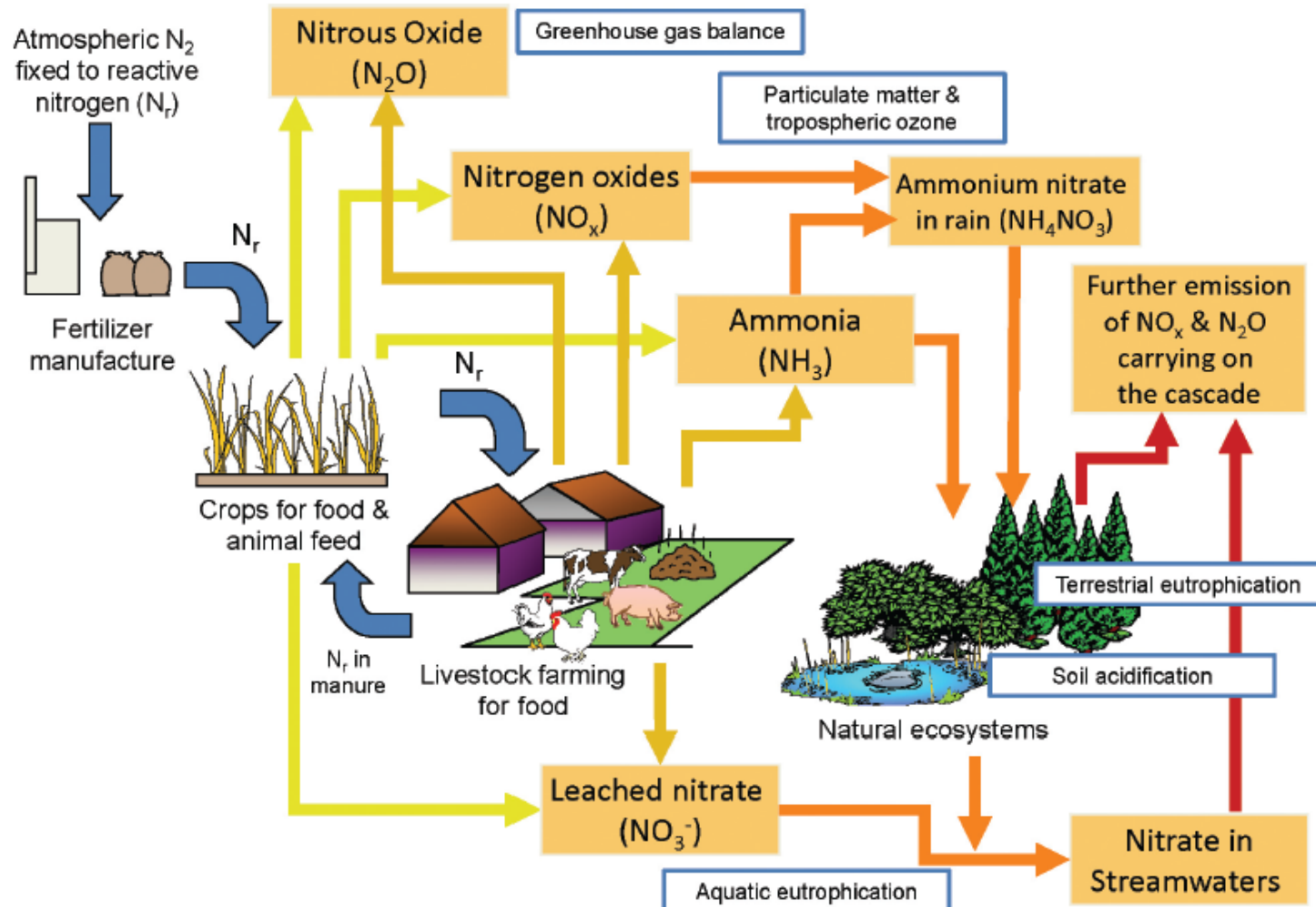
Prepare a concise (*low/no budget*) report that shows the benefits of further action on ammonia

E.g.:

1. What is the current status of (a) policy and (b) science?
2. What will be the damage to health and ecosystems in the coming decades with policy inaction?
3. Which policy actions will be most effective?
4. How could other policies (climate and food) influence ammonia emissions?

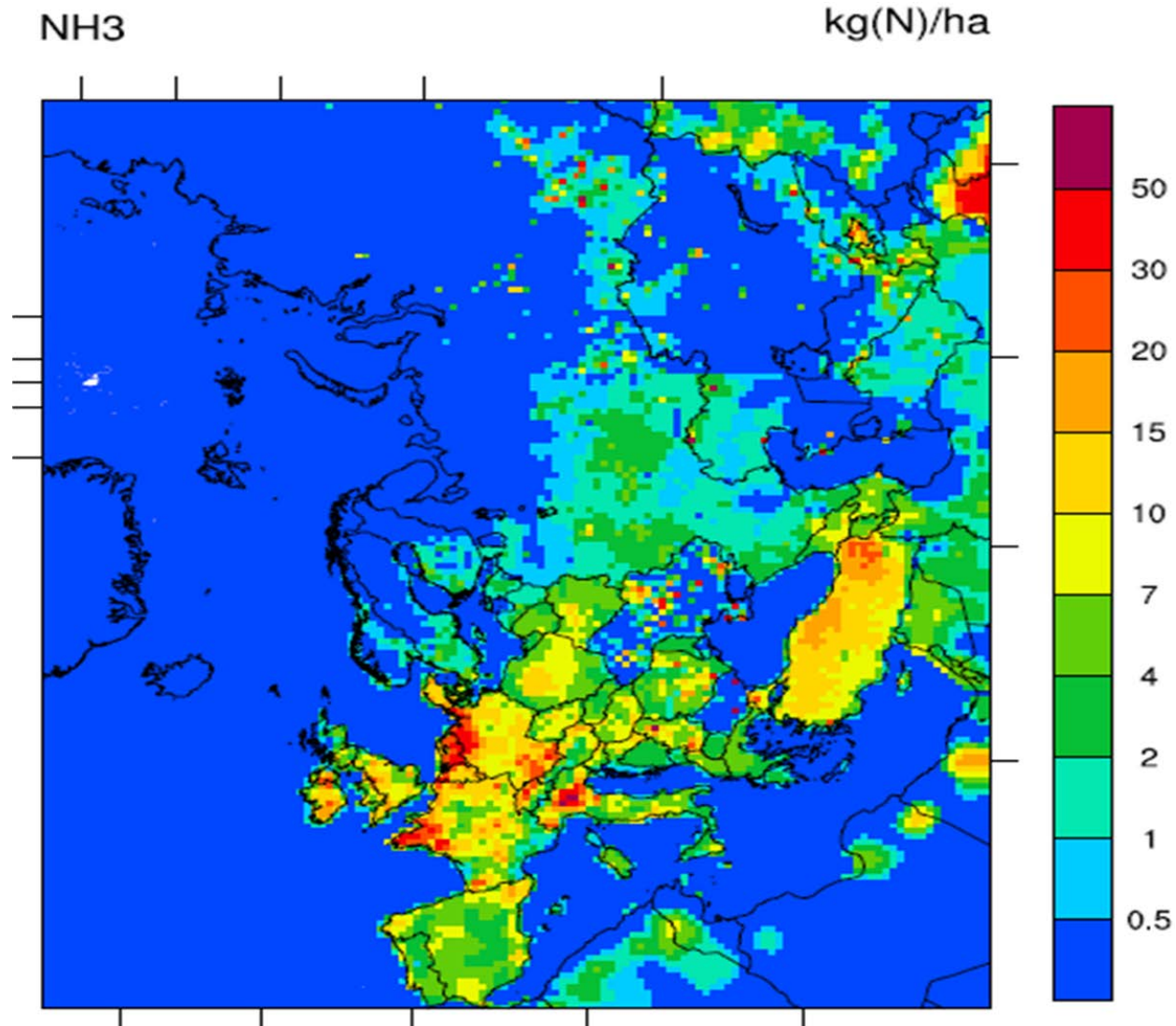
Integrated approach

Everything has been said, so how do we make a difference?



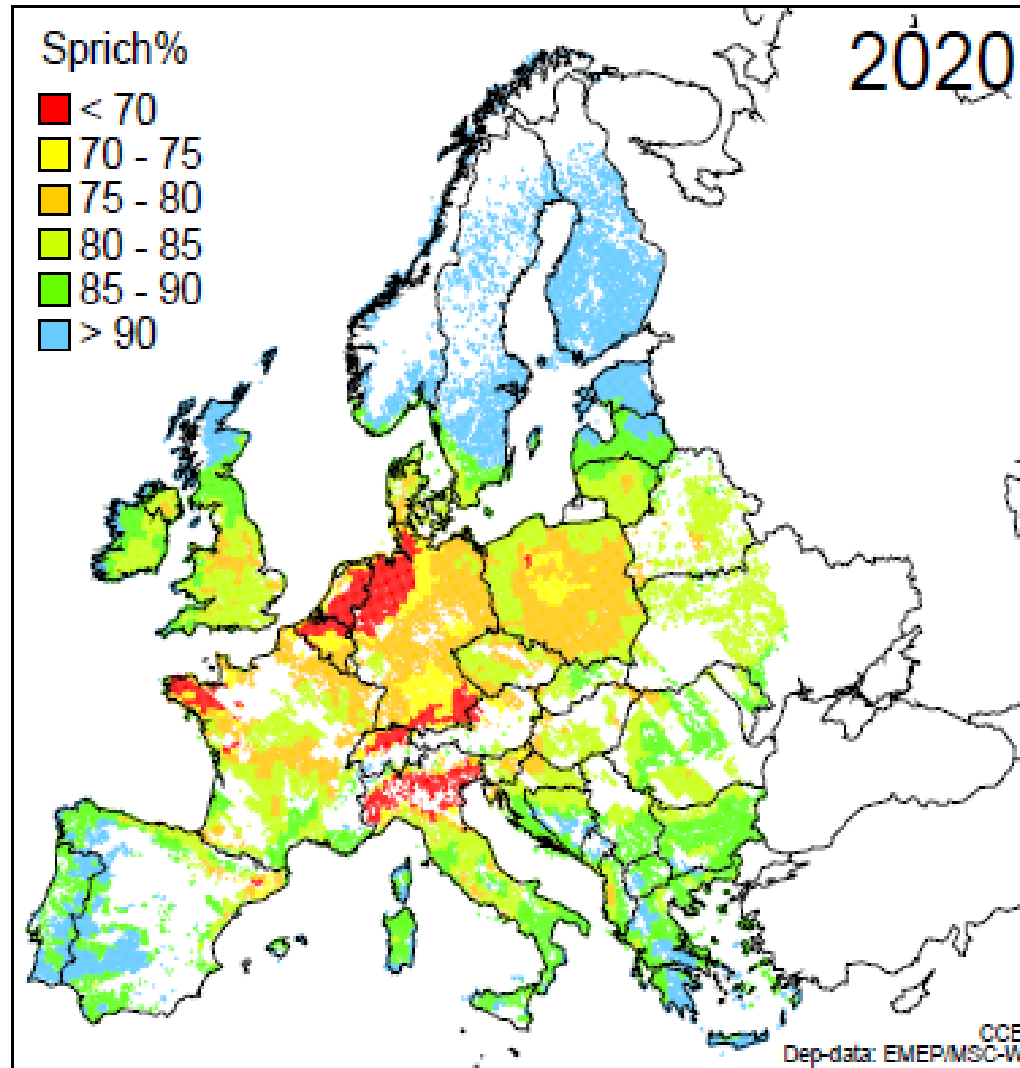
Current status (1)

Large differences in ammonia emission densities



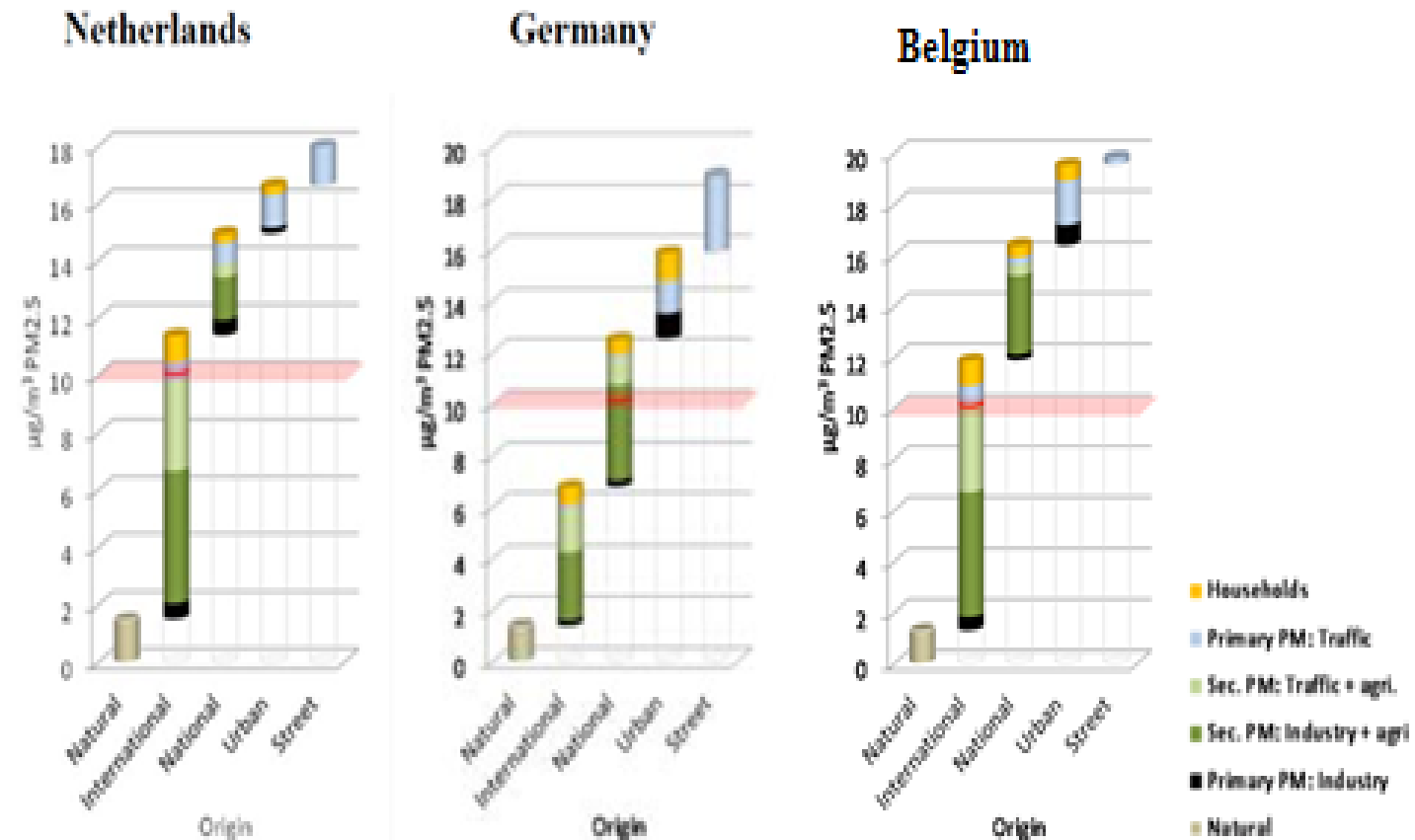
Current status (2)

strong correlation with differences in biodiversity loss



Current status (3)

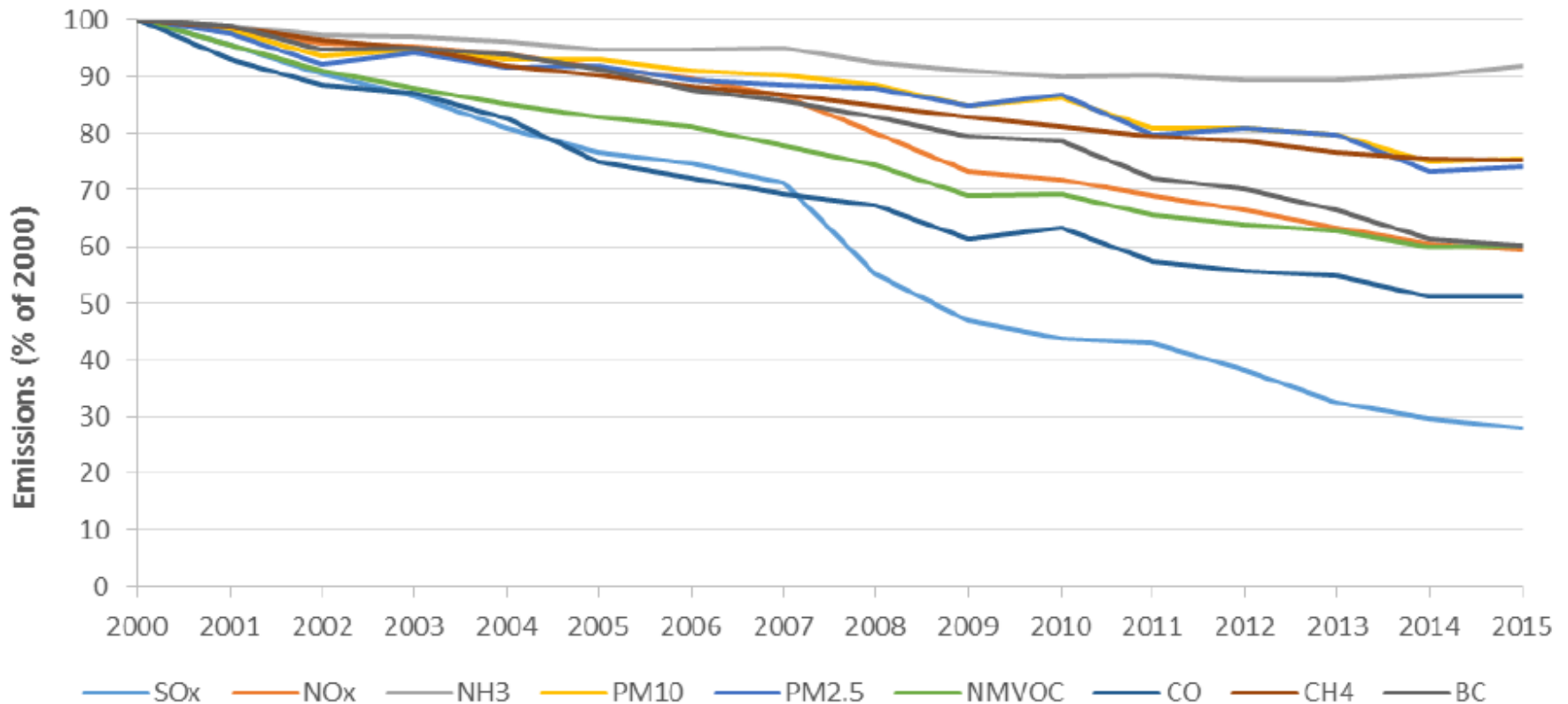
Game changer: ammonia plays important role in SIA formation and PM2.5 exposure in many cities



Current policy (1)

so far, only modest reductions in ammonia emissions

Figure 1: Development in EU-28 emissions, 2000-2015 (as % of 2000 levels) [Source EEA]



Current policy (2)

In coming decades, modest ammonia emission reductions

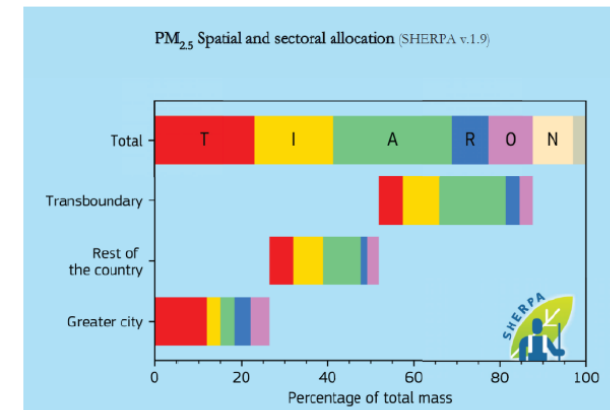
	NH3 emission	reduction percentages			
		2020- NECD	2030- NECD	2030- opt	
	level 2005				
Belgium	73	2	13	16	19
Denmark	73	24	24	37	47
France	675	5	29	29	37
Germany	593	4	13	39	50
Luxemburg	6	1	22	24	27
Netherlands	146	13	21	25	25
United Kingdom	308	8	16	21	22
EU-28	3982	6	19	27	35

NECD- 5 July 2016, and abatement potential (source IIASA)

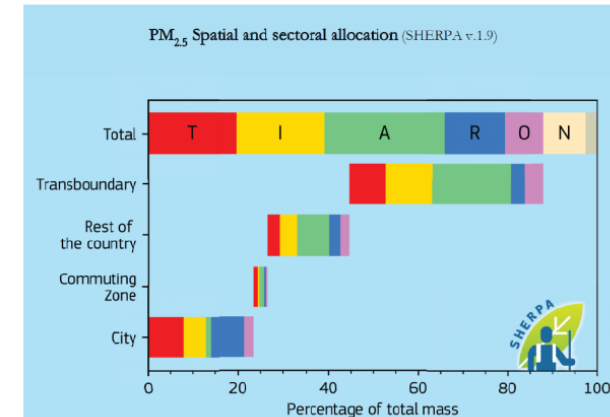
What might prevent action?

- Uncertainties in emission estimates?
- Uncertainties in source apportionment?
- SIA-modelling – what is (in different parts of Europe) more effective: ammonia or NO_x -reduction?
- Uncertainties in abatement potential, including ‘applicability’?
- Uncertainties in relative toxicity of PM-species?

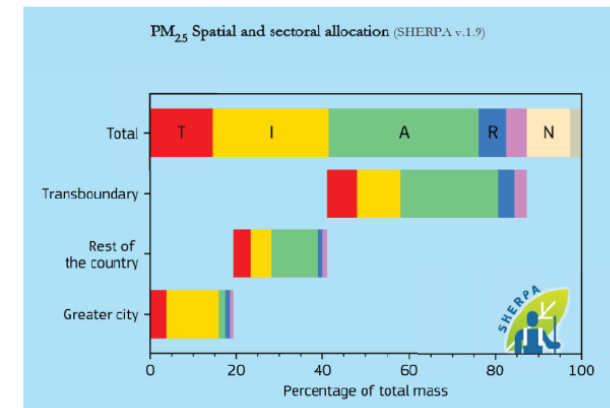
Brussels



Lille



Saarbrücken



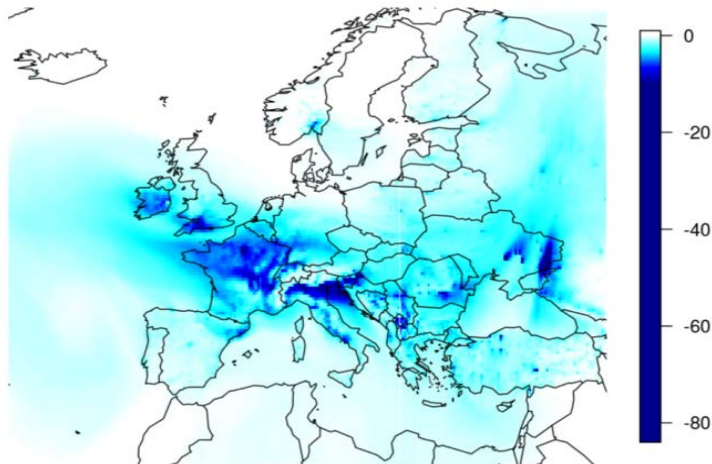
Chimere PM-exposure scenarios – without (L) and with (R) NH₃-measures

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User scenario
(excluding natural sources)

Difference

PM10 - daily mean ($\mu\text{g} / \text{m}^3$)



Difference between the reference PM10 map including from only the main anthropogenic sources and the user scenario assuming a Europe-wide uniform reduction of :

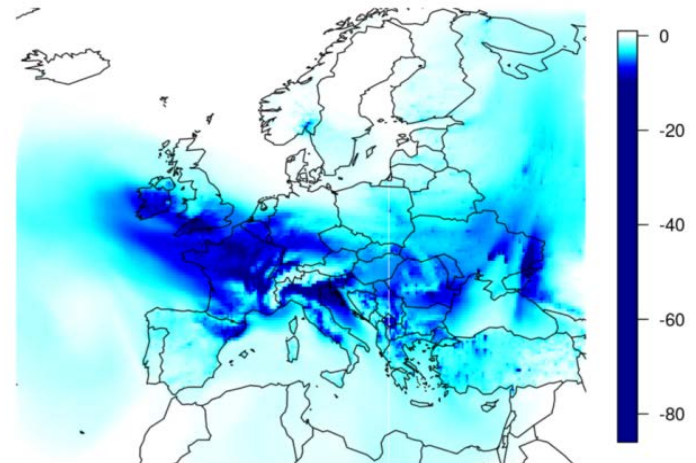
Agriculture: 0 % ; Traffic: 50 % ; Residential: 50 % ; Industry: 50 % .
Based on a non linear surrogate model trained on CHIMERE CAMS Regional Forecasts.

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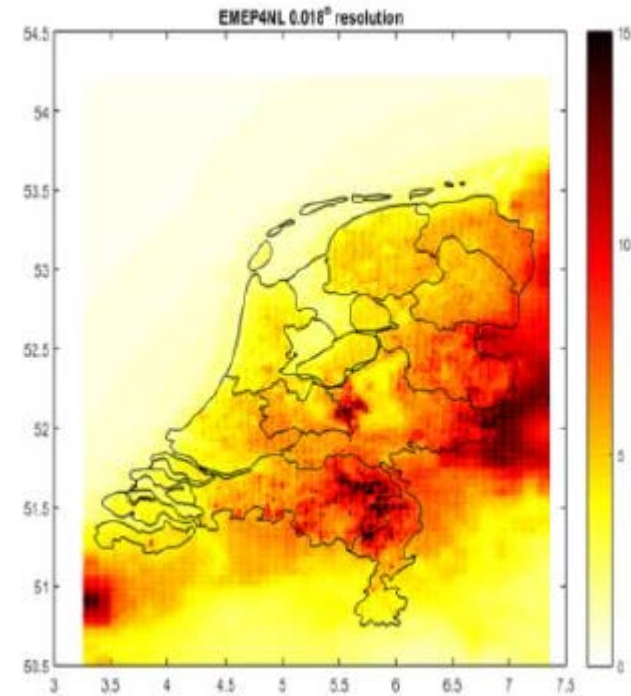
Relative importance of NH₃-reductions

Impact of 45% reduction in NH₃-emissions (in ng PM_{2.5}/m³)

from: \ to:	Belgium	Netherlands	Luxemburg	Germany	France
Belgium	453	117	174	36	36
Netherlands	228	504	87	84	33
Luxemburg	15	3	102	3	3
Germany	420	330	585	792	135
France	207	102	228	81	429
Other EU	192	231	123	207	96
Total	1515	1287	1299	1203	732
Domestic share	30%	39%	8%	66%	59%

Impact of 45% reduction of all precursors (in ng PM_{2.5}/m³)

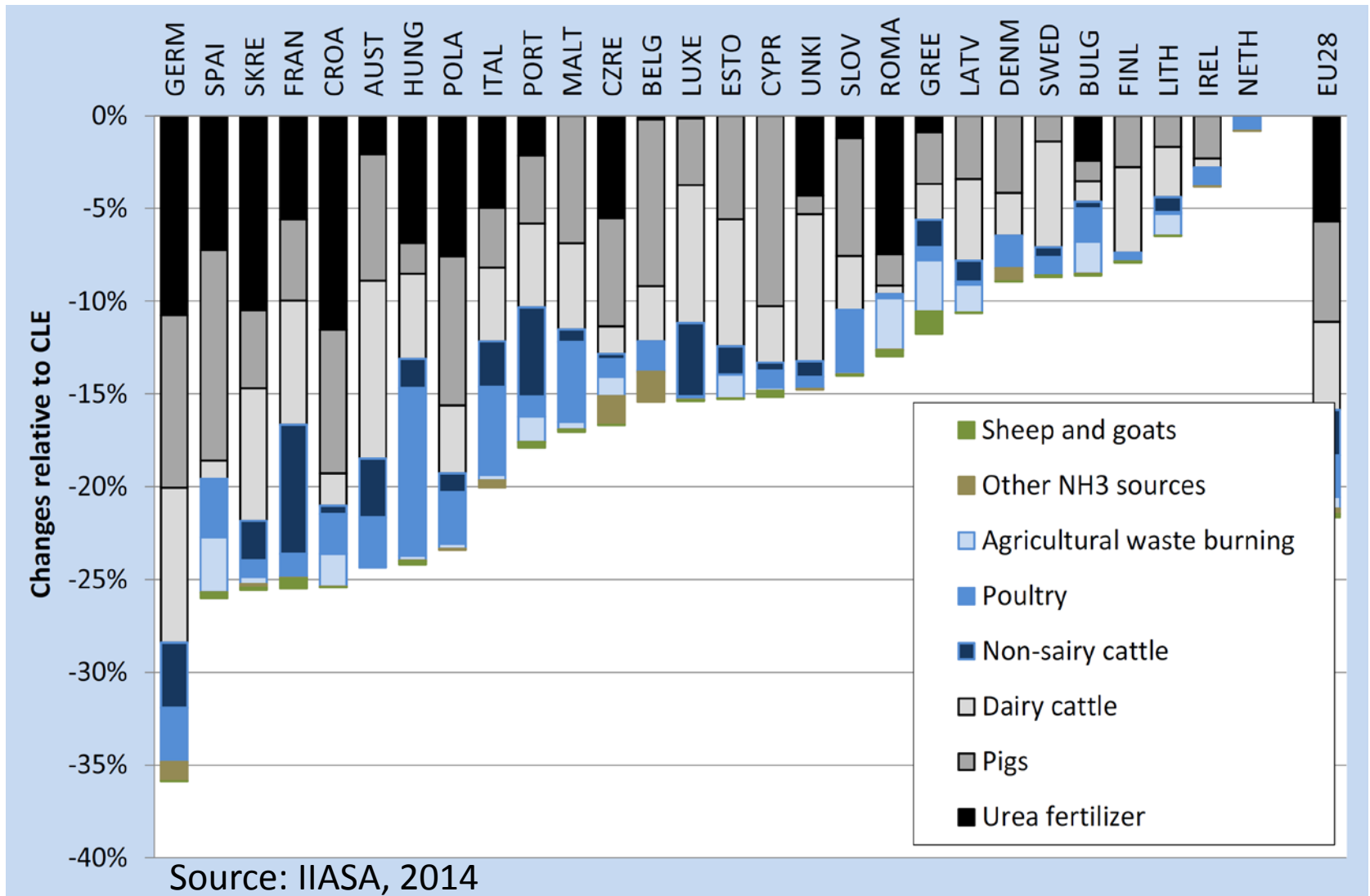
from: \ to:	Belgium	Netherlands	Luxemburg	Germany	France
Belgium	1452	429	540	132	135
Netherlands	501	918	216	162	90
Luxemburg	39	15	330	18	15
Germany	1272	1128	1686	2250	516
France	888	759	999	372	1455
Other EU	828	732	660	966	561
Total	4980	3981	4431	3900	2772
Domestic share	29%	23%	7%	58%	52%



Source: EMEP4NL project

Source: EMEP2016

Technological abatement potential beyond current legislation

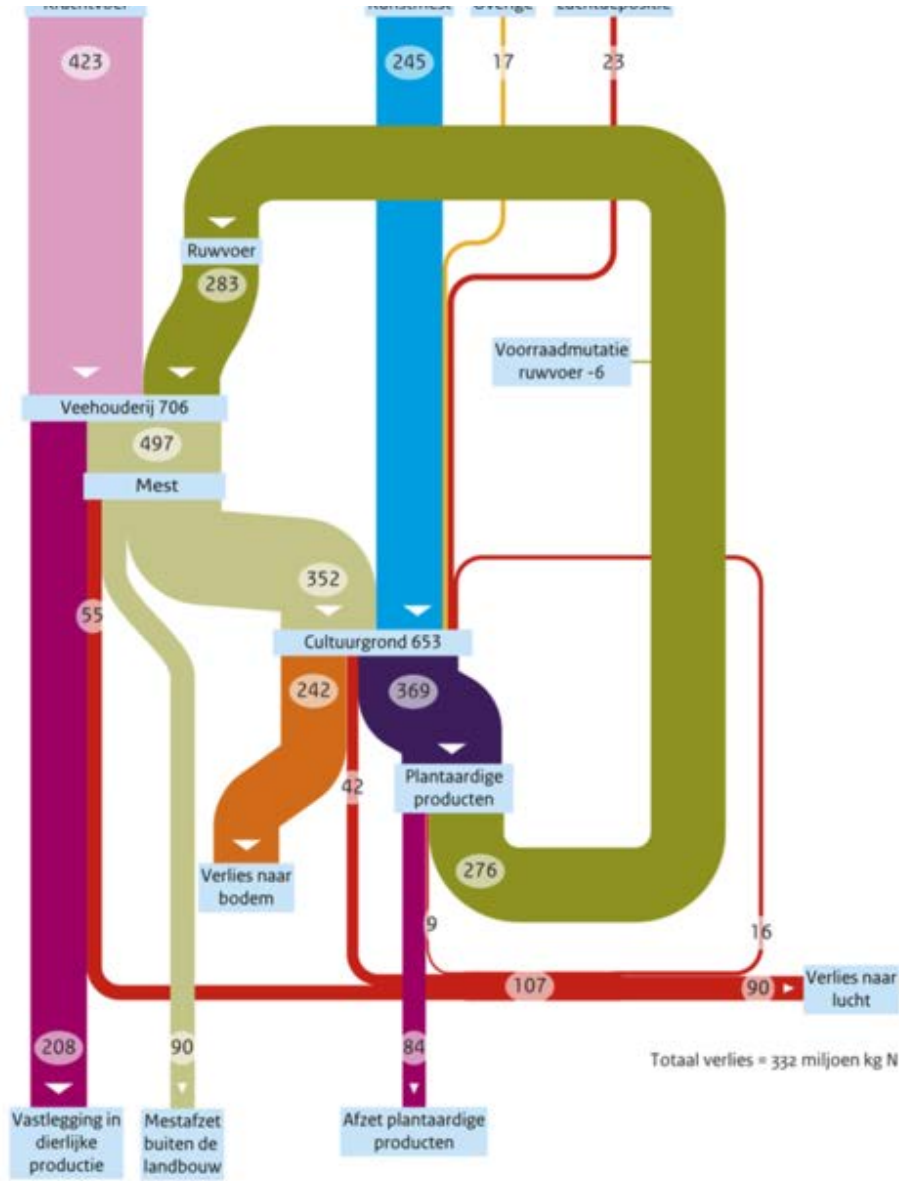


Policy issues

- What will be the costs and benefits of additional ammonia reduction?
- Could methane and N₂O-policies contribute to NH₃-reduction?
- Could food policy contribute to NH₃-reduction...
healthy and sustainable diets
- Will food prices remain affordable?
- How to win political support?

Towards a circular agricultural economy?

Waste less nutrients, use less feed and chemical fertilizer



To conclude

- How can we make a difference?
 - Goal: draft report for EMEP/WGE-September 2019
 - What are key messages ?
- What should get more attention in the report?
 - Global perspective?
 - Ideas for report outline?
- Who can/will contribute?
 - Division of tasks, how to organize work?
 - In TFMM positive reactions from MSC-W, INERIS, IIASA, WMO, NL