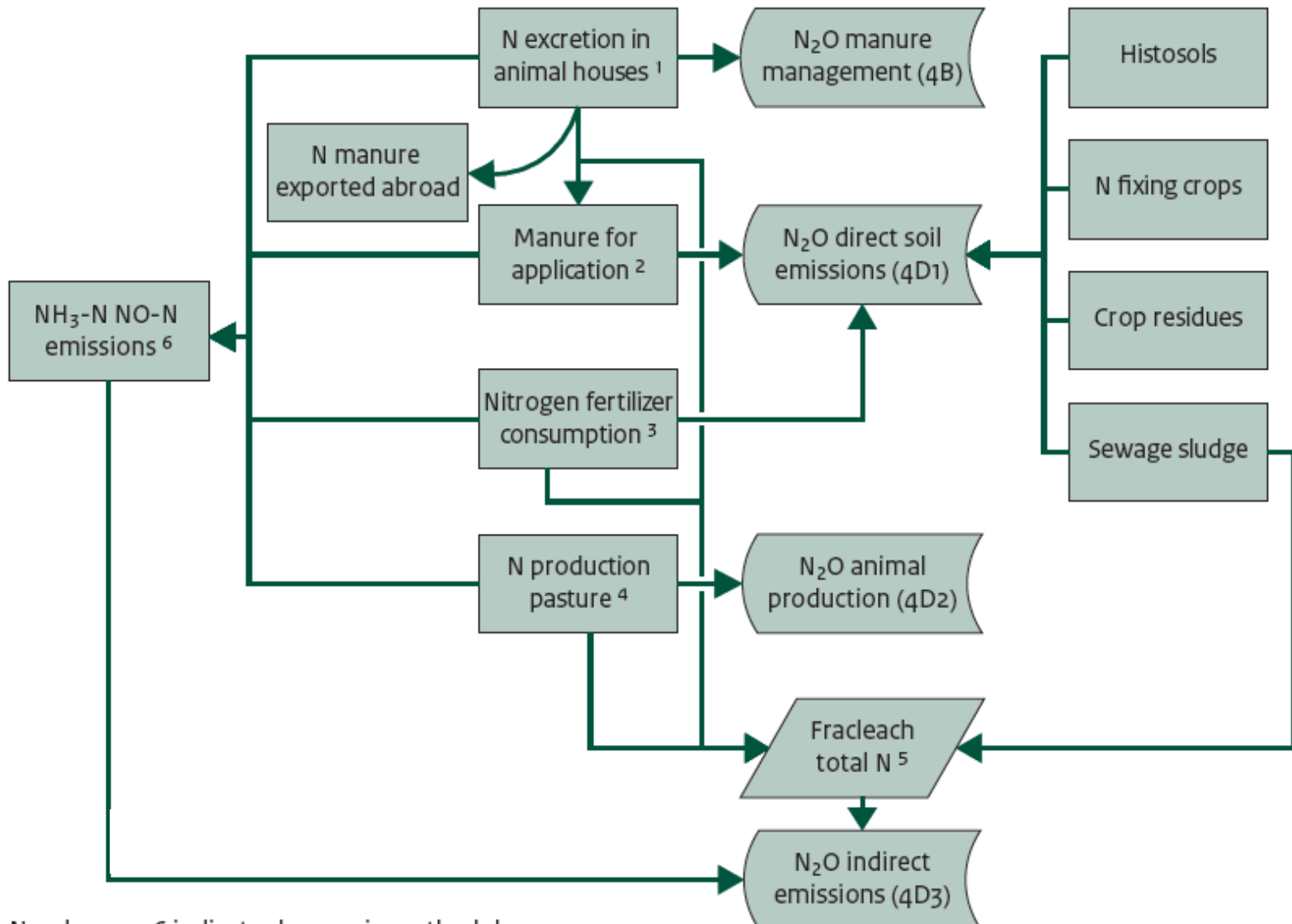


# Agricultural emission scenarios

**Netherlands**

Rob Maas, TFIAM - 6-8 May 2015

# N-flow per farm type + manure market model



	1990	1995	2000	2005	2006	2007	2008	2009	2009 - 1990
Nitrogen fertilizer consumption	412,4	405,8	339,5	279,2	287,8	257,5	238,1	238,1	-42%
Nitrogen excretion by animals	710,4	696,0	565,2	494,9	487,2	495,2	506,0	499,0	-30%
Nitrogen excretion in animals houses	514,5	516,1	432,6	393,7	390,5	406,3	413,0	418,1	-19%
of which in solid form	102,1	104,3	94,8	88,4	85,6	90,2	93,6	95,2	-7%
of which in liquid form	412,4	411,8	337,7	305,2	304,9	316,1	319,4	322,9	-22%
Nitrogen in manure exported abroad/ incinerated*	6,8	25,8	20,5	29,3	24,1	35,4	42,3	42,4	521%
Available manure for application	410,9	398,4	336,3	298,5	304,5	308,5	299,9	298,2	-27%
(N-excretion in animal houses - total N-emissions in animal houses - export)									
Nitrogen excretion in meadow	195,9	179,9	132,5	101,2	96,7	88,8	93,0	80,8	-59%
Nitrogen in sewage sludge on agric. land	5,0	1,5	1,5	1,2	1,1	1,0	1,0	1,0	-80%
Total nitrogen supply to soil (manure + fertilizer + sewage sludge - export)	1121,0	1077,5	885,7	746,1	751,9	718,3	702,9	695,7	-38%
Nitrogen fixation in arable crops	7,8	4,9	4,7	4,5	4,7	4,5	4,2	4,3	-45%
Nitrogen in crop residues left in field	36,4	34,9	34,1	32,1	29,8	29,3	26,7	26,4	-28%
Nitrogen in histosols	52,4	52,4	52,4	52,4	52,4	52,4	52,4	52,4	0%
NH <sub>3</sub> -N emission during application	12,0	12,0	10,5	11,4	13,1	10,7	9,0	9,0	-25%
NO-N emission during application	4,9	4,9	4,1	3,4	3,5	3,1	2,9	2,9	-42%
NH <sub>3</sub> -N emission in animal houses	72,6	70,8	56,7	46,3	45,8	46,5	47,4	47,5	-35%
NO-N emission in animal houses	1,4	1,4	1,1	1,0	1,0	1,0	1,0	1,0	-26%
NH <sub>3</sub> -N emission during application	182,8	64,1	51,7	44,9	45,1	46,1	35,6	35,3	-81%
NO-N emission during application	4,9	4,8	4,0	3,6	3,7	3,7	3,6	3,6	-27%
NH <sub>3</sub> -N emission in meadow	15,2	13,7	4,5	3,0	2,5	2,1	2,3	1,5	-90%
NO-N emission in meadow	2,4	2,2	1,6	1,2	1,2	1,1	1,1	1,0	-59%
Atmospheric deposition agr. NH <sub>3</sub> -N NO-N	296,3	173,9	134,1	114,7	115,8	114,2	103,0	101,7	-66%
Nitrogen lost through leaching and run off	156,9	140,1	106,3	89,5	90,2	86,2	84,3	83,5	-47%

		bedrijven met ... melk- en kalfkoeien						totaal	
		1	20	50	100	200	500	bedrij- ven	melk- & kalfkoeien (x1000)
		tot 20	tot 50	tot 100	tot 200	tot 500	en meer		
<b>Milk cows</b>									
	2000	3861	11565	12208	1725	105	2	29466	1504
	2001	3330	9525	12775	2170	123	2	27925	1546
75/farm	2002	2948	8864	12320	2119	138	4	26393	1485
	2003	2437	7878	12181	2363	138	5	25002	1478
	2004	2249	7473	11995	2448	160	4	24329	1470
	2005	2184	7231	11457	2483	168	4	23527	1433
	2006	1891	6391	11135	2700	178	6	22301	1420
	2007	1659	5789	10700	2940	217	8	21313	1413
	2008	1404	5097	10466	3485	289	5	20746	1466
	2009	1187	4627	10360	3769	320	5	20268	1489

bedrijven met ... vleeskalveren

totaal

		1	20	50	100	200	300	500	be- drij- ven	vlees- kalveren (x1000)
		tot 20	tot 50	tot 100	tot 200	tot 300	tot 500	en meer		
		<b>Meat cows</b>								
	2000	676	176	304	501	317	394	566	2884	783
	2001	1157	183	303	464	259	345	508	3159	712
450/farm	2002	1440	152	267	413	239	342	525	3314	713
	2003	1371	197	260	391	252	306	560	3253	732
	2004	1075	231	275	374	240	315	584	3006	765
	2005	1328	262	277	382	252	308	639	3329	829
	2006	1238	168	253	383	234	298	653	3174	844
	2007	1670	164	314	394	219	310	659	3672	860
	2008	305	130	247	367	257	293	692	2248	899
	2009	219	96	217	329	240	283	697	2053	894
	2010	239	95	191	340	218	278	729	2064	928

**Pigs**

1000/farm

	bedrijven met ... vleesvarkens (20 kg en meer)							totaal	
	1	50	200	500	1000	2000	5000	bedrij- ven	vlees- varkens (x1000)
	tot 50	tot 200	tot 500	tot 1000	tot 2000	tot 5000	en meer		
2000	2003	2849	3816	2479	1337	367	43	12894	6505
2001	1476	2615	3409	2250	1338	376	43	11507	6230
2002	1761	2188	2945	2137	1160	349	36	10576	5591
2003	1529	1812	2698	2002	1125	350	43	9559	5367
2004	1289	1619	2541	1908	1139	387	42	8925	5383
2005	1168	1531	2413	1844	1171	425	50	8602	5504
2006	1026	1366	2213	1736	1102	459	61	7963	5476
2007	940	1264	2062	1650	1093	486	81	7576	5559
2008	785	1095	1942	1588	1126	543	95	7174	5839
2009	715	895	1680	1432	1075	598	113	6508	5872
2010	630	751	1442	1325	1024	647	133	5952	5904

**Chicken**

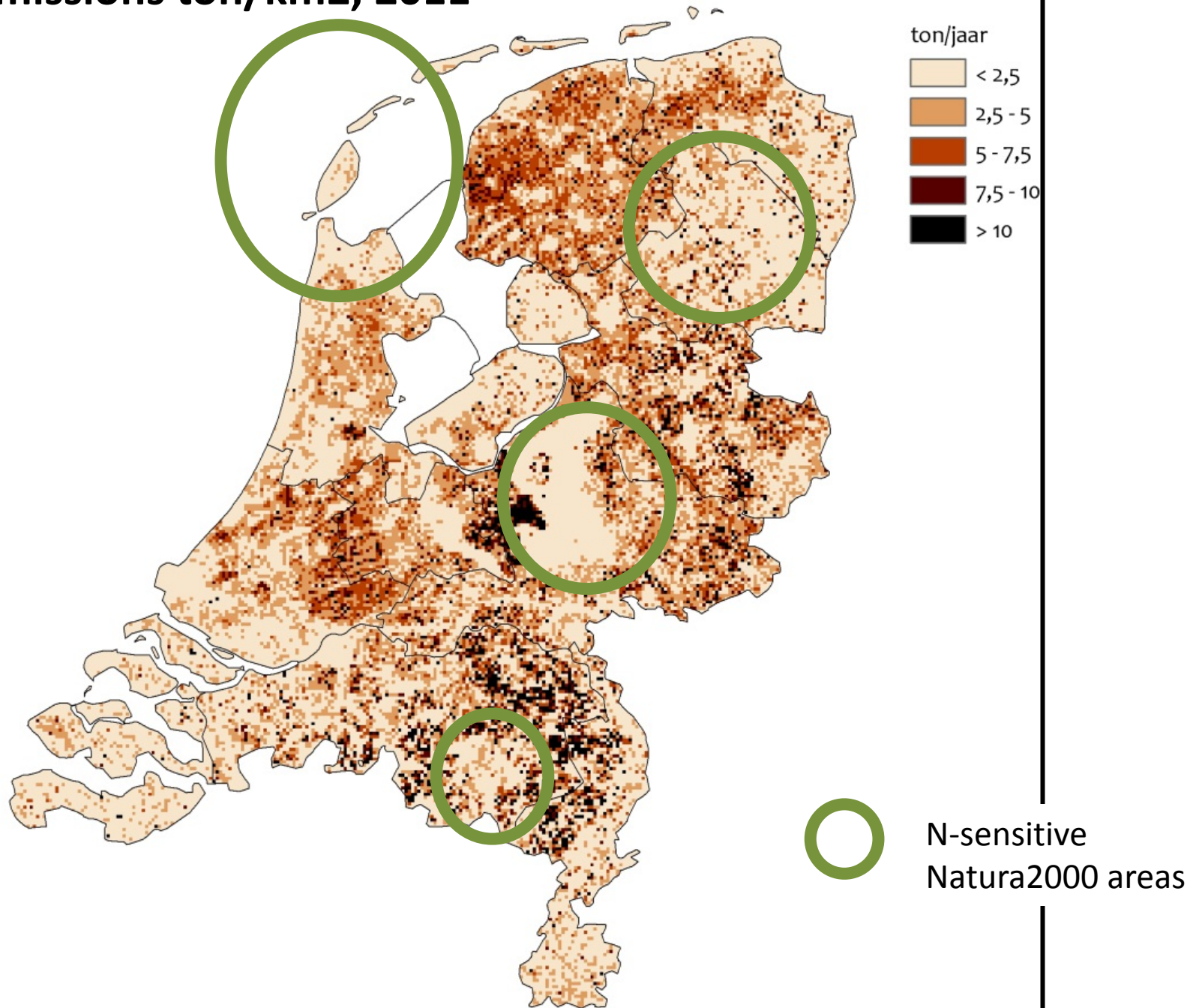
30.000/farm

	bedrijven met ... leghennen (18 w kn en ouder) 2)							totaal		
	25	1000	3000	5000	10000	25000	50000	100000	be- drij- ven	leg- hennen (x1000)
	tot 1000	tot 3000	tot 5000	tot 10000	tot 25000	tot 50000	tot 100000	en meer		
2000	686	170	156	286	379	211	129	45	2062	32573
2001	618	150	149	279	386	200	123	43	1948	31838
2002	522	133	122	210	365	174	112	46	1684	28703
2003	414	69	57	140	253	133	98	46	1210	23947
2004	435	111	93	204	344	190	113	36	1526	27219
2005	406	90	90	199	333	227	123	45	1513	30513
2006	360	70	86	169	328	232	127	46	1418	30845
2007	328	67	62	174	319	243	132	44	1369	31427
2008	322	47	57	140	301	234	135	52	1288	32923
2009	330	42	54	127	279	238	151	56	1277	34557
2010	310	42	49	117	288	235	172	58	1271	35310

# NH<sub>3</sub>-emission projection

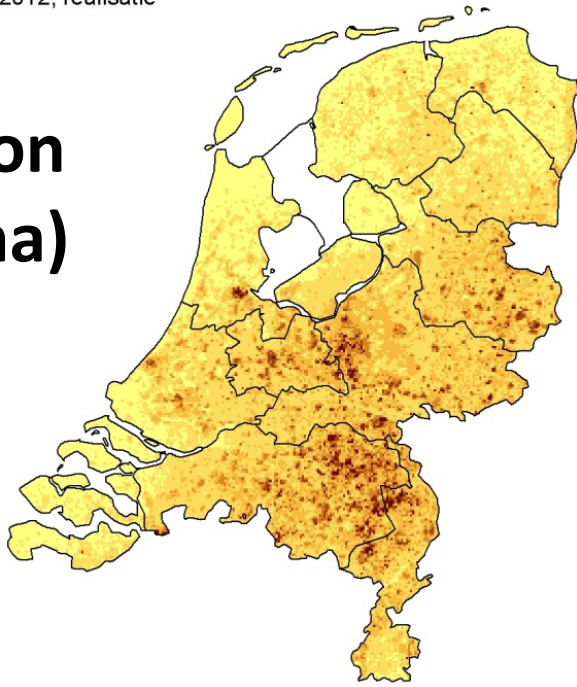
NFR Code		2013	2020	2025	2030
1	Road Transport	4,5	3,4	3,4	3,3
2	Industrial Processes	2,8	1,7	1,8	1,8
3B	Animal husbandry and manure management	54,6	53,4	52,6	51,8
3B1a	Cattle Dairy	17,4			
3B1b	Cattle Non-Dairy	9,1			
3B2	Sheep	0,1			
3B3	Swine	14,6			
3B4f	Goats	0,4			
3B4g	Horses	0,5			
3B4j	Poultry	10,7			
3B4n	Other	1,7			
3D	Plant production and agricultural soils	59,2	54,4	55,3	56,3
5	Waste	0,2	0,28	0,28	0,28
6	Other	12,6	12,4	12,4	12,4
	<b>National Total</b>	<b>134</b>	<b>126</b>	<b>126</b>	<b>126</b>

# NH3 emissions ton/km2, 2011

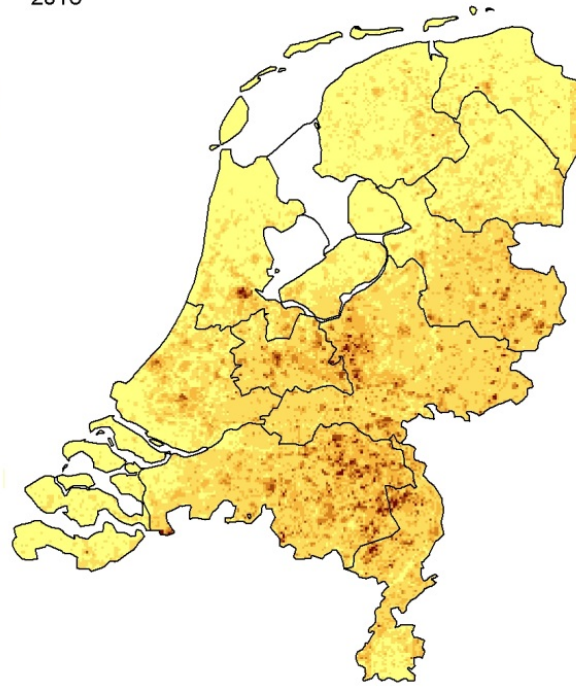


# Deposition (mol N/ha)

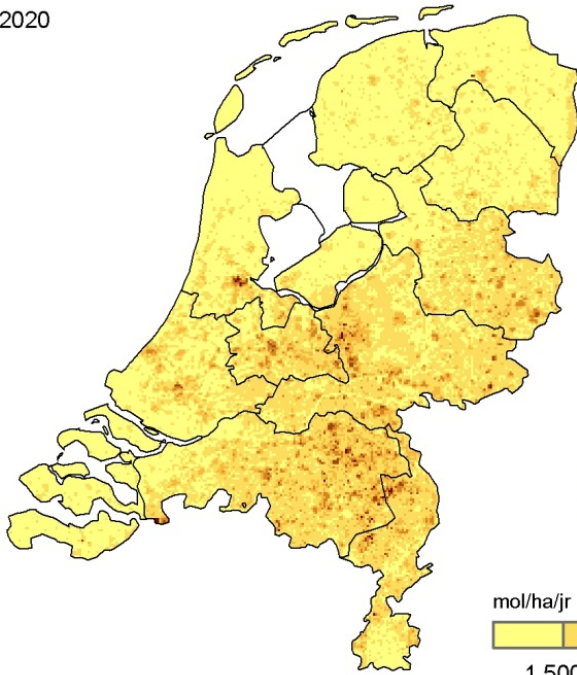
2012, realisatie



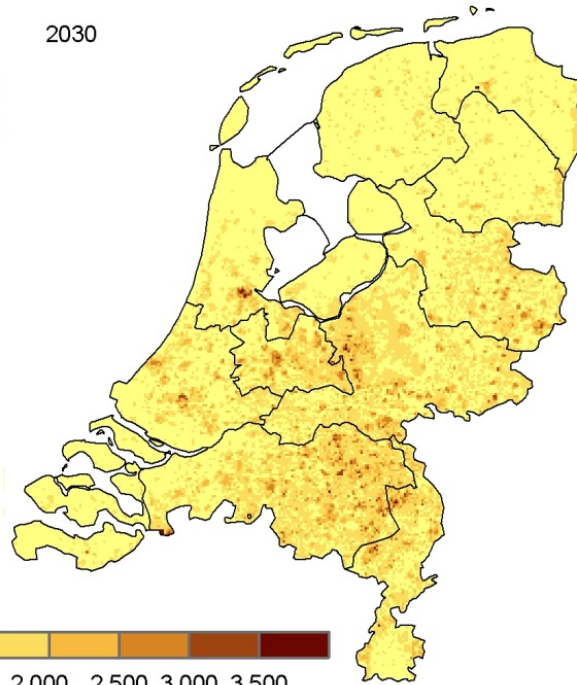
2015



2020



2030

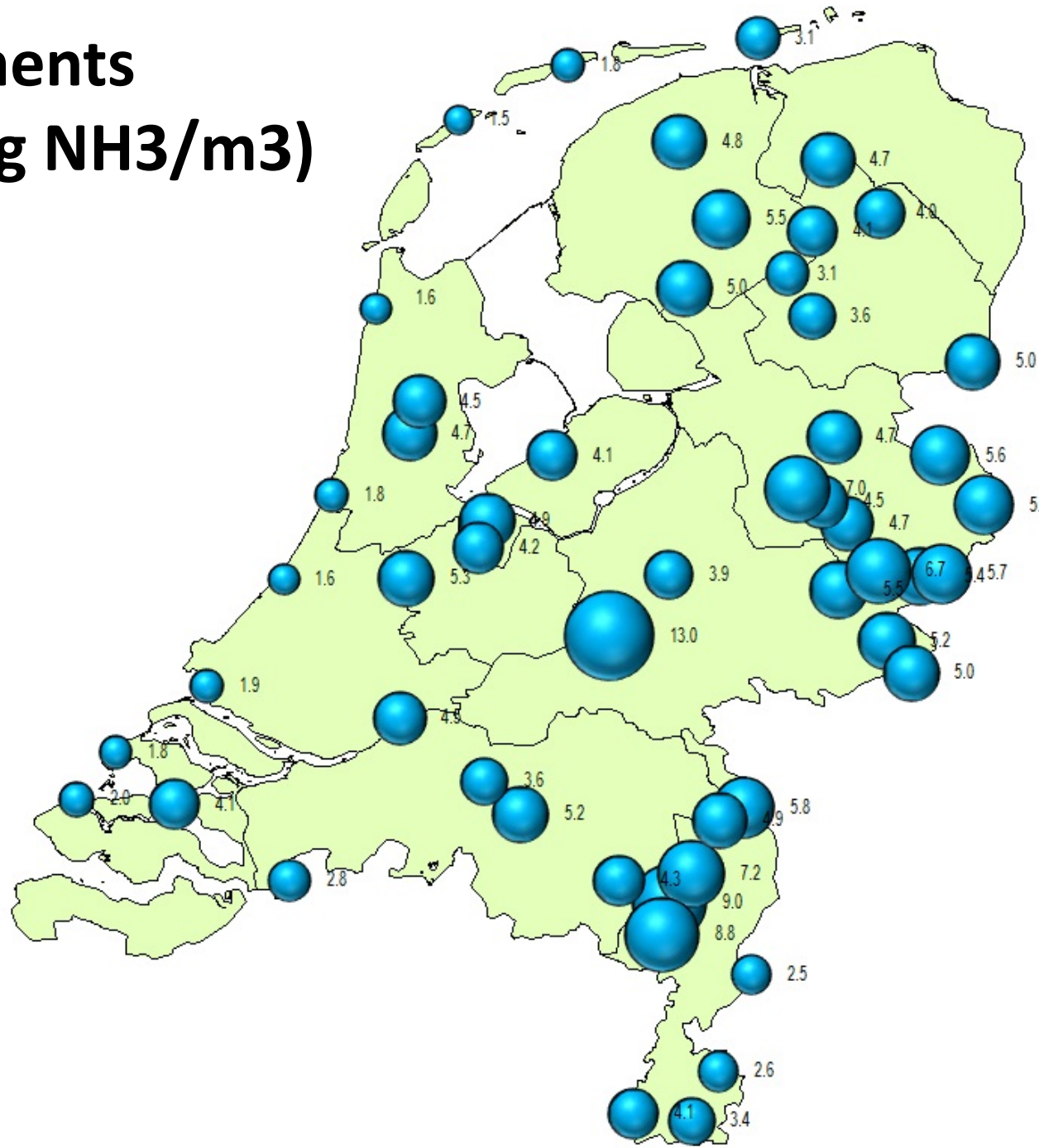


mol/ha/jr



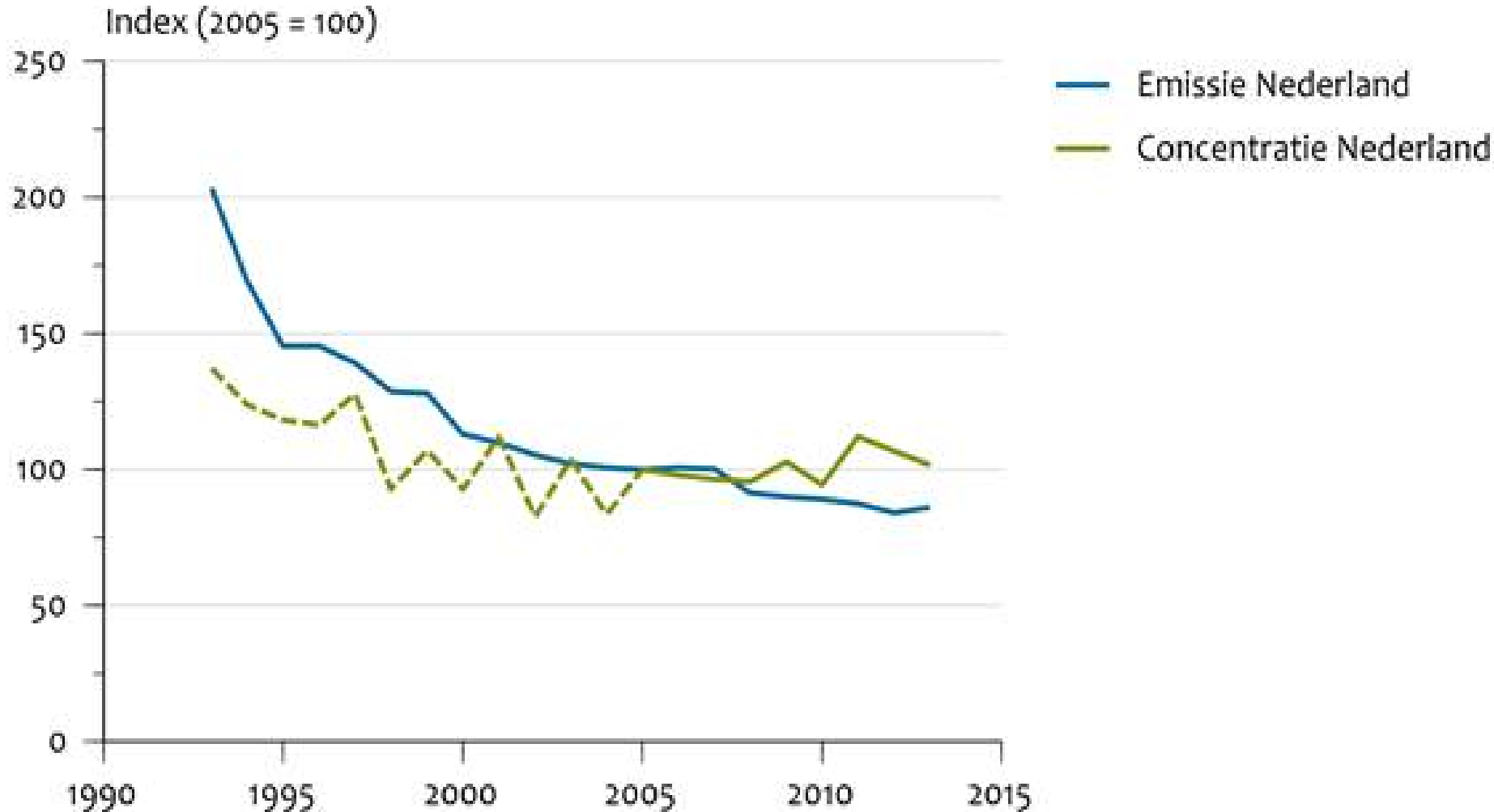
1 500 2 000 2 500 3 000 3 500

# NH<sub>3</sub>-measurements nature areas (ug NH<sub>3</sub>/m<sup>3</sup>)



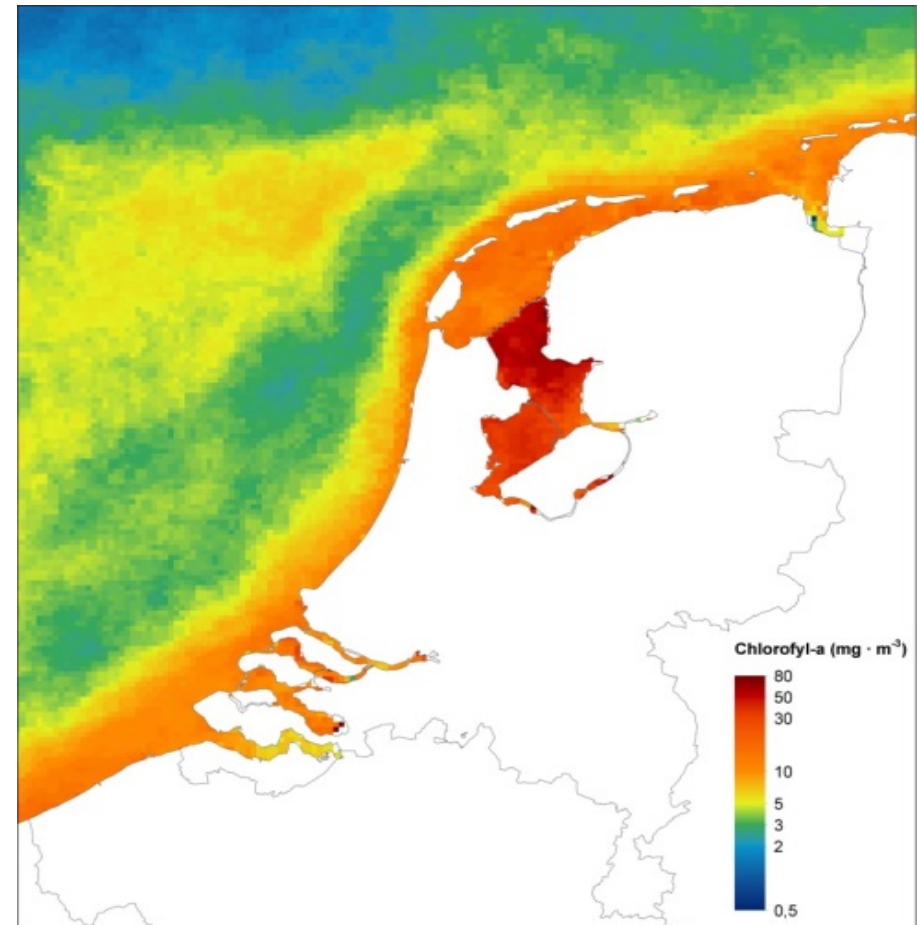
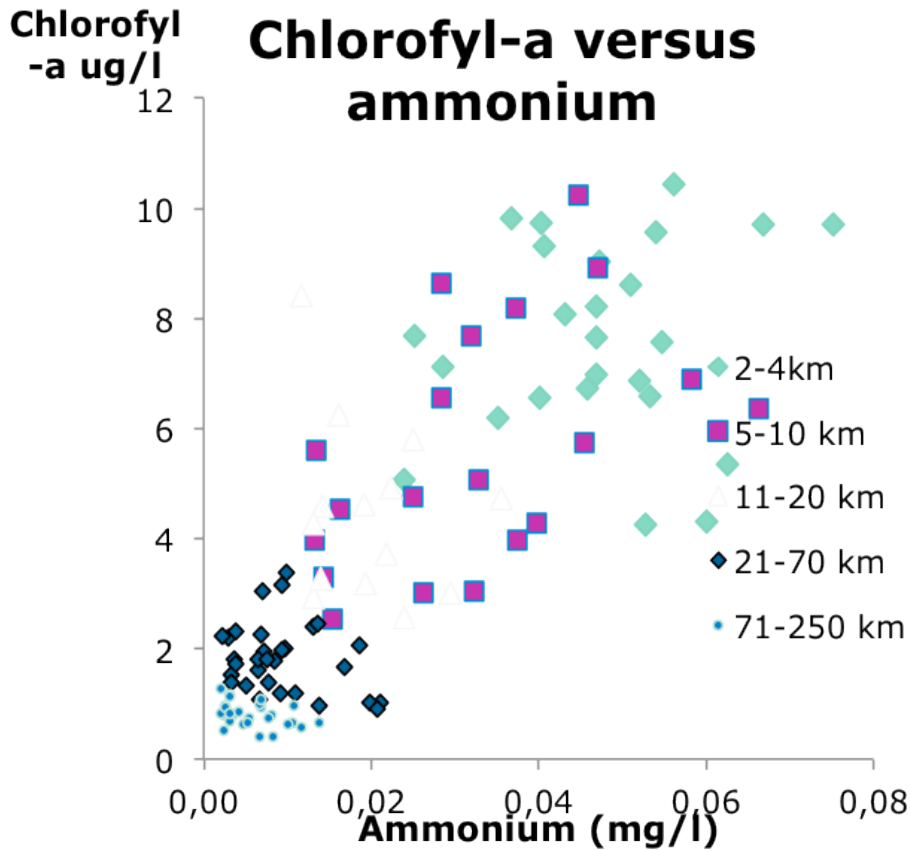
# Uncertainties (1)

## Different trends in NH<sub>3</sub>-emissions and NH<sub>3</sub>-concentrations



# Uncertainties (2)

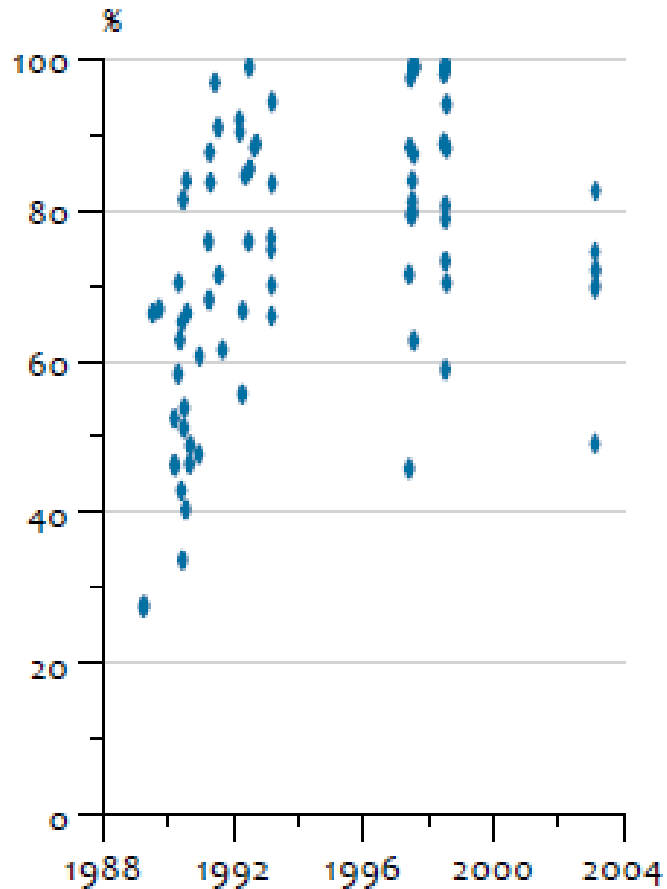
“Natural” emissions of NO<sub>x</sub>, N<sub>2</sub>O, NH<sub>3</sub>



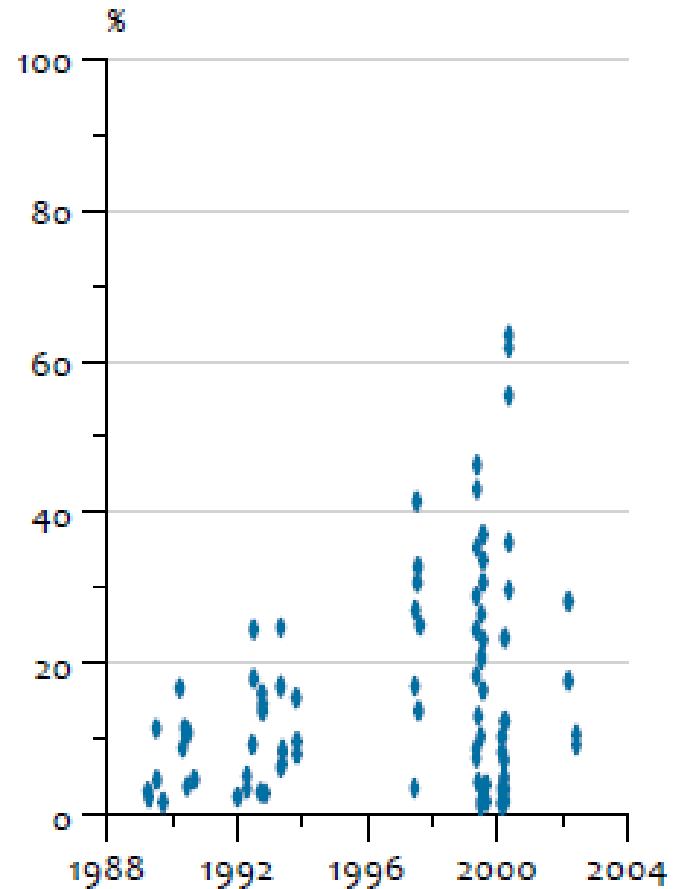
# Uncertainties (3)

## Spreading of manure – debate

Spreading with/without water



Injection



# Uncertainties (4)

## Abolishment Milk Quota

More cows → expansion limited by Nitrate directive, Natura 2000 policy and NEC

1. More export of (dry) manure from poultry to ....?
2. Around Natura 2000 areas: less (pig) farms or local use of gas scrubbers to compensate for emissions from cows
3. Additional national NH<sub>3</sub>-measures: gas scrubbers, more export of manure, ...