

Ammonia emission abatement in agriculture

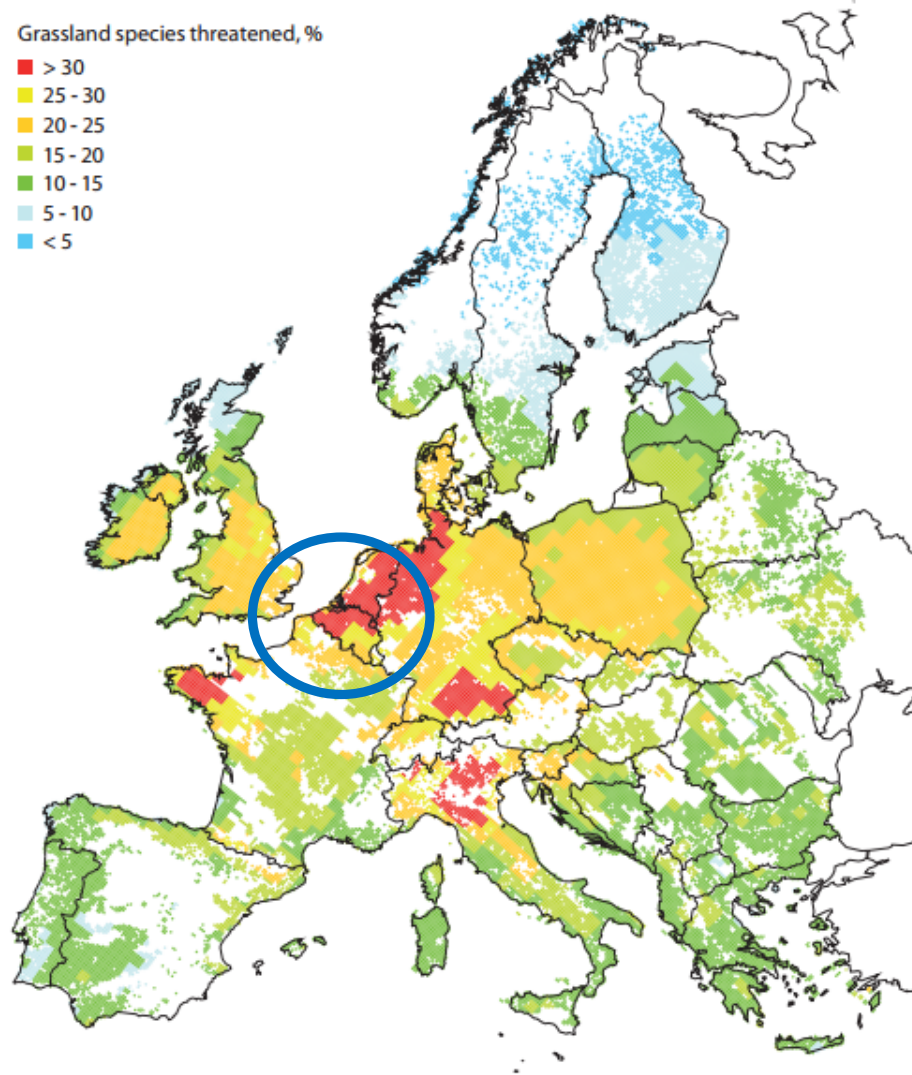
The case of Flanders - Belgium



1 June 2017 – WGSR 55, special session on agriculture and air pollution

Grassland species threatened, %

- > 30
- 25 - 30
- 20 - 25
- 15 - 20
- 10 - 15
- 5 - 10
- < 5



▲ Models suggest that the share of grassland species threatened by nitrogen deposition in 2020 under the revised Gothenburg Protocol will be greatest for regions in northwestern Europe with the most intensive agriculture.ⁱⁱⁱ

FLEMISH
LAND
AGENCY

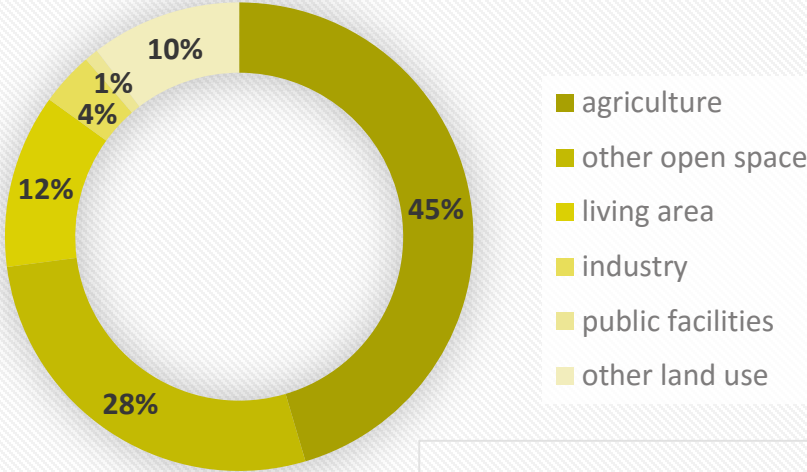
Towards Cleaner Air
Scientific Assessment Report 2016



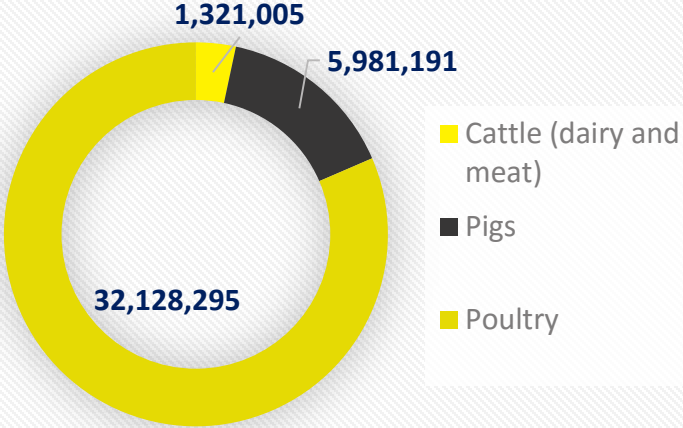
Flanders
State of
the Art

Agriculture in Flanders

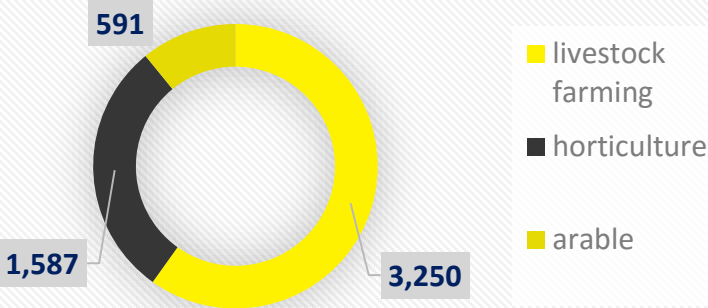
Land use in Flanders, 2014
(source: VRIND 2016)



Livestock numbers, 2015
(source: VRIND 2016)

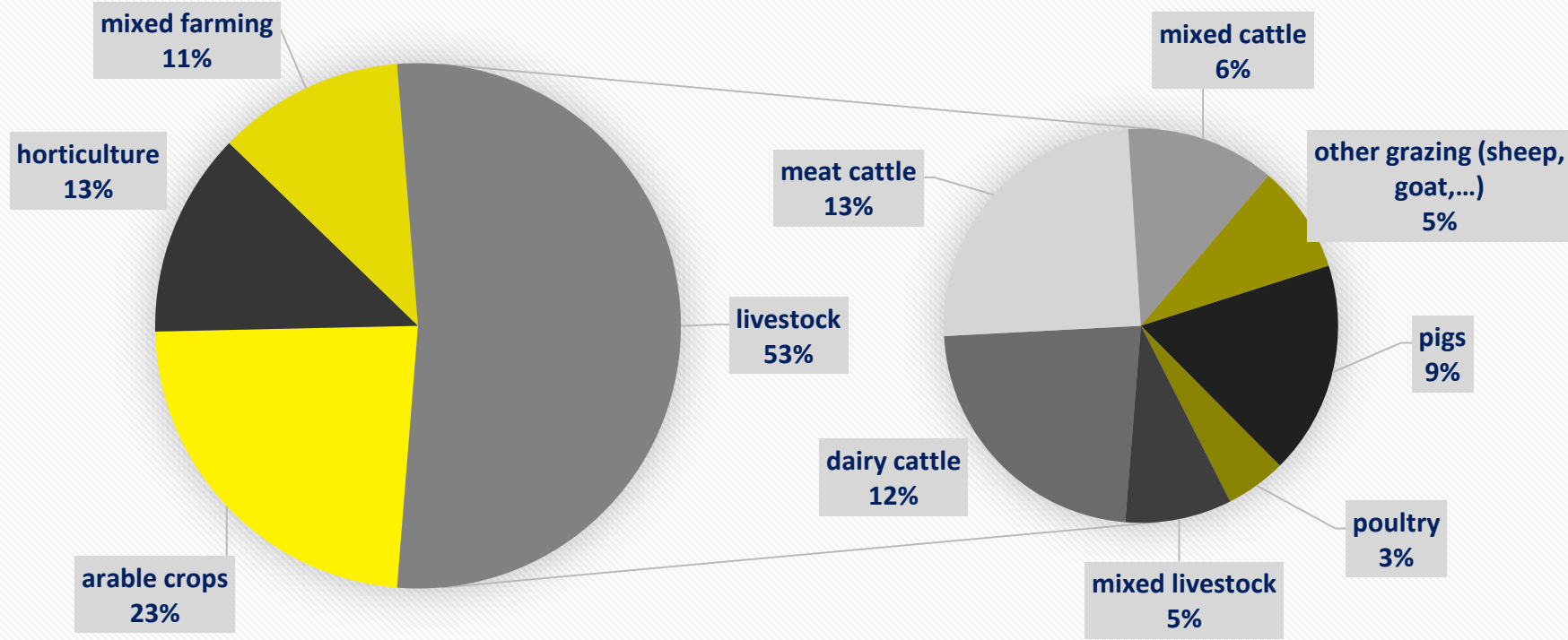


Final production value ,
2015 (M Euro)

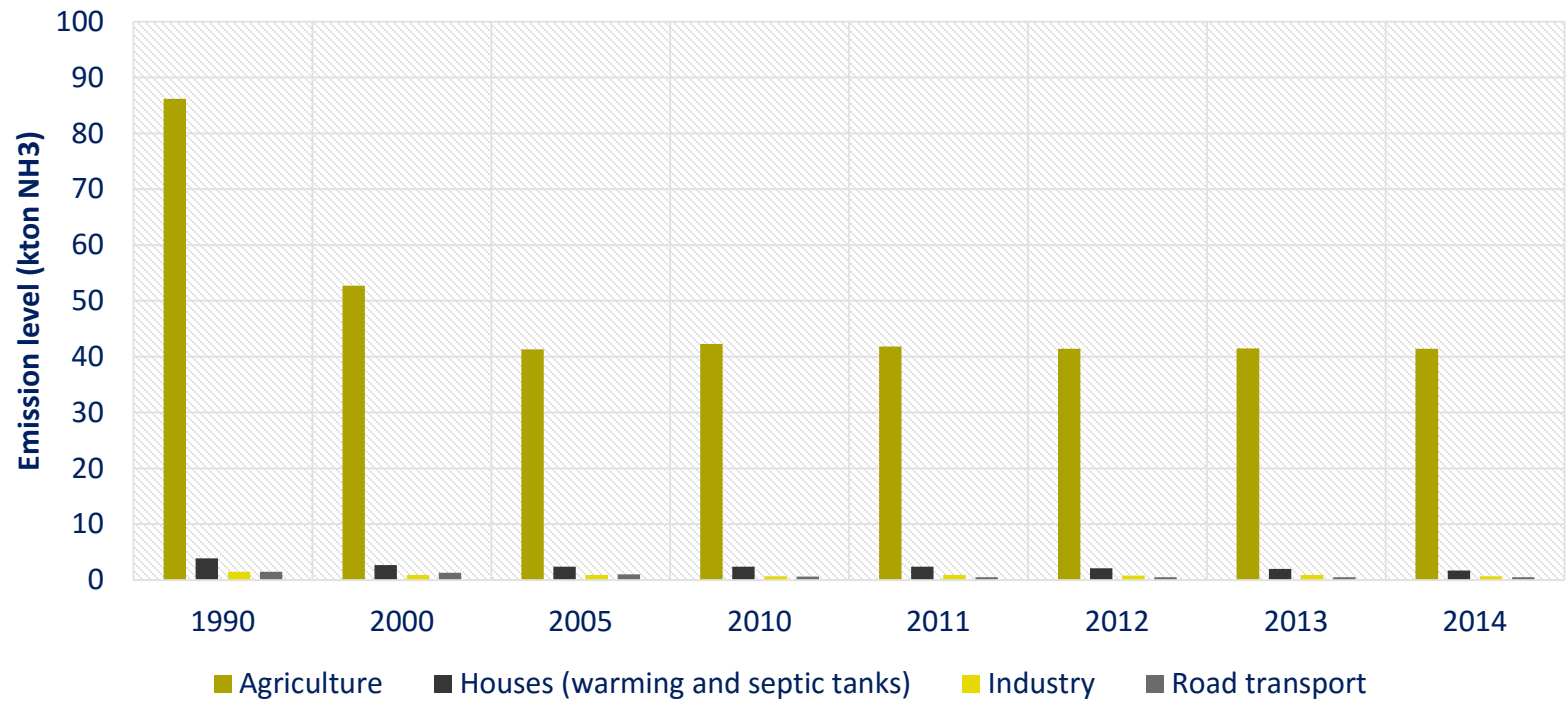


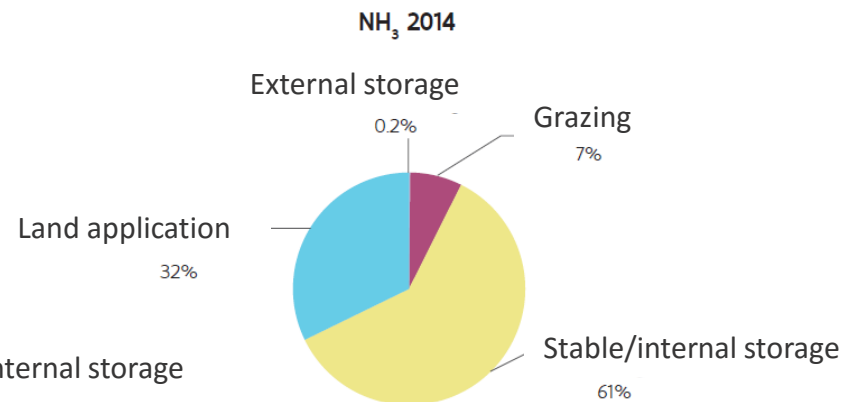
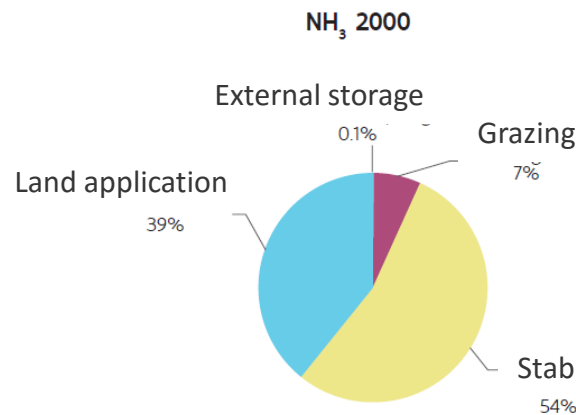
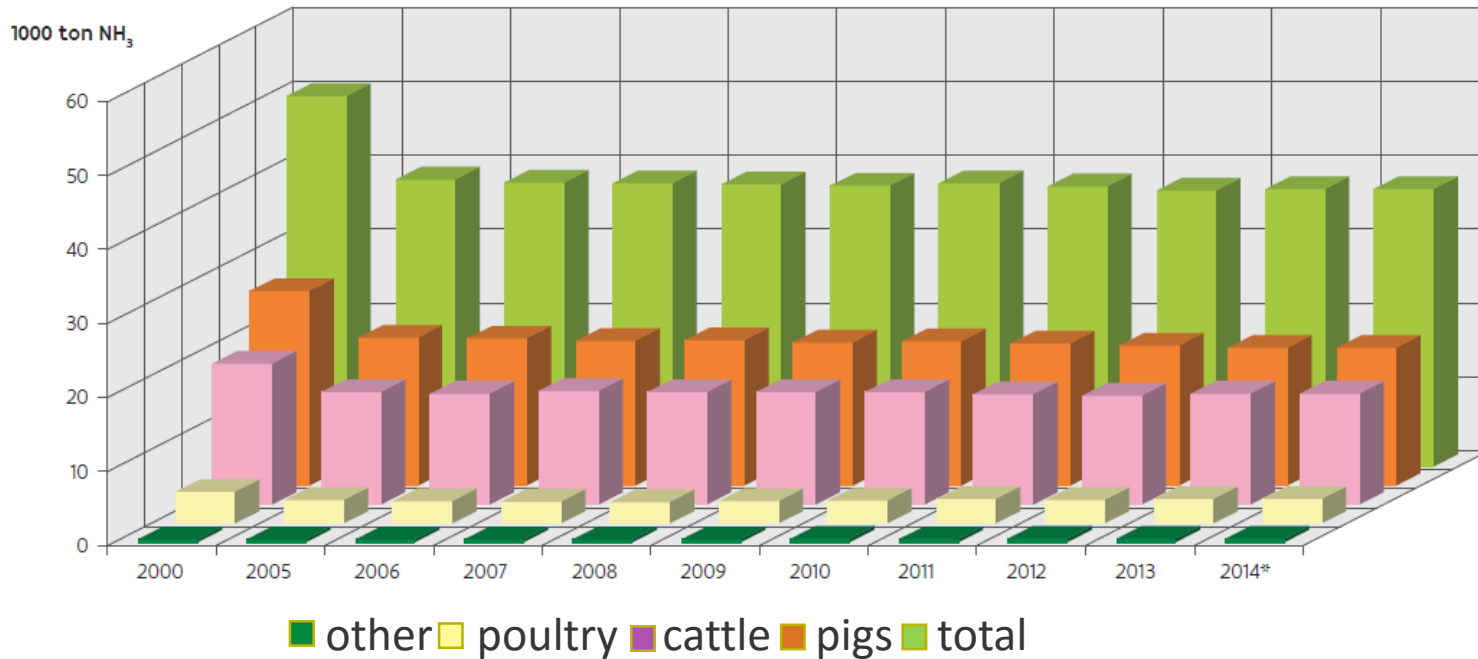
Agriculture in Flanders

Specialisation of farming in Flanders (number of farms)



Evolution of ammonia emissions in Flanders





2 main contributors:

- Land application of manure and fertilisers
- Animal housing

Land application of manure

Broadcast spreading + no incorporation

1991 Nitrates Directive + Manure Decree

- Maximum nitrogen application rates
- Closed period
- Manure incorporation within 24 hours

Since 2000

- Incorporation within 4 hours on bare arable land
- Injection / trailing shoes or hoses on grassland and cropped arable land

Since 2007

- Incorporation within 2 hours or injection on arable land
- Grassland: Sod-injection – trailing shoes – trailing hoses

+ decreasing inputs of N (link with Nitrates Directive: animal numbers, feed management, balanced fertilisation, manure processing)

Ammonia emission associated with land spreading of manure

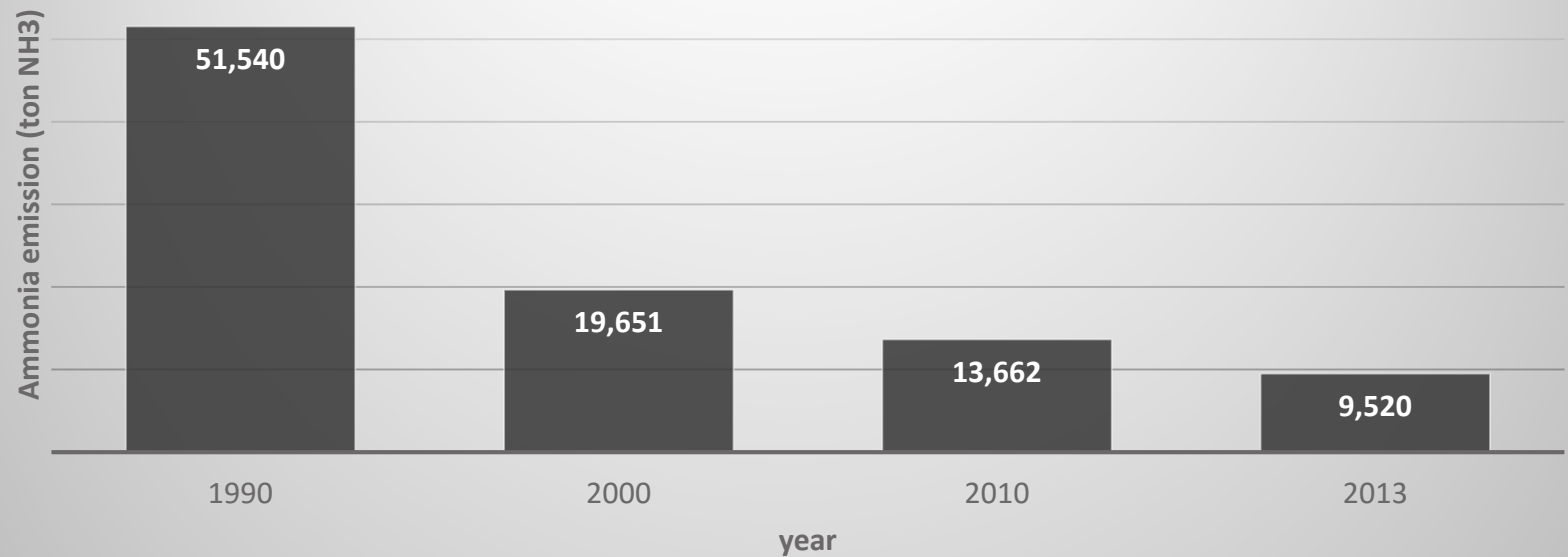


Table 4.201: Bonus for conserved nitrogen, achieved by applying low-emission spreading techniques for slurry

Technique	Example from Germany		Example from UK	
	Associated NH ₃ emission reduction	Bonus	Associated NH ₃ emission reduction	Bonus ⁽¹⁾
	(%)	(EUR/m ³ slurry)	(%)	(EUR/m ³ slurry)
Trailing hose	30	0.27	40	0.53
Trailing shoe	50	0.45	65	0.85
Open slot injector (discs)	60	0.54	80	1.07
Closed slot injector (cultivator)	90	0.81	NI	NI
Immediate incorporation	NI	NI	95	1.27
Incorporation within 1 h	90	0.81	NI	NI
Incorporation within 4 h	70	0.63	NI	NI
<i>Source</i>	[575, UBA 2011]		[254, Webb J.M. et al. 2009]	
⁽¹⁾ Values are calculated at the exchange rate of EUR/GBP = 0.88. NB: NI = no information provided.				

Table 4.202: Costs for slurry spreading and associated ammonia emission reduction costs for different application techniques and farm sizes, in Germany

Farm size and characteristics						
Annual process capacity (m ³ /year)	1 000	3 000		10 000	30 000	100 000
Characteristics	Single farm, with necessary equipment	Slightly larger farm or a cooperative of smaller farms, using the equipment cooperatively		A cooperative or a larger farm	Contractors and large farms	
Process capacity (m ³ /h)	low	high	low	low	-	-
Spreading costs (EUR/m³ slurry)						
Broadcast spreader ⁽¹⁾	6.61	3.22	4.31	3.04	3.19	2.49
Trailing hose	8.76	3.99	5.08	3.38	3.32	2.57
Trailing shoe	9.68	4.63	5.87	4.11	4.10	-
Open slot injector (discs)	9.97	4.89	6.16	4.37	4.67	2.89
Closed slot injector (cultivator)	10.38	5.71	7.49	4.96	5.30	3.04
Incorporation within 1 h	7.43	4.04	5.13	3.86	4.02	3.31
Incorporation within 4 h	7.10	3.71	4.80	3.53	3.69	2.98
Dilution with water 1:1	11.1	6.08	8.81	6.49	5.95	4.4
Ammonia emissions reduction costs (EUR/kg NH₃)						
Trailing hose	8.80	3.16	3.16	1.42	0.50	0.34
Trailing shoe	6.29	2.89	3.20	2.20	1.86	-
Open slot injector (discs)	4.60	2.28	2.53	1.82	2.02	0.55
Closed slot injector (cultivator)	3.43	2.27	2.89	1.75	1.91	0.50
Incorporation within 1 h	0.75	0.75	0.75	0.75	0.75	0.75
Incorporation within 4 h	0.81	0.81	0.81	0.81	0.81	0.81
Dilution with water 1:1	7.37	4.69	7.37	5.65	4.52	3.13

⁽¹⁾ Reference system.
Source: [575, UBA 2011]



Low emission housing

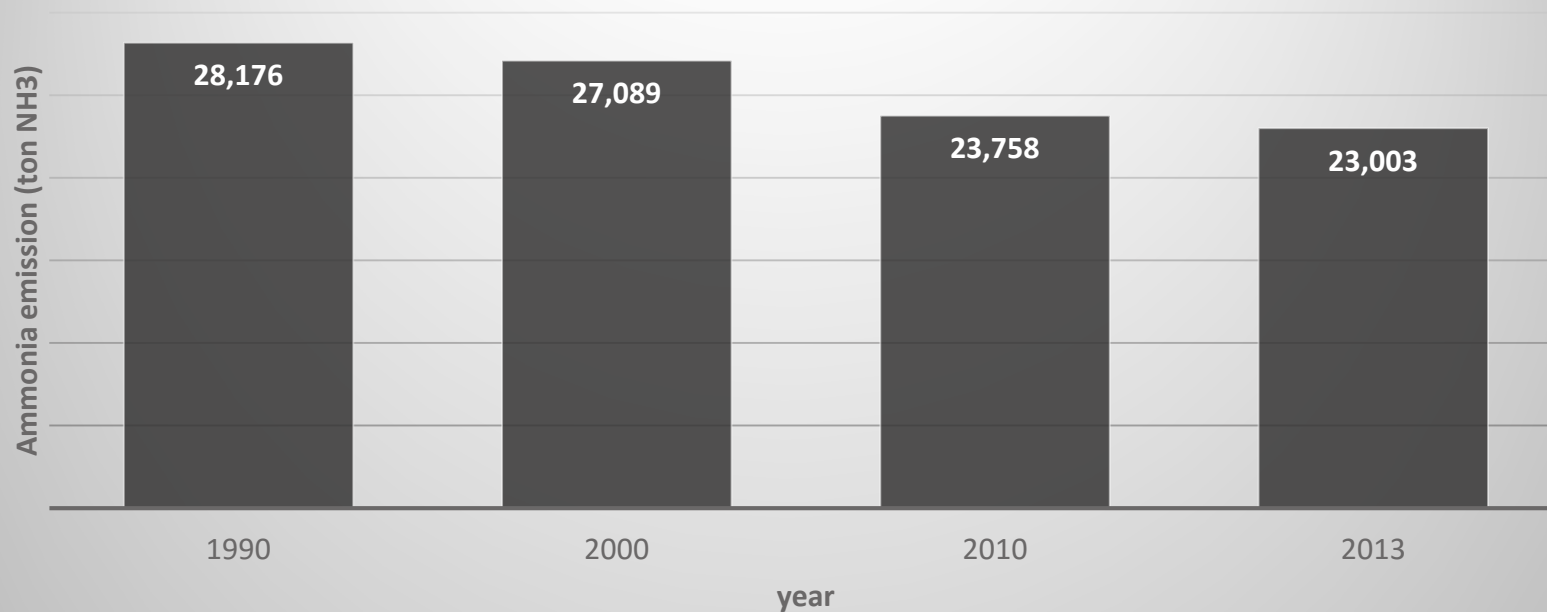
2004: Low emission housing mandatory for new stables (and thorough renovation)

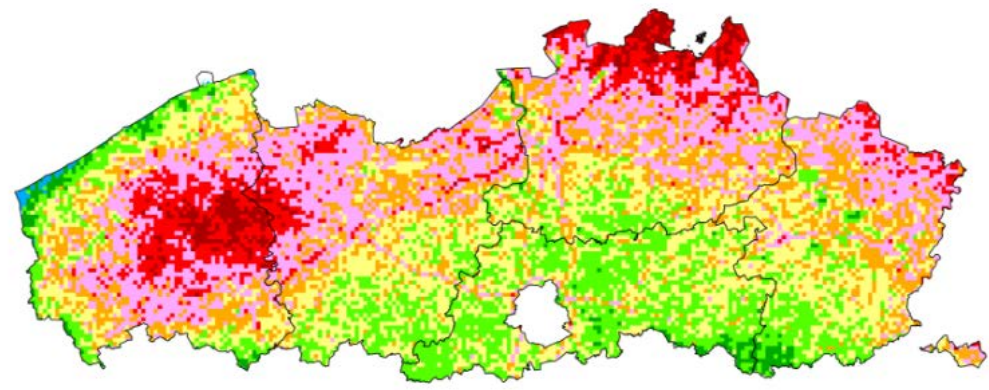
- Pigs and poultry
- 50% emission reduction compared to traditional housing
- Slow process
- New techniques: approval procedure → ministerial decree

Two ways of implementing:

- Low emission by technical interventions in building stables
- Air scrubber
 - Chemical (sulphuric acid)
 - Biological

Ammonia emission associated with housing and internal storage of manure



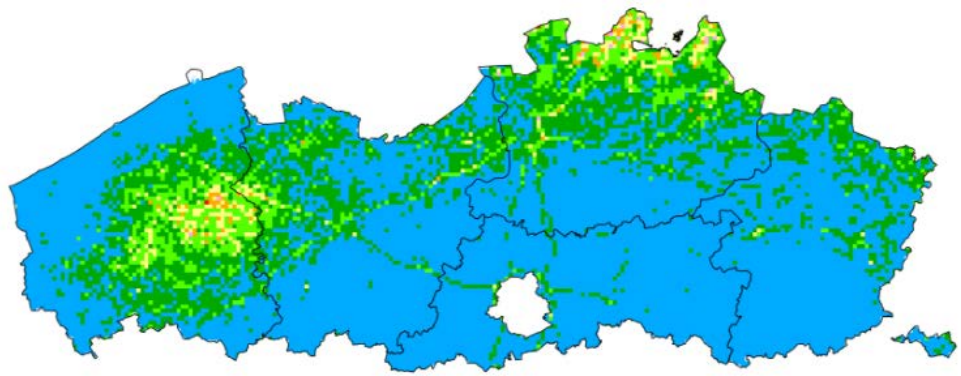


1990



2013

Totale vermestende depositie in 1990 berekend met VLOPS16 (kgN/ha.j)



Totale vermestende depositie in 2013 berekend met VLOPS16 (kgN/ha.j)



More information

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<https://www.facebook.com/VlaamseLandmaatschappij>



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Flanders
State of the Art