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Reactive Nitrogen in IIASA's GAINS model

GAINS model:

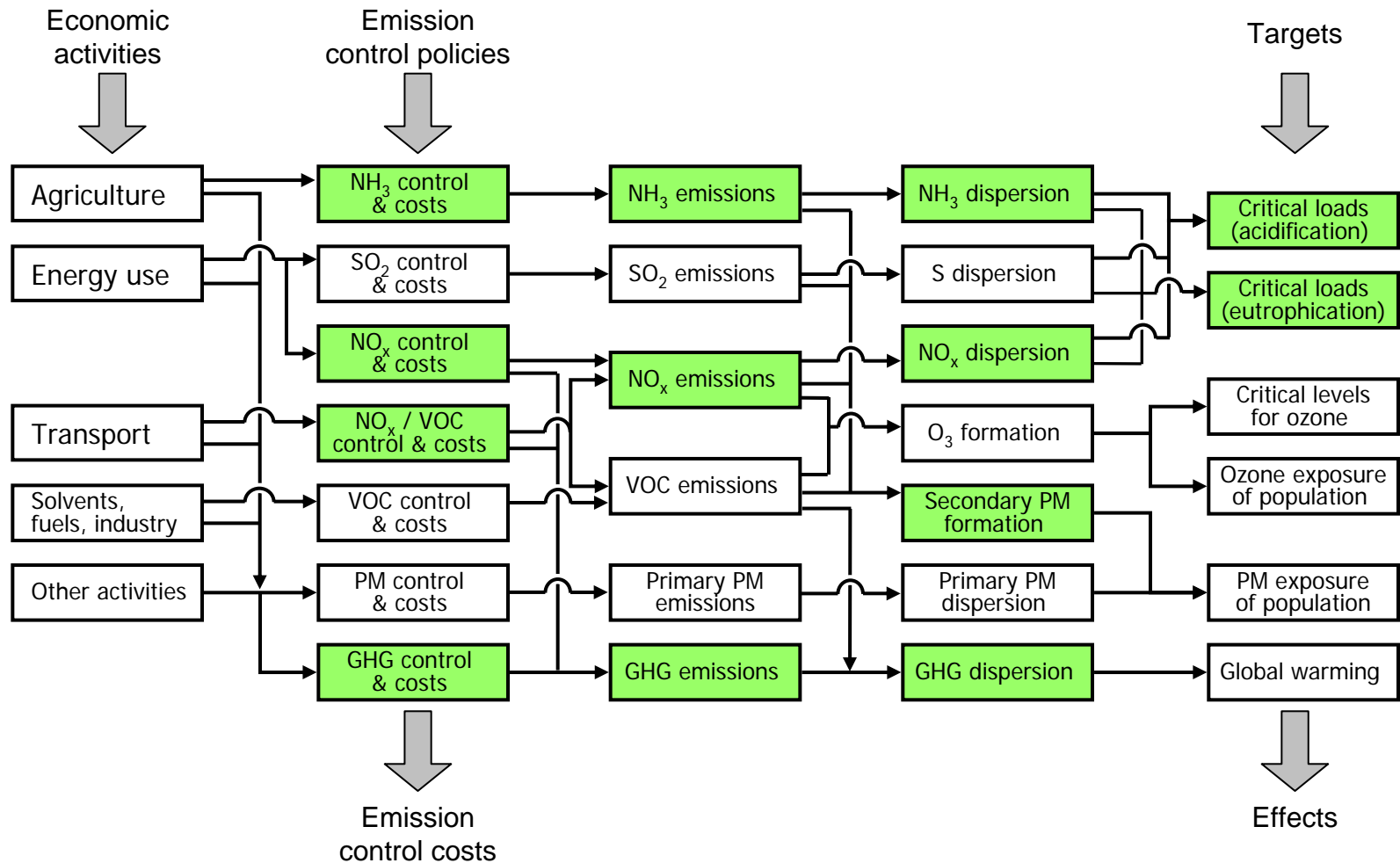
Interaction of air pollution and climate change



Web-based tool to handle

- Air pollution
- Climate change
- Underlying activities
- Abatement measures and their efficiencies
- Costs
- Effects
- Optimization towards environmental targets

GAINS model: overall model scheme

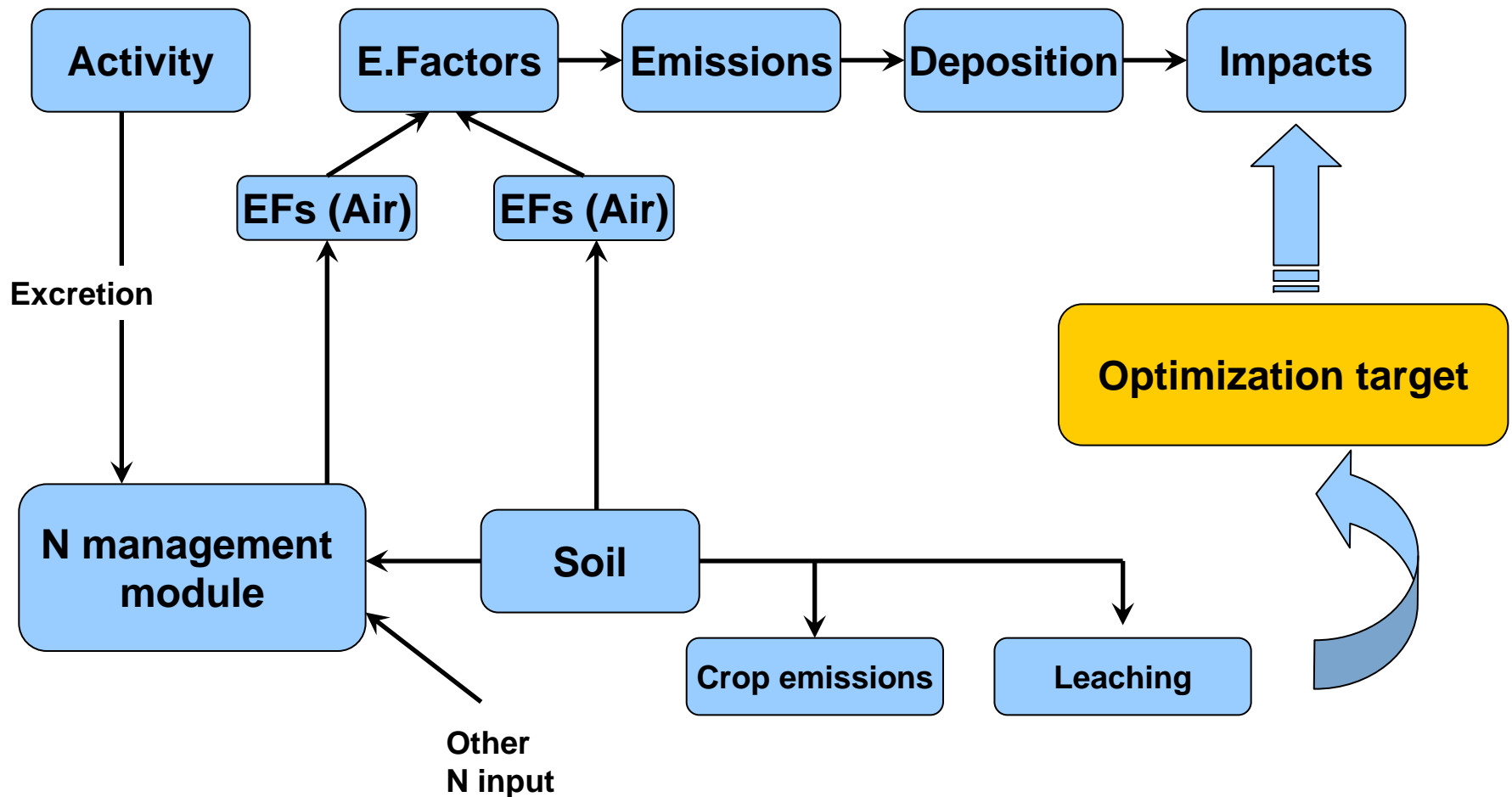


Consistent treatment of N in GAINS



- Linkages between emissions of NH_3 , NO_x , N_2O (and CH_4) need to be reflected in the model
- Same base input information is used in different modules
- Interaction of abatement options applied
- Consistent scenarios for 2010 ... 2030 based on adequate projections

GAINS agricultural module



N balances in GAINS



- Soil inputs:
 - Mineral fertilizer N
 - Manure N
 - N excretion rate
- Soil outputs
 - NO_x
 - NH_3
 - N_2O
- Other release to the atmosphere
 - NO_x from combustion
 - Farm NH_3
 - other

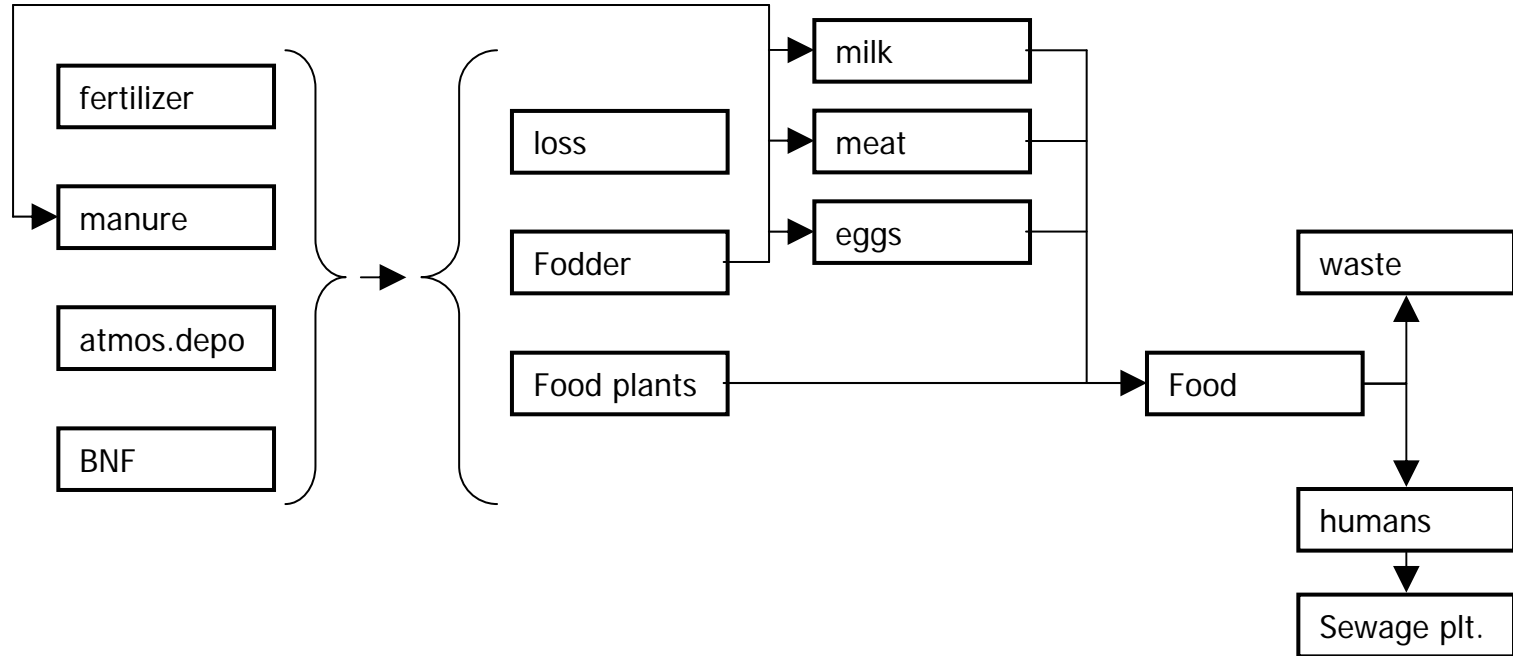
N – balances: available data



- Farm level:
 - National balances
- Soil area level:
 - OECD environmental indicators: soil N balances
 - Eurostat
 - EEA
- Country level incl. projections:
 - GAINS

➔ Opportunity for validation

GAINS country N-balances

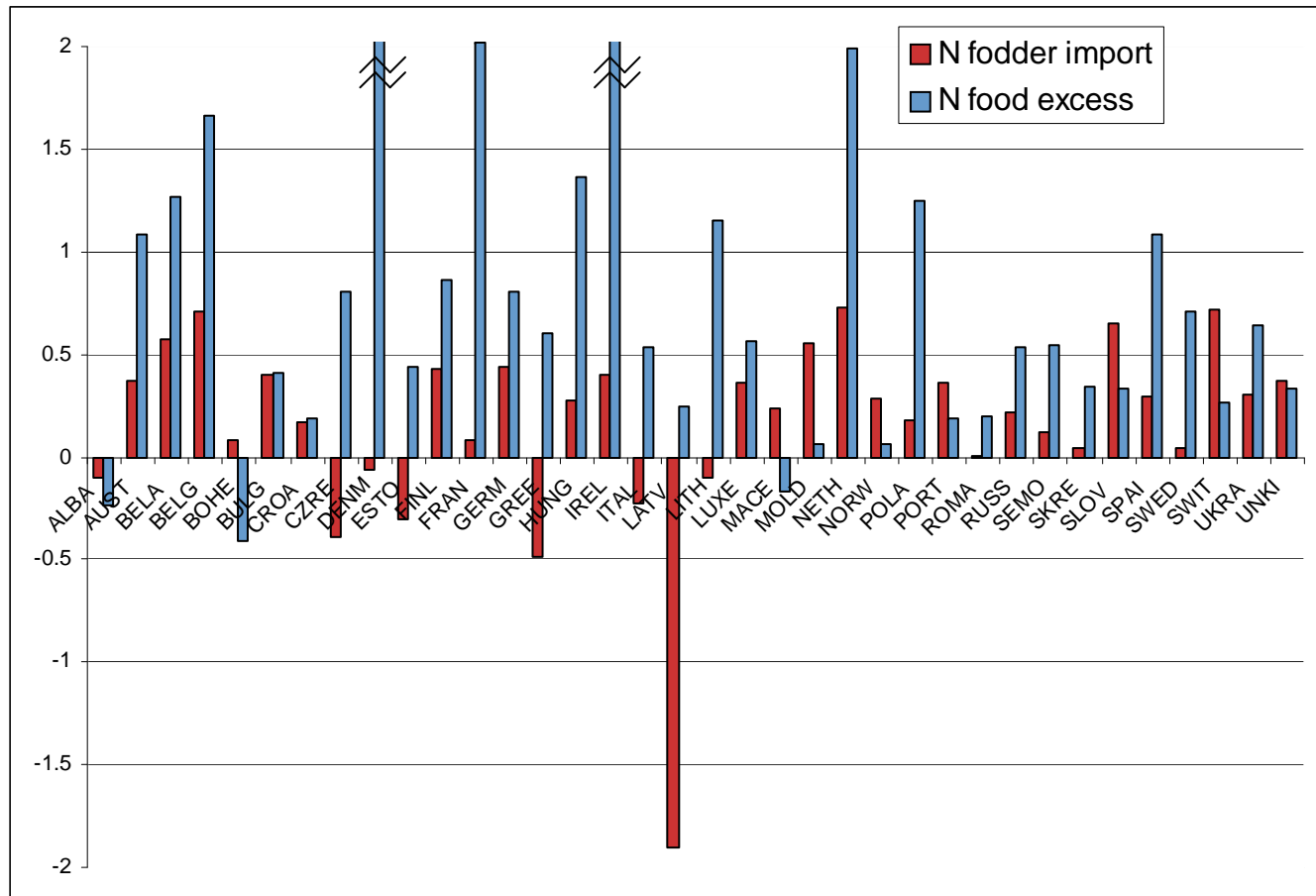


Missing items:

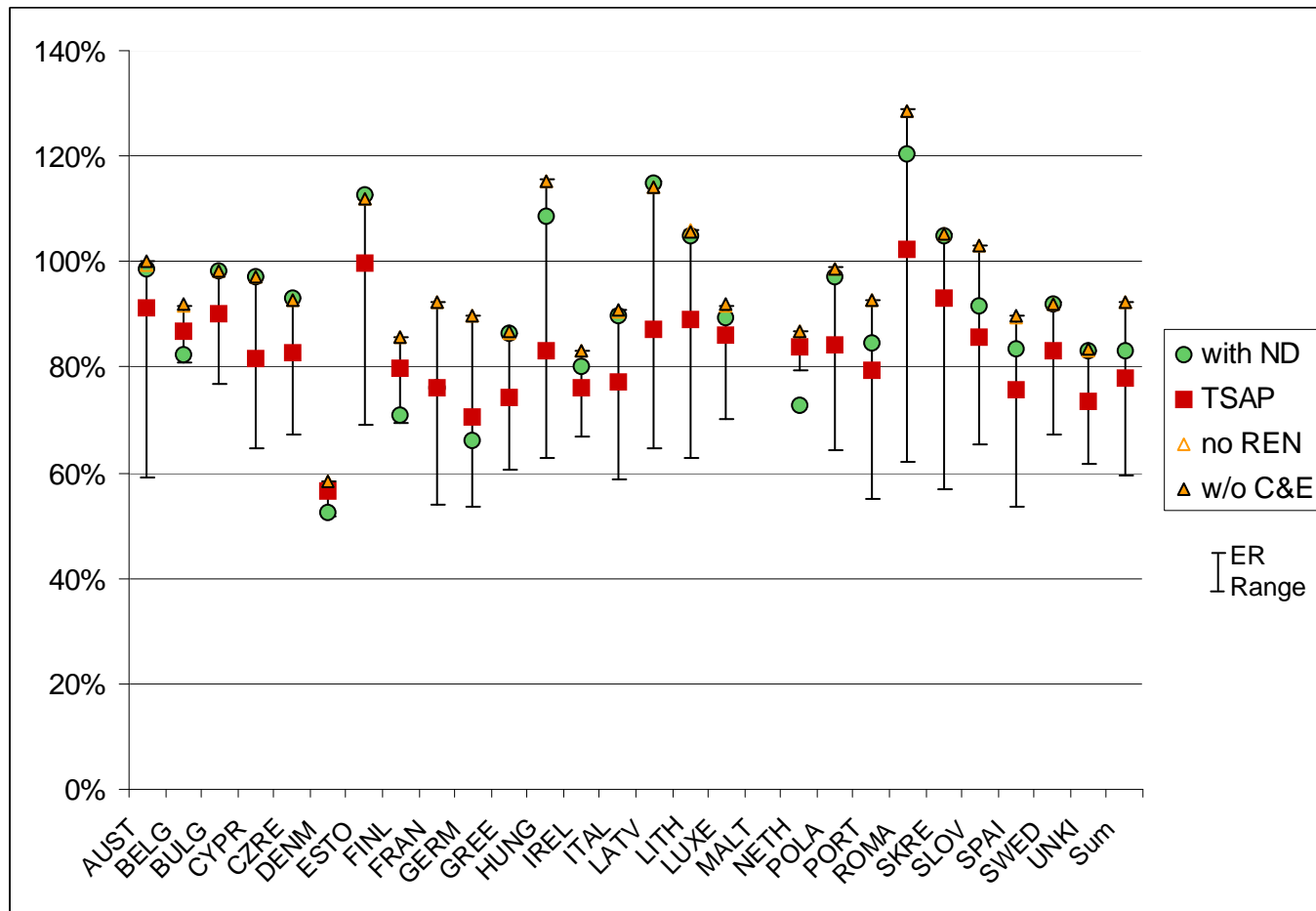
- imports
- exports
- fish

Sensitivity/reliability at respective stages still needs to be assessed

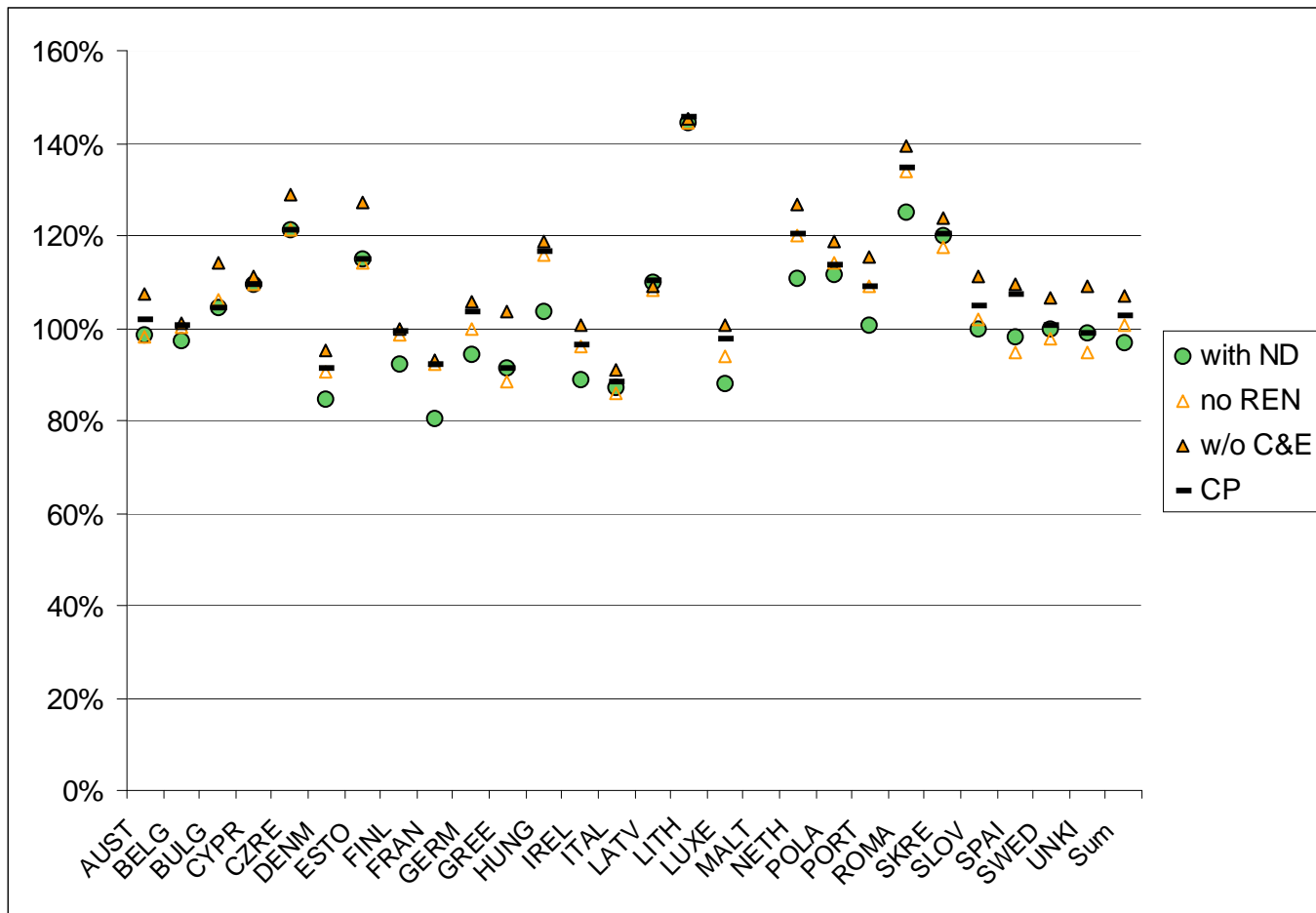
N-balances: examples



Current policy scenarios: NH₃ emissions 2020 (relative to 2000)



Current policy scenarios: N₂O emissions 2020 (relative to 2000)



Some conclusions



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- GAINS moves into harmonizing agricultural input in an appropriate model
 - N-balances (from GAINS database) may help improve understanding and critical issues
 - Consistent scenarios for different N-components can be derived, feed into policy when requested