Miljøministeriet
Miljøstyrelsen

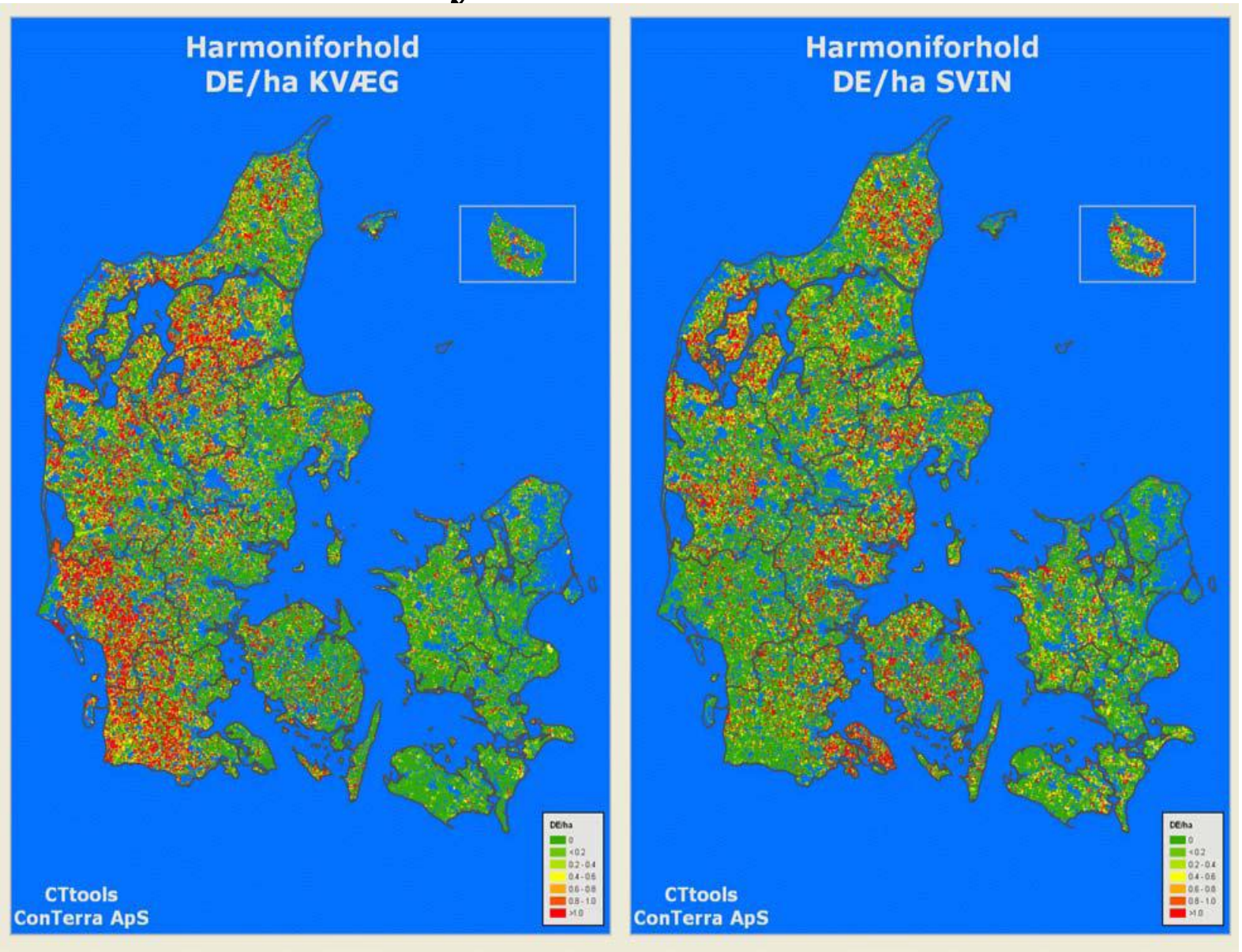
Ammonia abatement in Denmark April 2013

Chief Advisor Christian Lange Fogh

Danish Agriculture

National territory	4.3 mill. hectares
Agricultural area	2.6 mill hectares (6 pct. permanent grass)
Number of agricultural holdings	55.000 holdings
Number of livestock holdings	30.000 holdings
Annual production of pigs for slaughter	23 mill. pigs for slaughter
Annual milk production (2010)	4.7 bn. kg milk (from app. 450.000 cows)

Livestock density



Focus for the media and politicians

Before 2001-2003

- Nitrate pollution of the ground water (health)
- Fish killing in response to periods of oxygen deficit in fjords and coastal waters

Now - also

- a growing a concern for biodiversity and vulnerable nature
  - More focus on ammonia emission
  - More focus on phosphorous
- local 'response' to increase in livestock production.
  - Focus on odour from pigs and slurry

Overview, Action Plans

1985 NPo Action Plan

1987 Action Plan I on the Aquatic Environment (objective 49 % reduction of nitrate leaching)

1991 Action Plan for Sustainable Agriculture

1998 Action Plan II

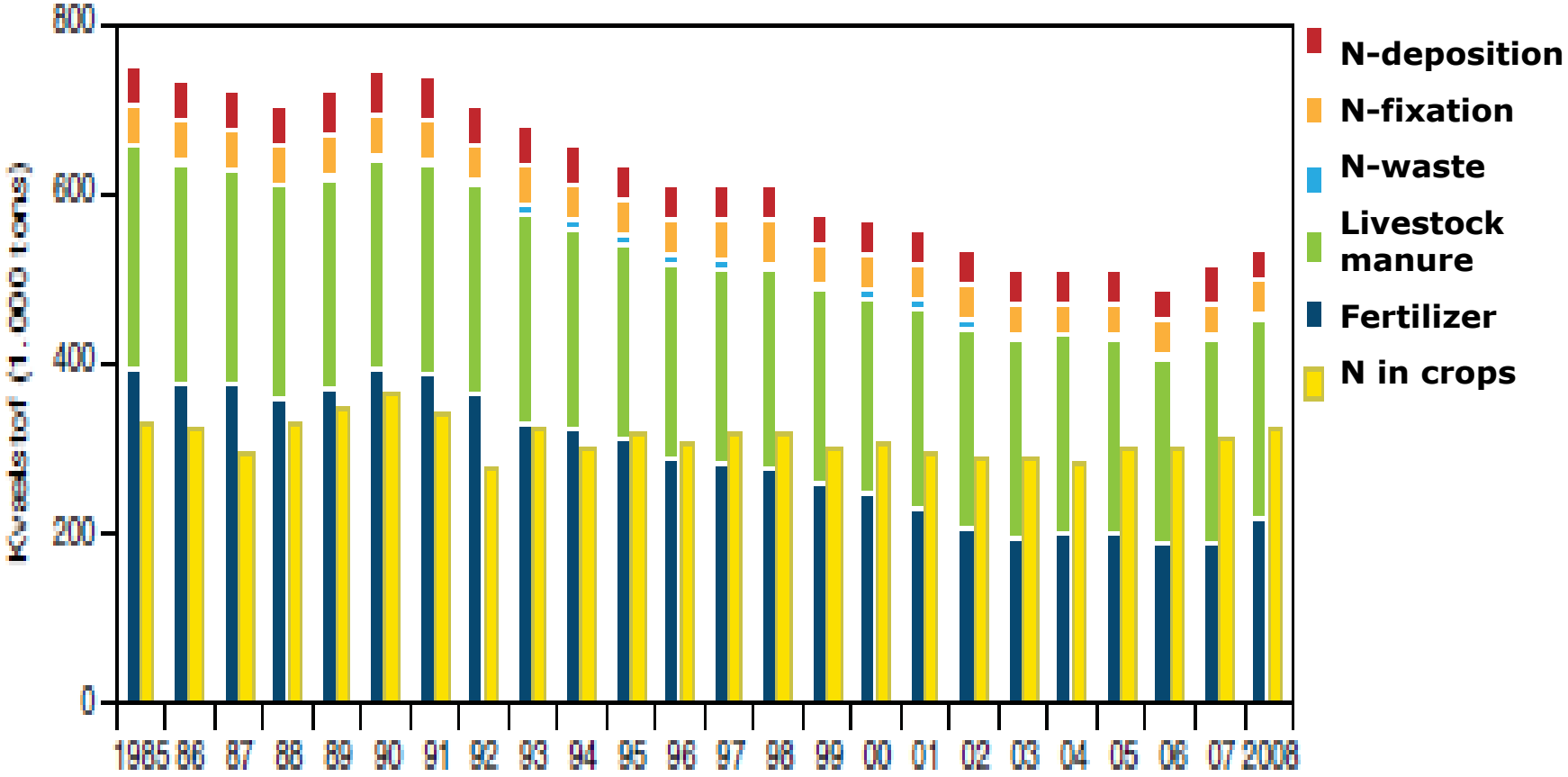
2000 AP II Midterm evaluation

2001 Ammonia Action Plan (as set out in Action Plan II)

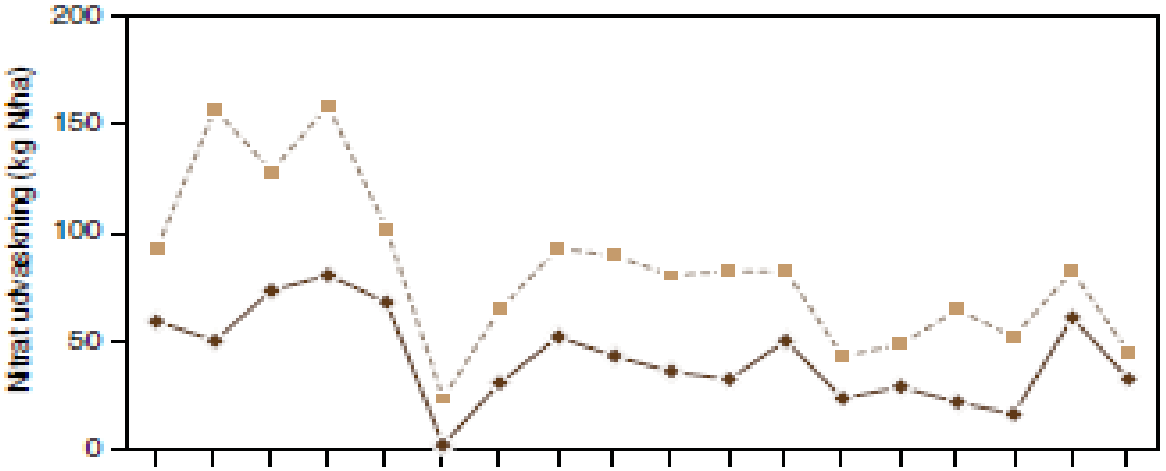
2004 Action Plan III

2009 Green Growth

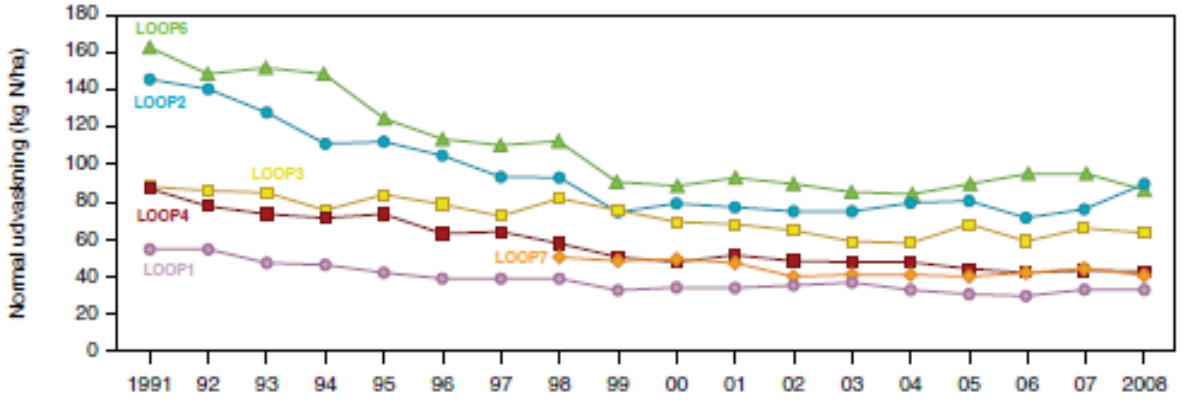
Nitrogen in agriculture



Nitrogen leaching from agriculture



Nitrogenleaching (average for Denmark)



Nitrogenleaching in each cacthment

Utilization of slurry (1991) compared to chemical fertilizers

	Sep/okt	Nov/dec	April/mai	June
Winterwheat	20 %	30 %	75 %	50 %
Springbarley	20 %	30 %	70-90 %	30 %

Regulatory measures encompassed <u>all</u> livestock production. Control and inspection by local authorities every 3. Year by <u>Local authorities.</u>

Demands to animal housing (Floors ect.)

Storage capacity

- 7-9 month

Cover on storage container, compost and manure yards

Regulatory measures due to spreading livestock manure with the purpurse to reduce ammoniaemission and nitrateleaching

•Periods of spreading (Not allowed to use livestock manure from harvest (august) to 1. february. Thou allowed in the autumn on grass and winterrapeseed)

•only band spreading and injection of slurry is allowed (no overall spreading)

•It is mandatory to inject slurry used in grass and on “bare soil”

•Solid manure shall be incorporated into the soil within 6 hours when spreading on bare soil

Regulatory measures on use of fertilizers and winter plant cover. Control and inspection by state authorities

- Mandatory fertilizer plans
- Mandatory demands for late crops (grass, beets, catch crops)
- Standards on utilization of animal manure N (70-75 % slurry)
- Maximum limits for plant-available N applied to different crops (nitrogen standards which are 10% below economic optimum)
- Max. 140 kg N/ha from animal manure (170 kg N/ha from cattle holdings)

Voluntary measures

- 16.000 hectare wetlands
- 170.000 hectare organic farmning mostly dairyfarms

New local actionsplans for the aquatic environment

- 10 meter bufferzones along streams and lakes
- Additionally 140.000 ha late crops
- More wetlands
- Restrictions in soilmanagement in the autumn

Environmental achievements

Nitrate :

- 1985-2003 : Nitrate leaching reduced with 48 % (Chemical fertilizer (N) 49 %)
- Green Growth (2009) : add. 19.000 tons reduction (2015) (WFD) (30 %)

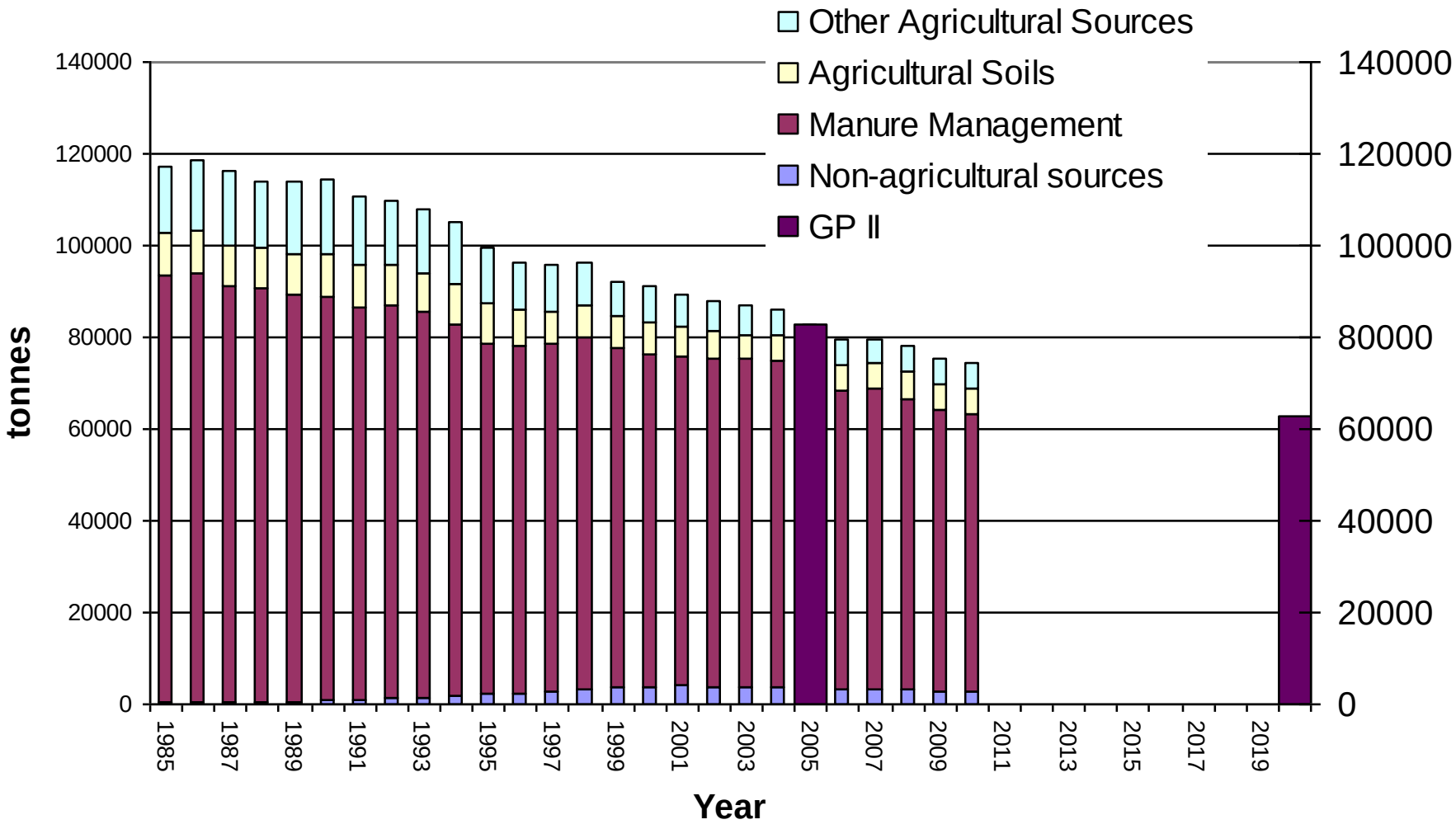
Phophorous :

- 1985-2003 : Surplus reduced with app. 50 % (25 kg P/ha => 13 kg P/ha)
- 2004 (AAE III) : Surplus reduced with 50 % (2015) => 7 kg P/ha

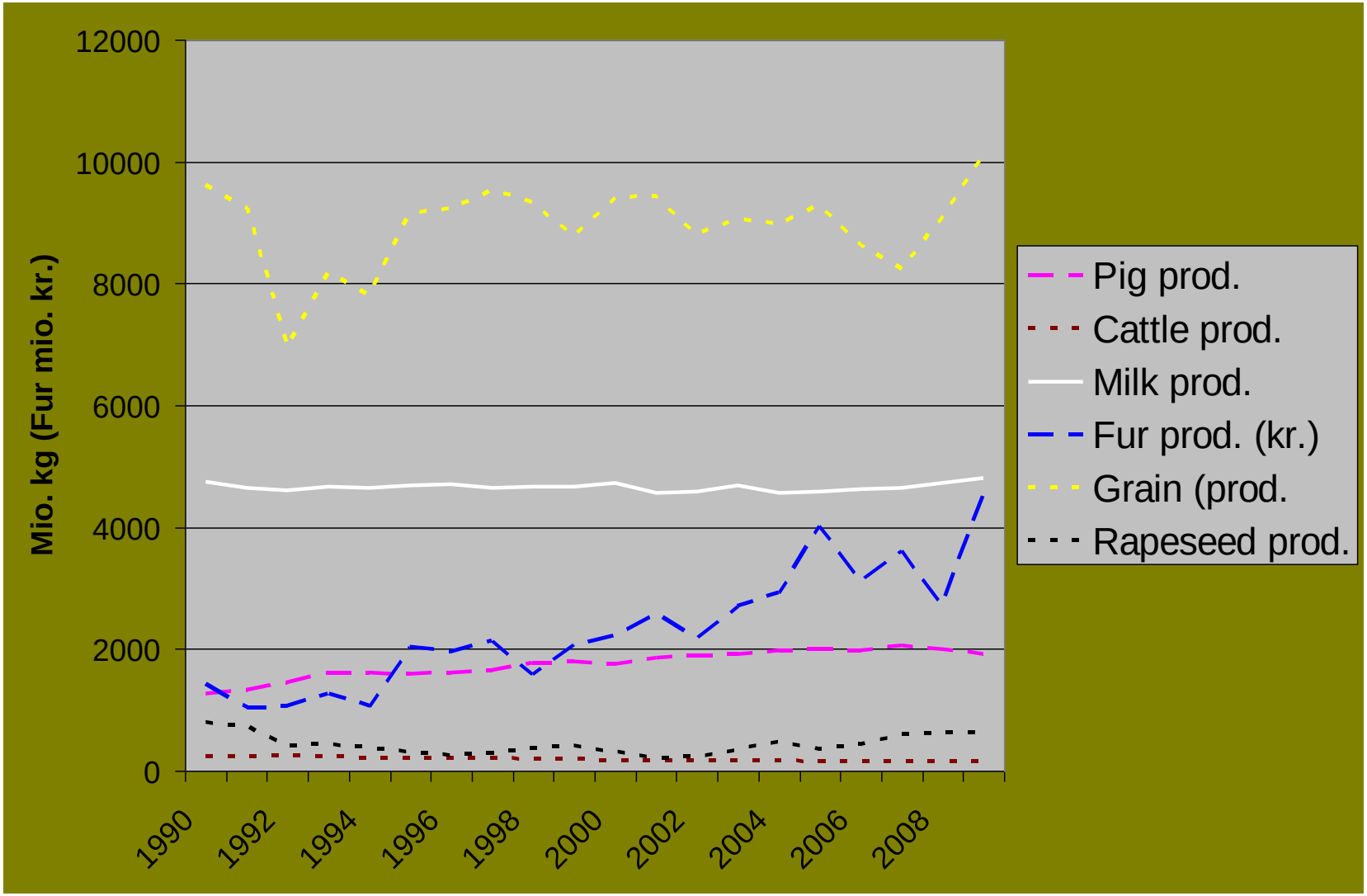
Ammonia :

- 1990-2010 : Reduced with app. 35 % .
- Green Growth (2009) : New standards (30 % reduction compared to best practice 200572006) and demands for max. deposition on nature (vulnerable nature compassed by Habitat Directive (0,2-0,7 kg N per hectare)

Annual ammonia emissions



Agriculture production



Whats on its way for animal manure ?

Biogas :

•6 % of the slurry is today treated in biogasplants

•Utilization is increased from 75 to 85 %, energi is produced and the methanemission is reduced.

Slurryseparation :

•10 % of the slurry is separated and dry matter is exported to other farms.

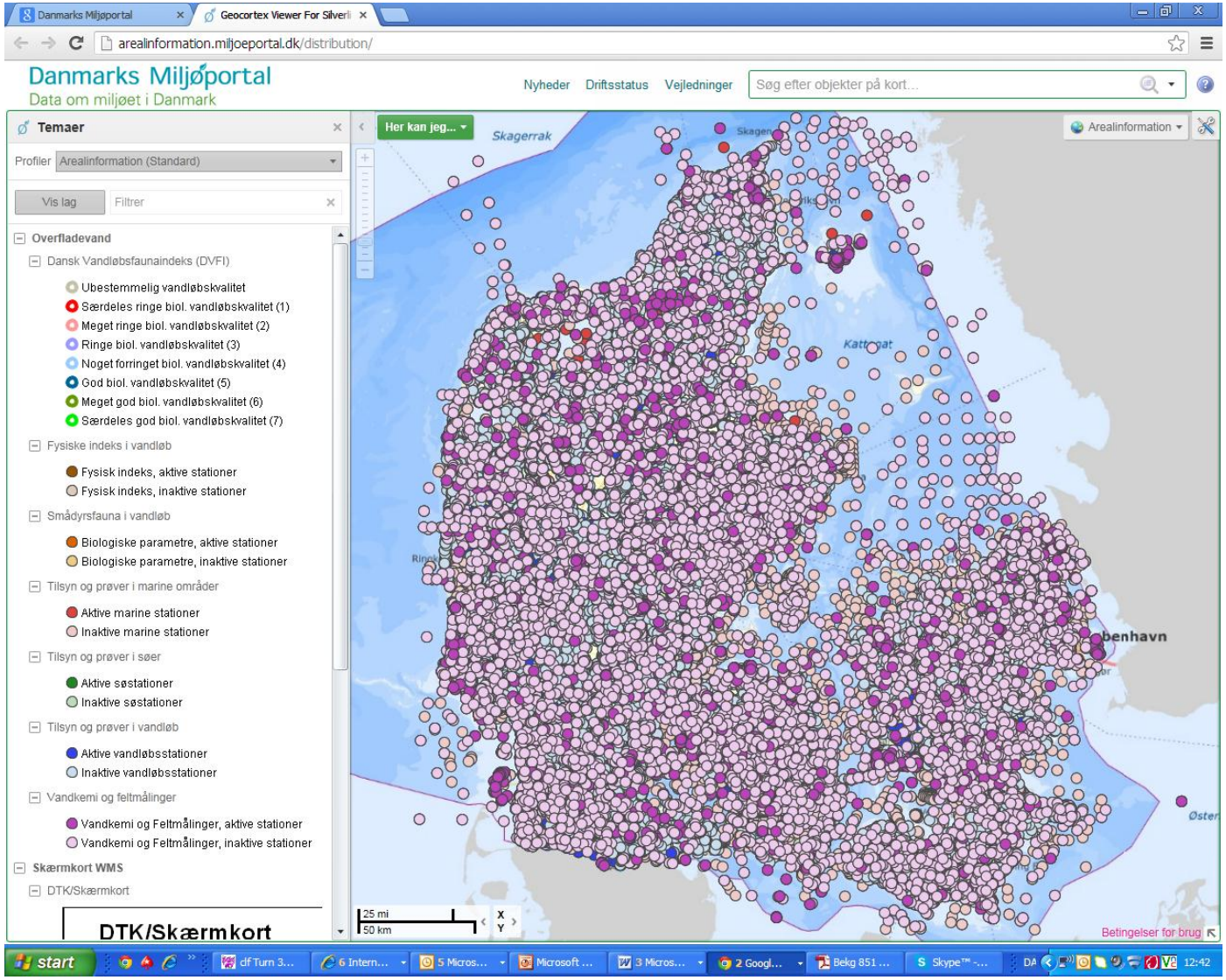
•Drymatter compressed to pills and exported (high dry matter and P)

•Dry matter could be used for burning (energyproduction)

Acidifikation :

•Reduced ammoniaemission and improved utilization of nitrogen

Surveillance of surface water quality



Surveillance of Lakes