Emissions as a challenge for dairy farming

Air filtering as technique

EAAP congress Lyon, August 2023

Climate Care Cattle farming

WAGENINGEN
UNIVERSITY & RESEARCH

Abele Kuipers, Paul Galama

Trend in environmental focus field in Netherlands

Production

1945----------1985

Animal welfare

1970----------

Nitrate leaching

1980----------

N-emissions 1995--------

GHG emissions 2015-------

-

Biodiversity 2015--------

Since 2019: N-Emission Crises

- Natura 2000 areas: in total 162 nature areas, as reported in 2000 to EU.

- Goal: Protect nature, reduce N-precipitation on those areas

- Environmental Institute:

  42-45% N from animal manure

  12% from traffic

  9% from industry

  32% from outside country; 3% from sea

Ammonia precipitates close to source (within 25 km?); NOx not

2019: Environmental action group won procedure about protection of nature at High Juridical Court

- Resulted in:

Maximum N-deposition of 0.7 gr/ha/yr limit for economic activity;

in Germany is this factor 100 gr/ha/yr; Denmark 200-700gr/ha/yr

- All activities delivering N stopped – concerned 18000 construction projects

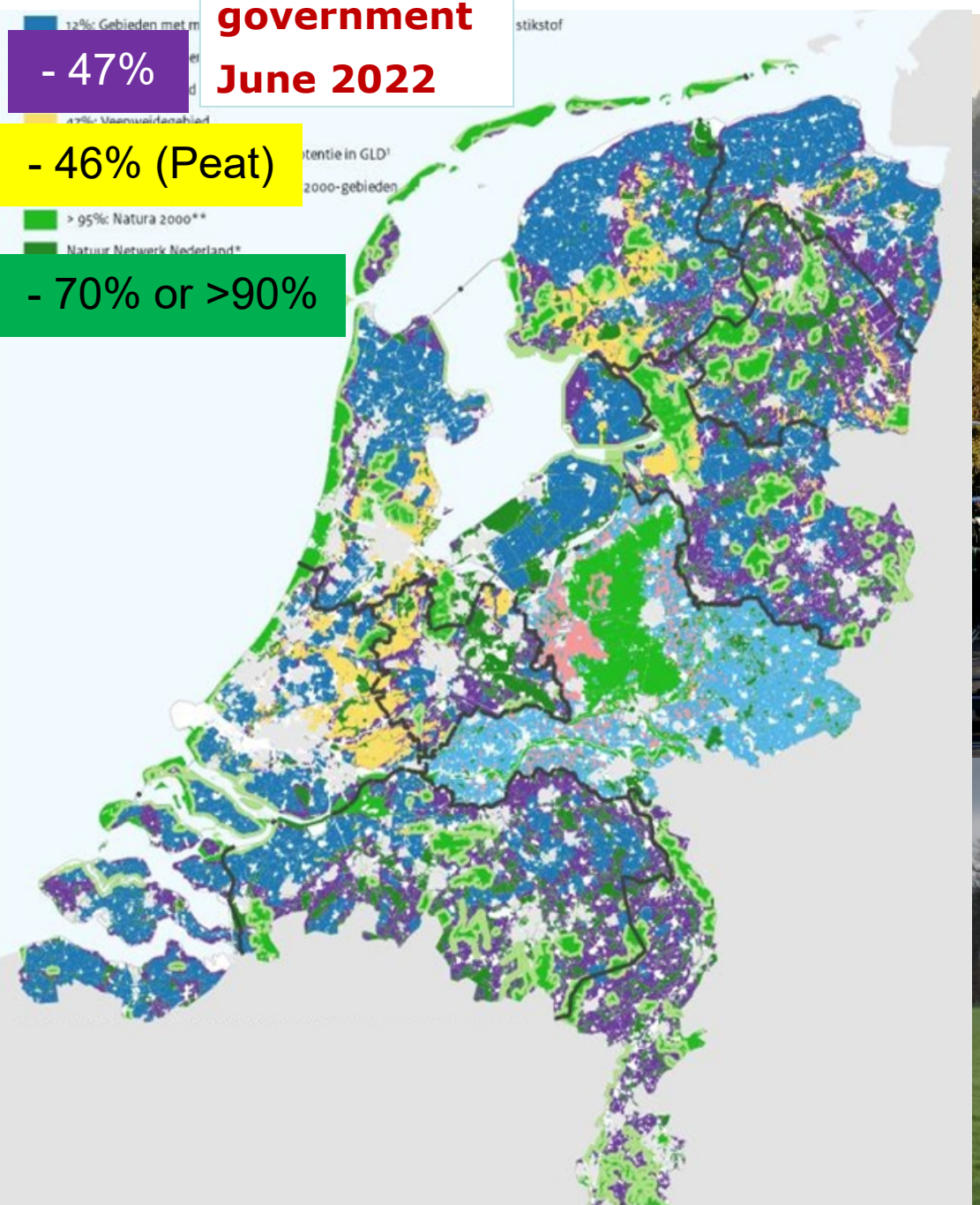
N-Chart government

June 2022

- 47%

- 46% (Peat)

- 70% or >90%



resulted in large scale protests

Political party

Farmer - Citizen

Choice: keep less animals or innovate

Presently by out program
for “peek polluting” farms
(3000 farms)
close to Nature 2000 areas

- emission limit is set

- using Aerius model for
  GHG emission calculation

- to be done by farmer himself

Our goal

filtering of ammonia and methane in same flow

Less known techniques in dairy sector

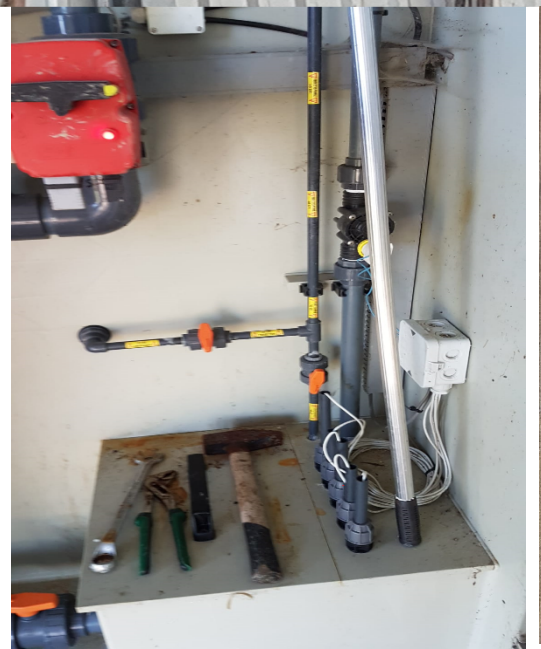
Target: realize big reduction in emissions

Principle: do not adapt cow to the environment, as with genetics and methane blockers in feed

Instead: adapt environment to the cows

Ammonia – mainly from manure

Air filtering techniques: use of acid (like in pig and poultry housings)



Air sucked from below floor - manure cellar

> 70% ammonia reduction

Focus on methane

from manure 25-30%

main source rumination of cow (70-75%)

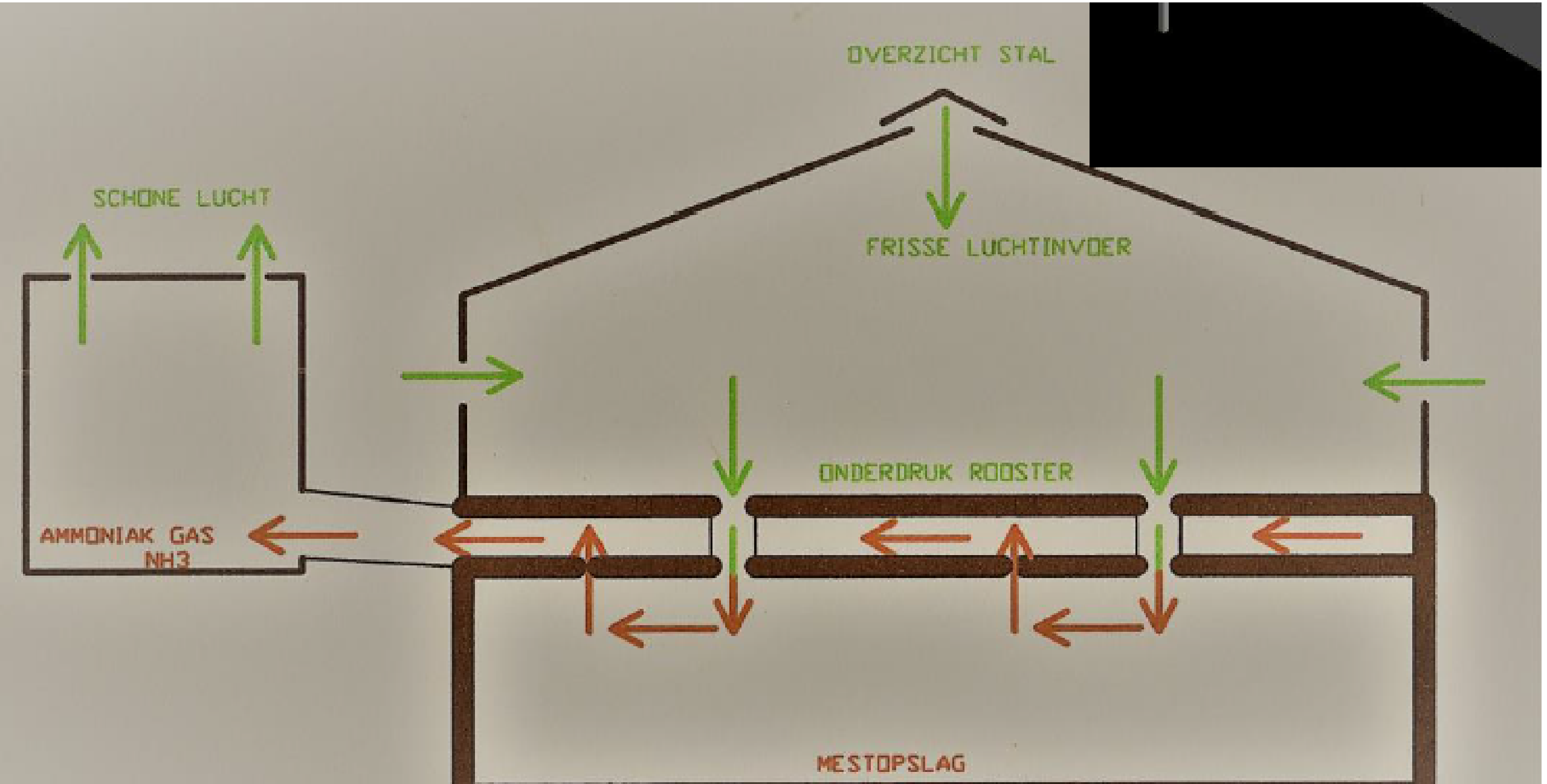
Methane level

- On 40 CCCfarming dairy farms we measured from 20 to 80 ppm (mg/m3) methane

- To process methane, literature learns that > 500 ppm is required to be successful with filtering and oxidation

We study smart ventilation techniques to realize a higher concentration

Air circulation using negative pressure under the slatted floor



- From Cecile Levrault, WUR, the Netherlands

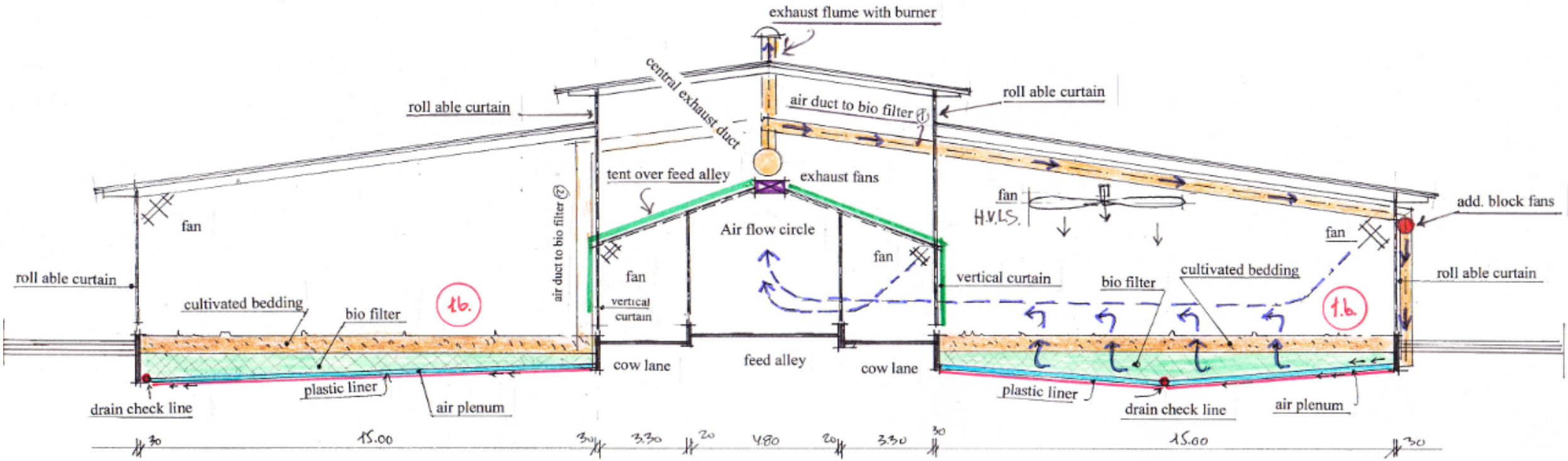
Denmark: onderzoek naar optimaliseren methaankap

Haalbaar

300 tot 500 ppm CH4

Methane cap in barn

J. Dairy Sci. 103:5759–5772 https://doi.org/10.3168/jds.2019-17214



negative air pressure tube

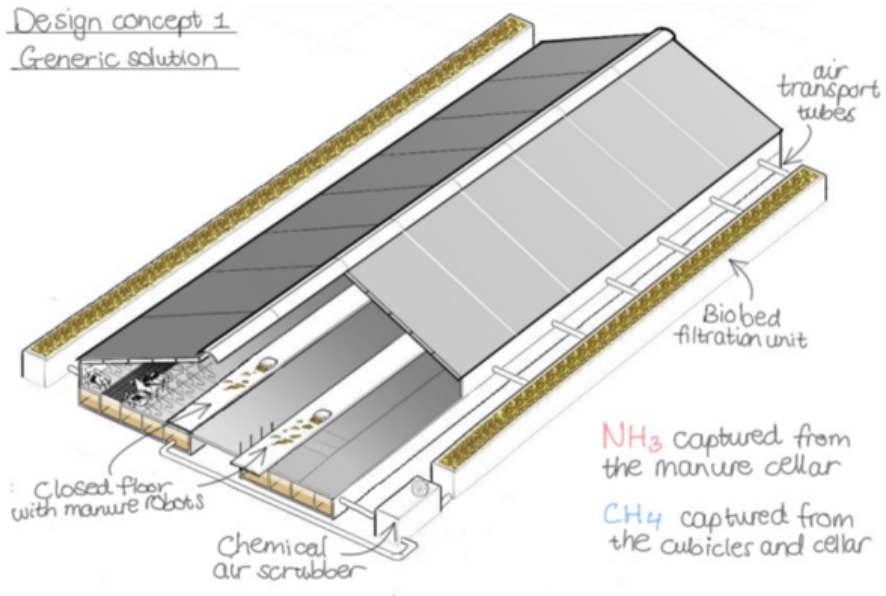
How to catch the methane

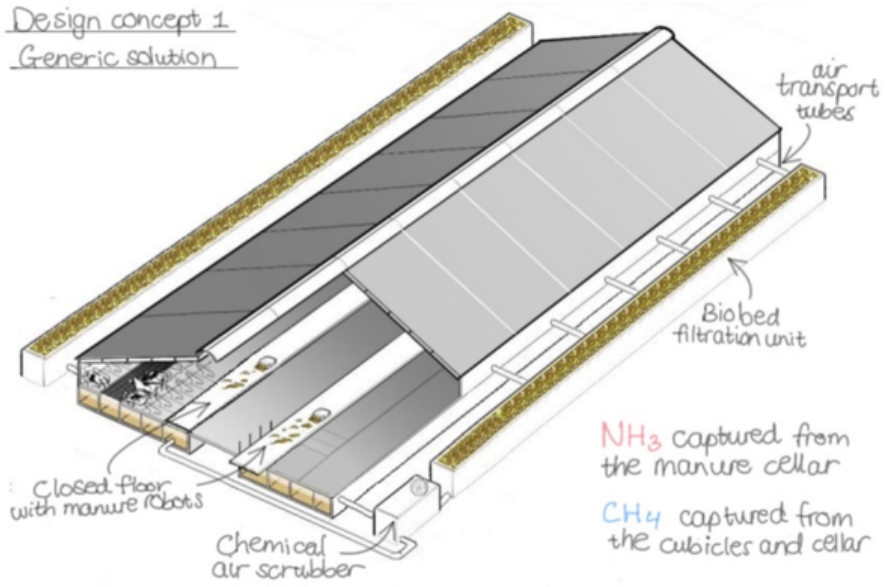
Oxidation (farm Van Roessel)

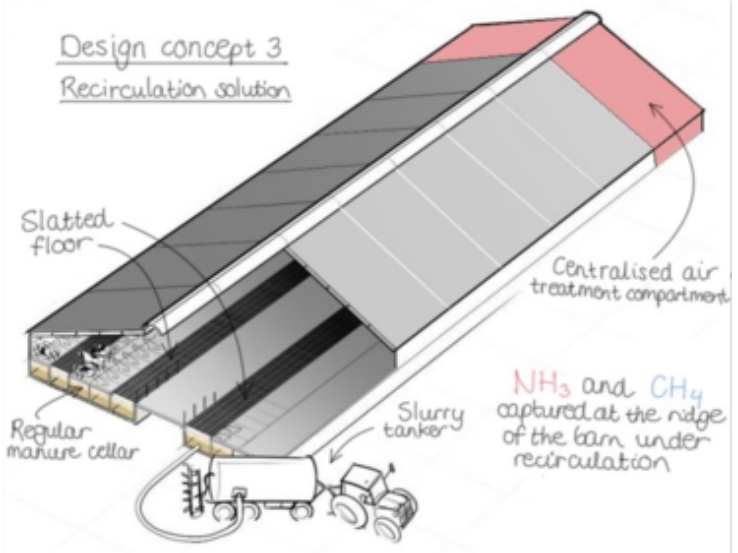
Biobed (research WUR)

Use of absorbens

Designs combining ventilation and filter techniques







Kees Wiering and Peter Groot Koerkamp
WUR

Conclusions

- **Reducing emissions priority in parts of Western Europe**
- **Ammonia reduction by filtering air very promising, but costly investment**
- **Methane reduction is a challenge to work on**
- **Juridical procedures and action groups to the forefront**
- **Certification of methods increasingly important**

- **Other options: acidification; cooling manure**