

National Greenhouse Gas Inventories: Understanding Uncertainties vs. Potential for Improving Reliability

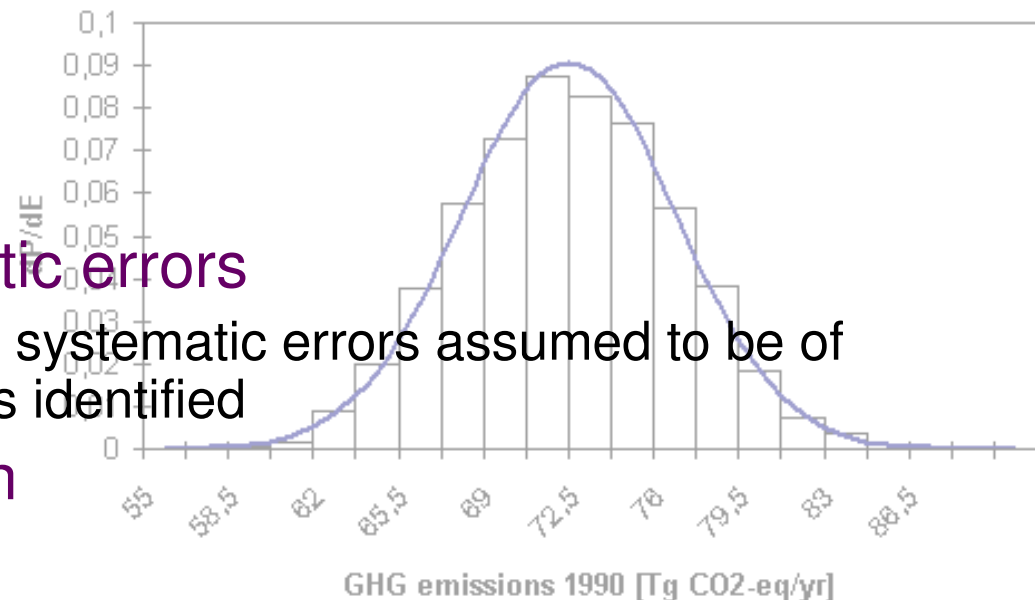
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Outline

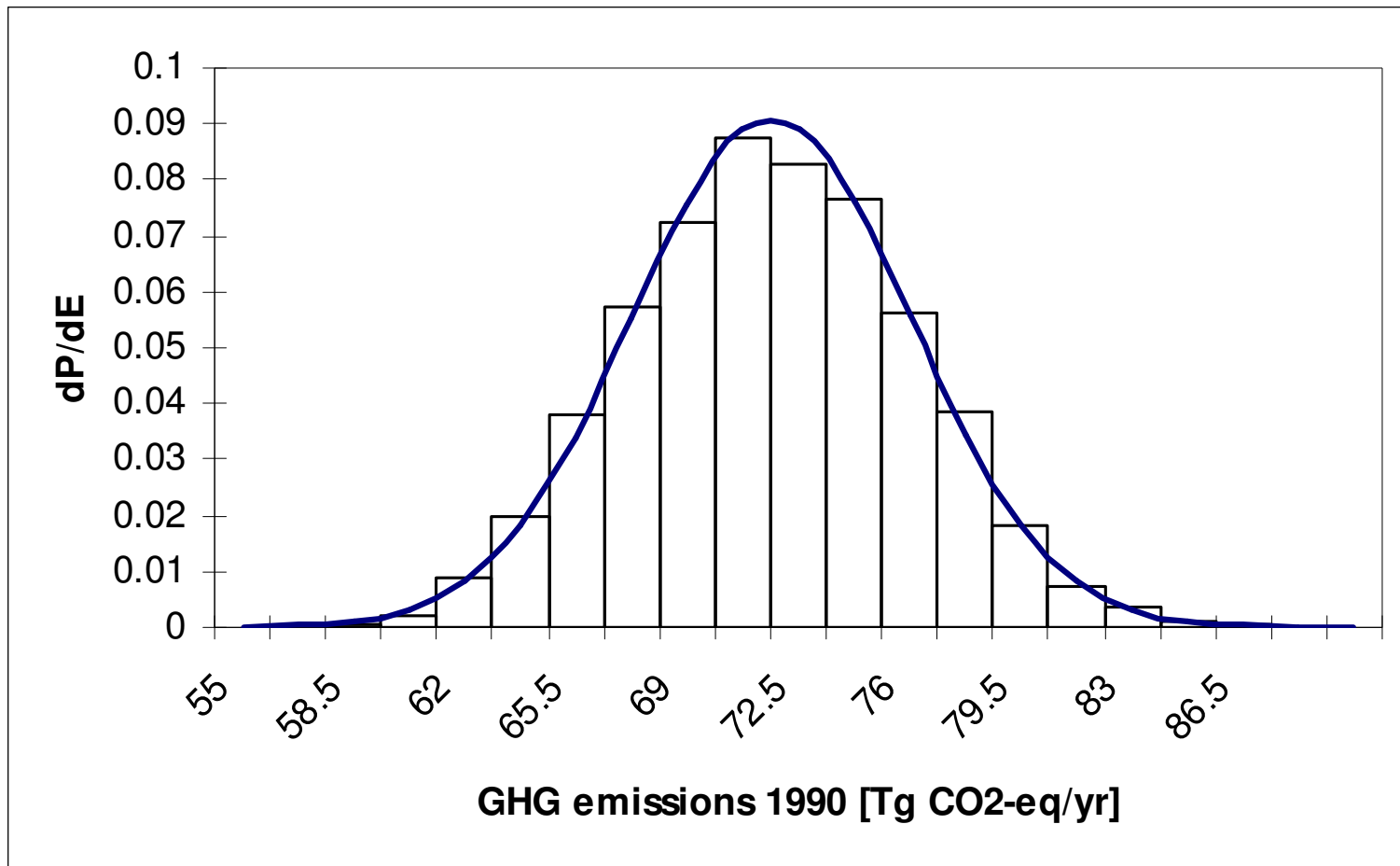
- Uncertainty of GHG inventories
 - example for Austria
- Sensitivity studies to identify potential improvements:
“conclusions”
- Recommendations:
 - Use of uncertainty in compliance evaluation
 - Use of uncertainty in target setting

Uncertainty calculations: Austria

- Input uncertainties:
 - Statistical differences
 - Reported variation
 - Expert judgement
 - Estimation
- Treatment of systematic errors
 - Magnitude of unknown systematic errors assumed to be of the same size as errors identified
- Monte-Carlo approach
 - impressive
 - easy to operate
 - allows handling of co-variances
 - supports sensitivity analysis

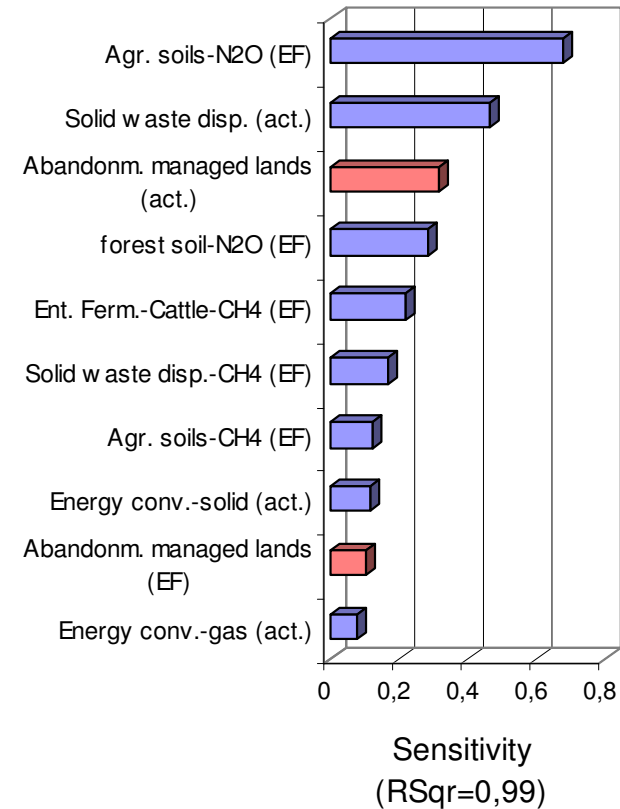


Austrian GHG emissions

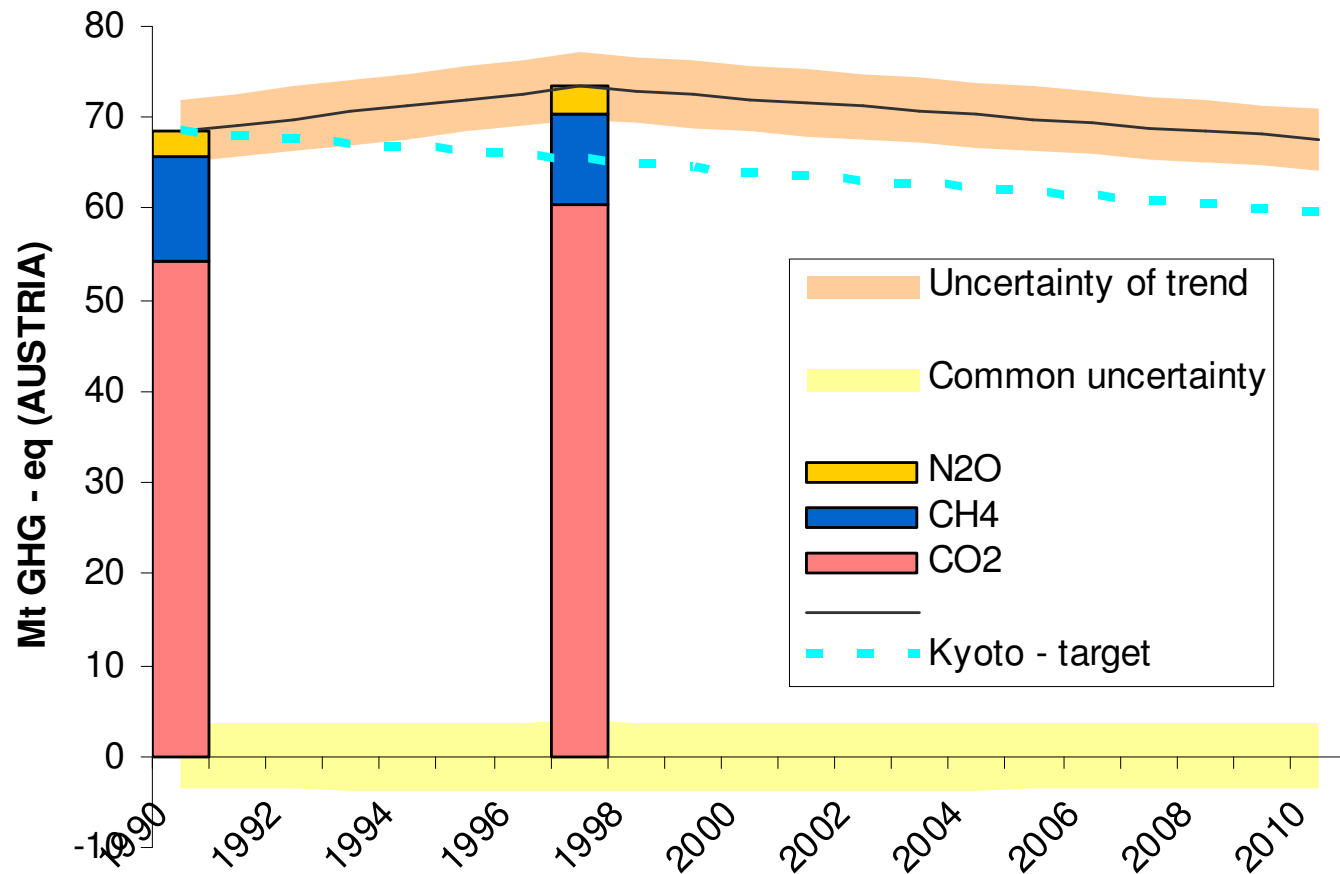


Sensitivity studies

- **Input uncertainties**
total uncertainty influenced by few inputs
requirement to deep investigation limited
- **Uncertainty by gas**
similar variances for CO₂, CH₄, N₂O
when decreasing variance of any gas
→ little change to overall uncertainty
when increasing variance of any gas
→ increase of overall uncertainty
- **Robustness to assumptions on probability density function**



Emission vs. trend uncertainty

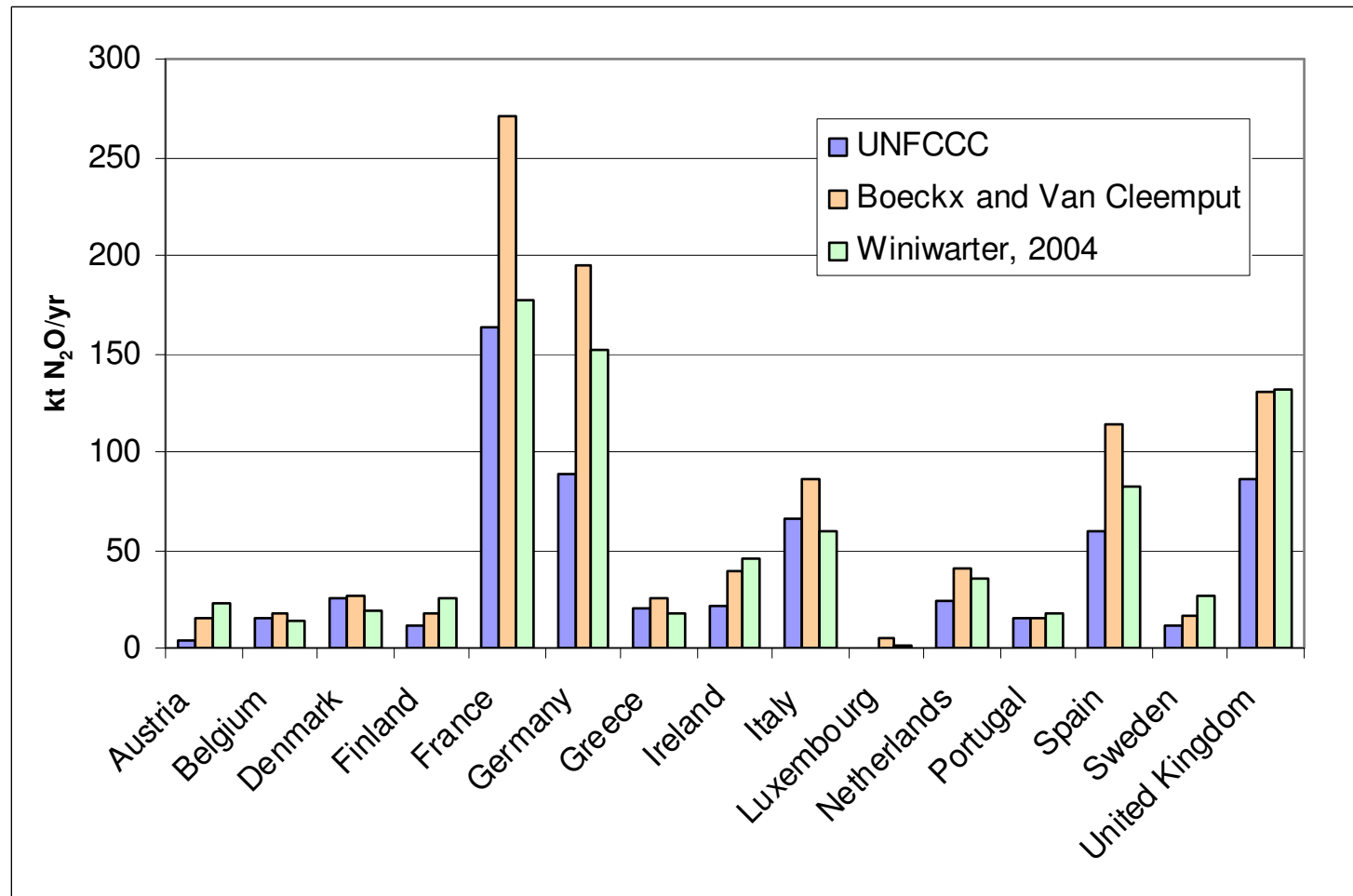


International comparisons

	Austria	Finland	Holland	Norway	UK	USA
CO ₂	2	6	3	3	4	3
CH ₄	48	20	17	22	17	36
N ₂ O	90	40	34	200	230	120
HFCs	..	..	41	50	24	25
PFCs	..	..	100	40	20	..
SF ₆	..	..	50	5	13	..
<i>Total</i>	10	6	4.4	21	19	13
Total trend (1990-2010)	5	5	..	4	4	..

all uncertainties in % (2s), trend in %-points

Soil N₂O



Conclusions (1)

- Improvements possible only in sectors of large uncertainty
- Personal judgement (of experts ...) does have influence on uncertainty estimates
- Scenario analysis and sensitivity runs allow to assess this influence and to understand / evaluate it
- Intuitive aspect gains weight when uncertainties are larger

Conclusions (2)

- Magnitude of uncertainty is similar for industrialized countries
- Differences due to different approaches rather than structural differences
- Uncertainty of trends smaller, but in the same size as national commitments
- Meeting or failure to meet the commitments will often remain within the bounds of uncertainty
- Whose obligation is it to prove?



What is the Kyoto protocol good for?

- Will NOT halt climate change
- Will NOT lead to decreasing GHG concentrations
- Will NOT lead to stable GHG concentrations

What is the Kyoto protocol good for?

- Will modify increase of GHG concentrations
- Will provide a framework for further steps to be taken

Environmental equity

- Equal/similar treatment of countries
- Co-variance between countries in certain inventory elements will lead to an *uncertainty of country differences* well below trend uncertainty
(uncertainty of target hits two economies the same way)

Co-variance

- Trend calculation
 - Co-variance of most emission factors
- Country comparison
 - Co-variance of many activity inputs
(structural differences will remain)

What is uncertainty assessment good for (1)?

- Will NOT contribute to test/verify a country's compliance

Instead:

→ use rigorous guidelines to assess emissions which leave little space for interpretation

Requirements to Guidelines

- Based on scientific agreement (similar to GWP)
- Non-ambiguous
- Allow for inter-country comparisons to homogenize approaches
- To be used for evaluation of national commitments

What is uncertainty assessment good for (2)?

- Uncertainty assessment should contribute to definition / revision of guidelines
- Uncertainty assessment should contribute to validation/verification and new target setting

Messages

- Uncertainty of GHG emission trends can be as large as reduction commitments
- Uncertainty decreases when comparing inventories -- rigorous guidelines at least can provide fair conditions
- Uncertainty becomes important in revising targets for future commitment periods