Recent CIAM activities

EMEP Steering Body
Geneva, September 13-16, 2016

Markus Amann
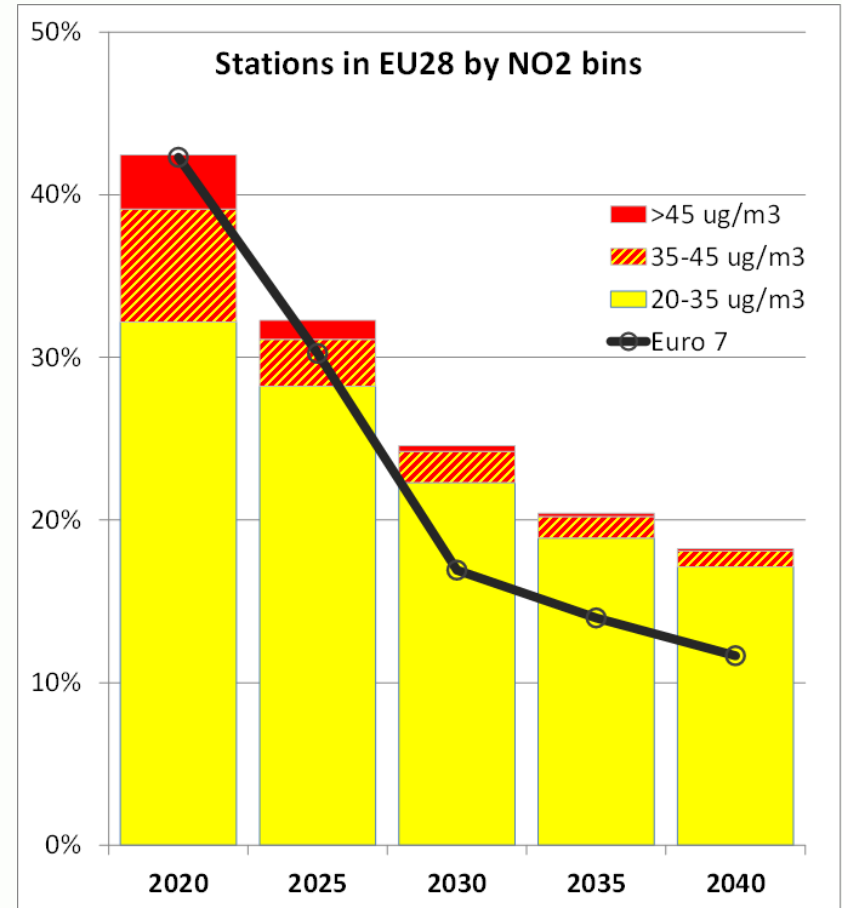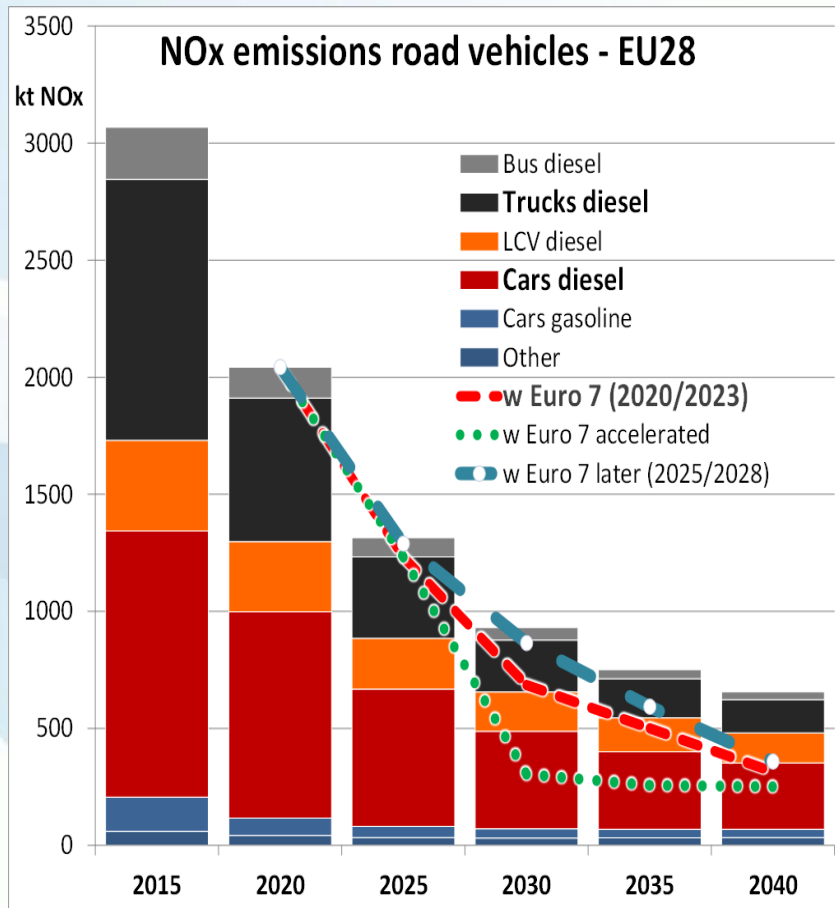EMEP Centre for Integrated Assessment Modelling

IIASA, International Institute for Applied Systems Analysis

Some CIAM activities

- Serbia, Montenegro, Kosovo, Bosnia-H. distinguished in GAINS, with data on inventories, legislation, projections, dispersion and impacts

- Bilateral consultations, catching up with living inventories
  - Some discrepancies remain, and new emerge
  - National projections seem strategic, ignoring new legislation
  - Major incoherence in PM inventories (condensables)

Modelling the consequences of enhanced road emission standards

NOx emissions road vehicles - EU28

kt NOx

Legend:
- Bus diesel
- **Trucks diesel**
- LCV diesel
- **Cars diesel**
- Cars gasoline
- Other
- w Euro 7 (2020/2023)
- w Euro 7 accelerated
- w Euro 7 later (2025/2028)

Stations in EU28 by NO2 bins

Legend:
- >45 ug/m3
- 35-45 ug/m3
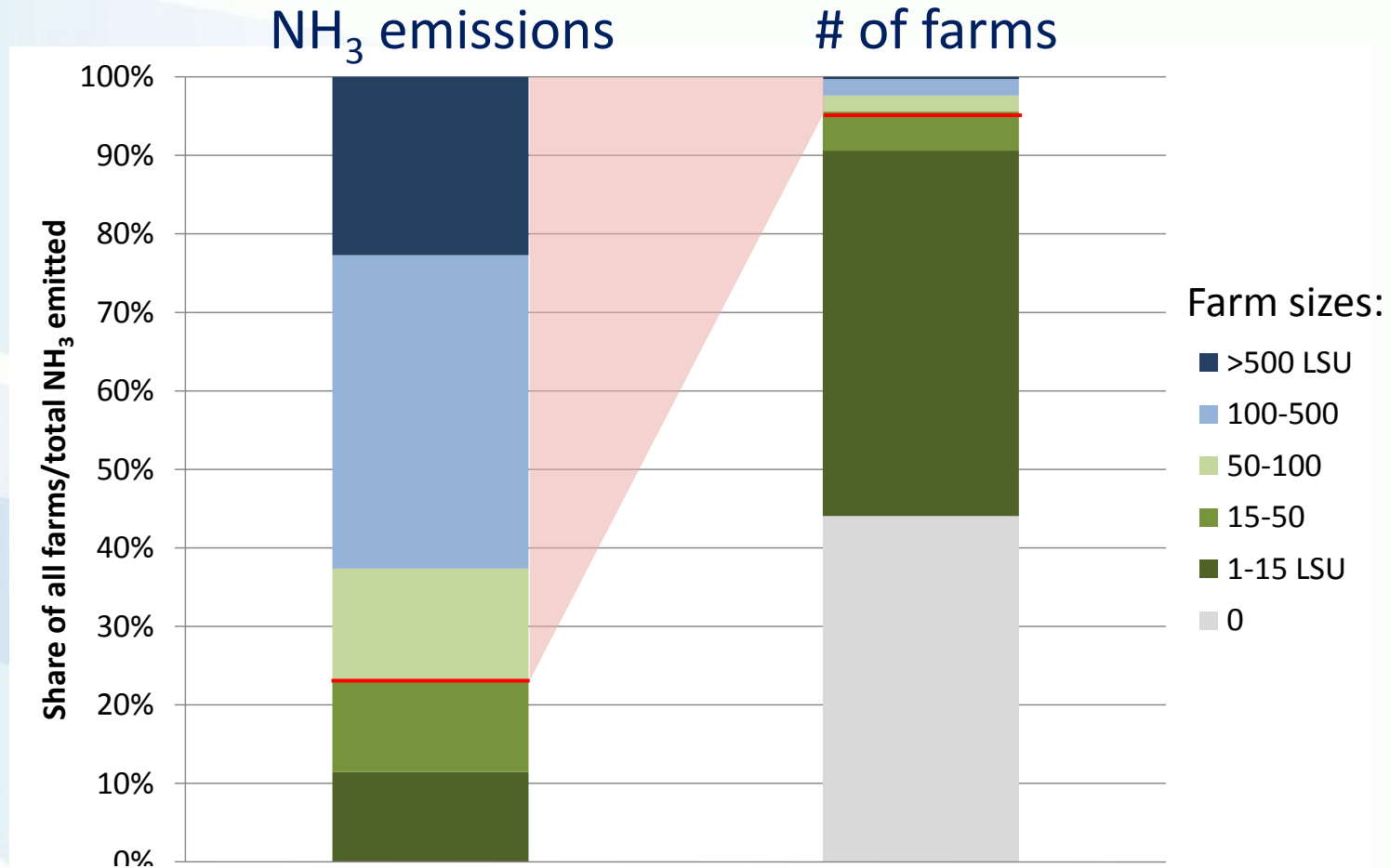- 20-35 ug/m3
- Euro 7

Hypothetical Euro 7/VII scenarios: emission standards ~1/3 of Euro 6/VI

New biodiversity indicators

- The **monetized biodiversity benefits** of an illustrative scenario that reduces excess N deposition by an additional 2% **are 1.5-10 times higher** than the costs, depending on the methodology for valuation of biodiversity.

- To **protect biodiversity** from air pollution threats, an effective strategy should reduce emissions
  - of NH_3 in Europe, to halt the loss of biodiversity,
  - and of CH_4 at the hemispheric scale, to reduce ozone damage.

80% of NH$_3$ emissions emerge from 5% of the farms in the EU

NH$_3$ emissions   # of farms

Farm sizes:
- ■ >500 LSU
- ■ 100-500
- ■ 50-100
- ■ 15-50
- ■ 1-15 LSU
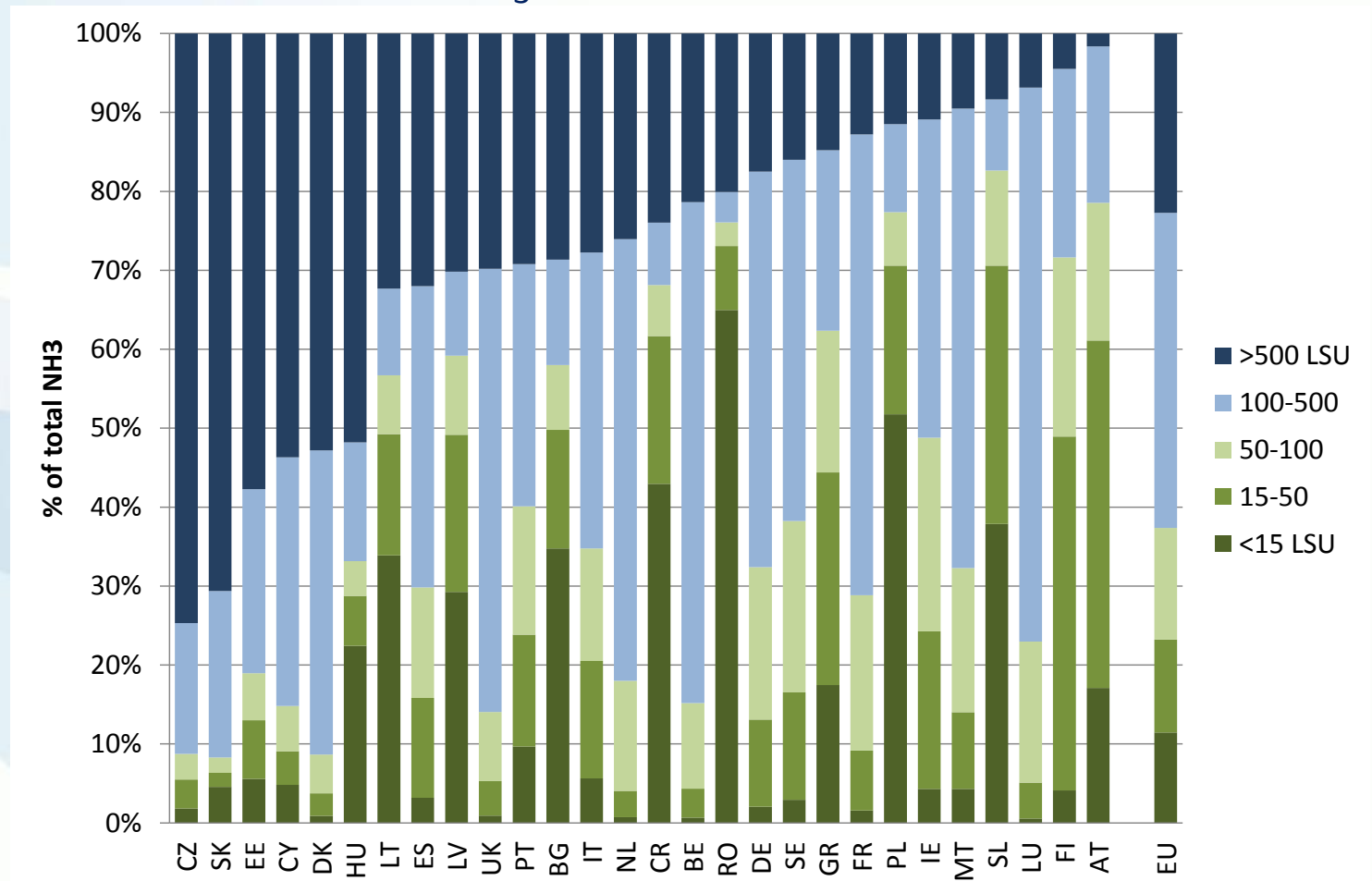- ■ 0

Share of all farms/total NH$_3$ emitted

Source: IIASA-GAINS

The NEC proposal suggests measures for 3% of the farms,
i.e., for large industrial animal holdings

There are large differences in the size structure of farms in the EU

NH$_3$ by farm size – 2005

Source: IIASA-GAINS, based on EUROSTAT

Current policies are insufficient to avoid steep increases in global nitrogen emissions
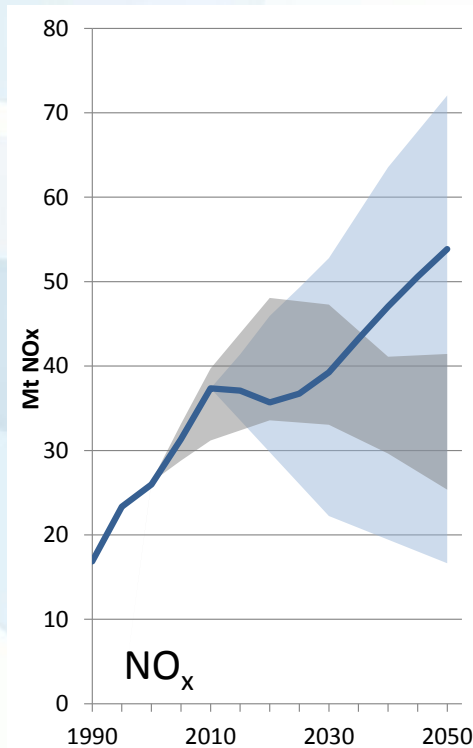
Regional and Global
Emissions of Air Pollutants:
Recent Trends and Future
Scenarios

Markus Amann, Zbigniew Klimont,
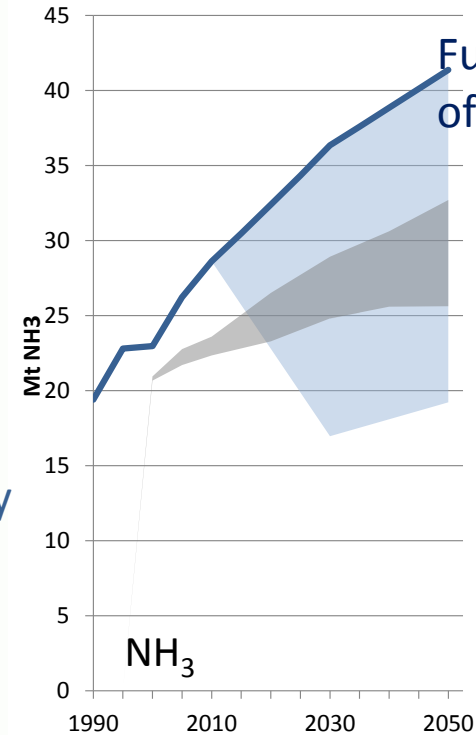and Fabian Wagner

Ann.Rev.Env.Res. 38(1)

Range of future NO$_x$ and NH$_3$ emissions in Asia: GAINS vs RCP scenarios

Emission controls frozen as of 2010

Maximum technically feasible reductions

Full implementation of current legislation

NO$_x$

NH$_3$

Range spanned by different RCP climate scenarios

Global health impact assessment (HIA) in GAINS
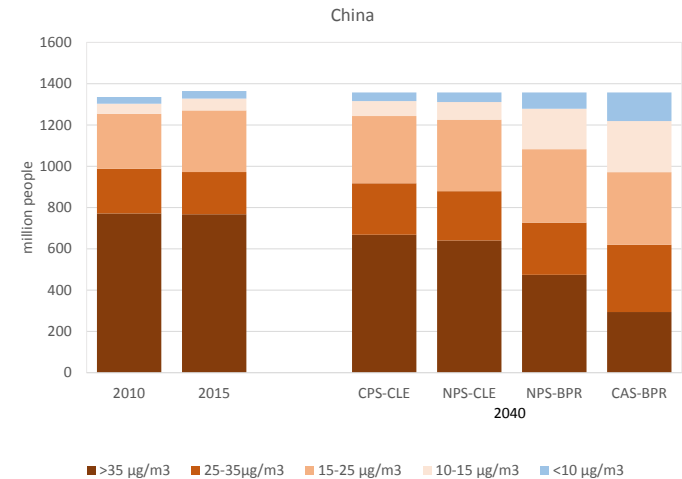
▸ The global HIA method of WHO and Global Burden of Disease projects have been implemented in GAINS

▸ Main differences to the HRAPIE/WHO-Euro method:

  ▸ Non-linear Exposure-Response (IER) functions

  ▸ Cause-specific (IHD, COPD, stroke, lung cancer, ALRI)

  ▸ Including natural background

▸ Inclusion of indoor pollution from household sources

▸ 'Population-attributable fraction' to scale pollution estimates with total deaths

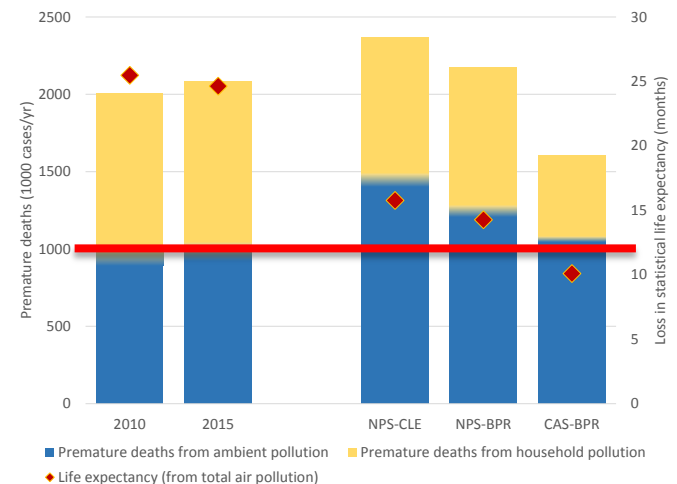# Health and climate benefits of new energy policies

- IEA 'Energy and Air Quality' report:
  - Current policies (CPS)
  - INDCs (NPS)
  - Best practices air pollution controls (BPR)
  - Clean Air Energy Policies (CAS)

- Key findings:
  - INDCs will have health co-benefits
  - Ageing (+population growth) will counteract health benefits of air pollution controls
  - A new energy policy can reduce health impacts, and cut CO_2 emissions by 20%

China
Exposure to WHO target levels

China — million people; categories: >35 µg/m3, 25-35µg/m3, 15-25 µg/m3, 10-15 µg/m3, <10 µg/m3; years 2010, 2015; 2040: CPS-CLE, NPS-CLE, NPS-BPR, CAS-BPR

Premature deaths

Premature deaths (1000 cases/yr); Loss in statistical life expectancy (months); 2010, 2015, NPS-CLE, NPS-BPR, CAS-BPR
- Premature deaths from ambient pollution
- Premature deaths from household pollution
- Life expectancy (from total air pollution)

Key points

▸ The further evolution of emission inventories reveals important new information, but should be validated

▸ In-equalities in emissions and air quality impacts are important for policy making,
current models catch such aspects only partially

▸ Need for further review of methodologies for health impact assessment

▸ Ageing of societies is an important factor
that might counteract benefits of emission reductions