

# Verification of compliance with GHG emission targets: Annex I countries

A. Bun, Kh. Hamal, M. Jonas

Lviv Polytechnic National University,  
International Institute for Applied Systems Analysis

IIASA, Laxenburg, Austria  
2<sup>nd</sup> International Workshop on Uncertainty in GHG inventories,  
27-28 September 2007

# Verification of compliance with GHG emission targets: Annex I countries

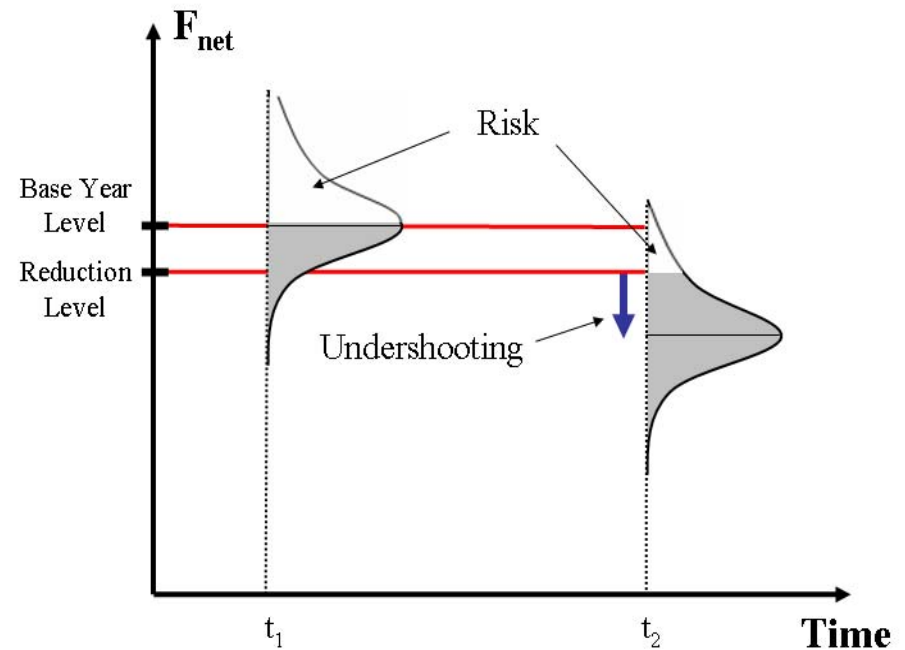
## Background:

- **The Kyoto Protocol:**
  - Emissions reduction/limitation
  - Emissions estimates (Inventory Reports)
  - Emissions trading ⇒ cost efficiency
  - Uncertainty estimates

# The Issue of Uncertainty

Uncertainty:

- Undershooting is one way of dealing with it;
- Requires considering risk.



# Methodology

Undershooting and verification time concept (Jonas et al, 2004):

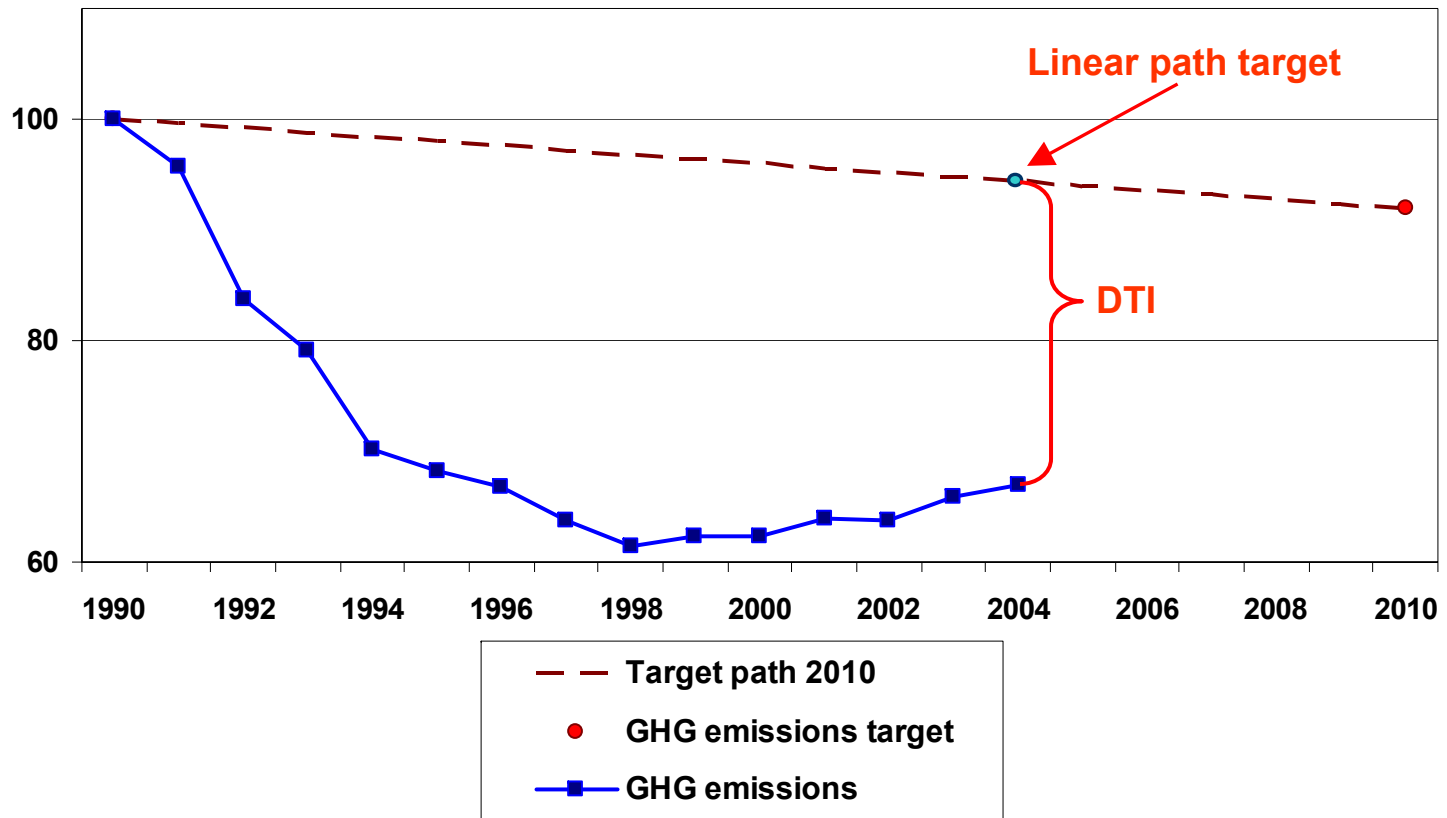
- Modified emissions limitation/reduction target:

Modified target = Kyoto target + Undershooting

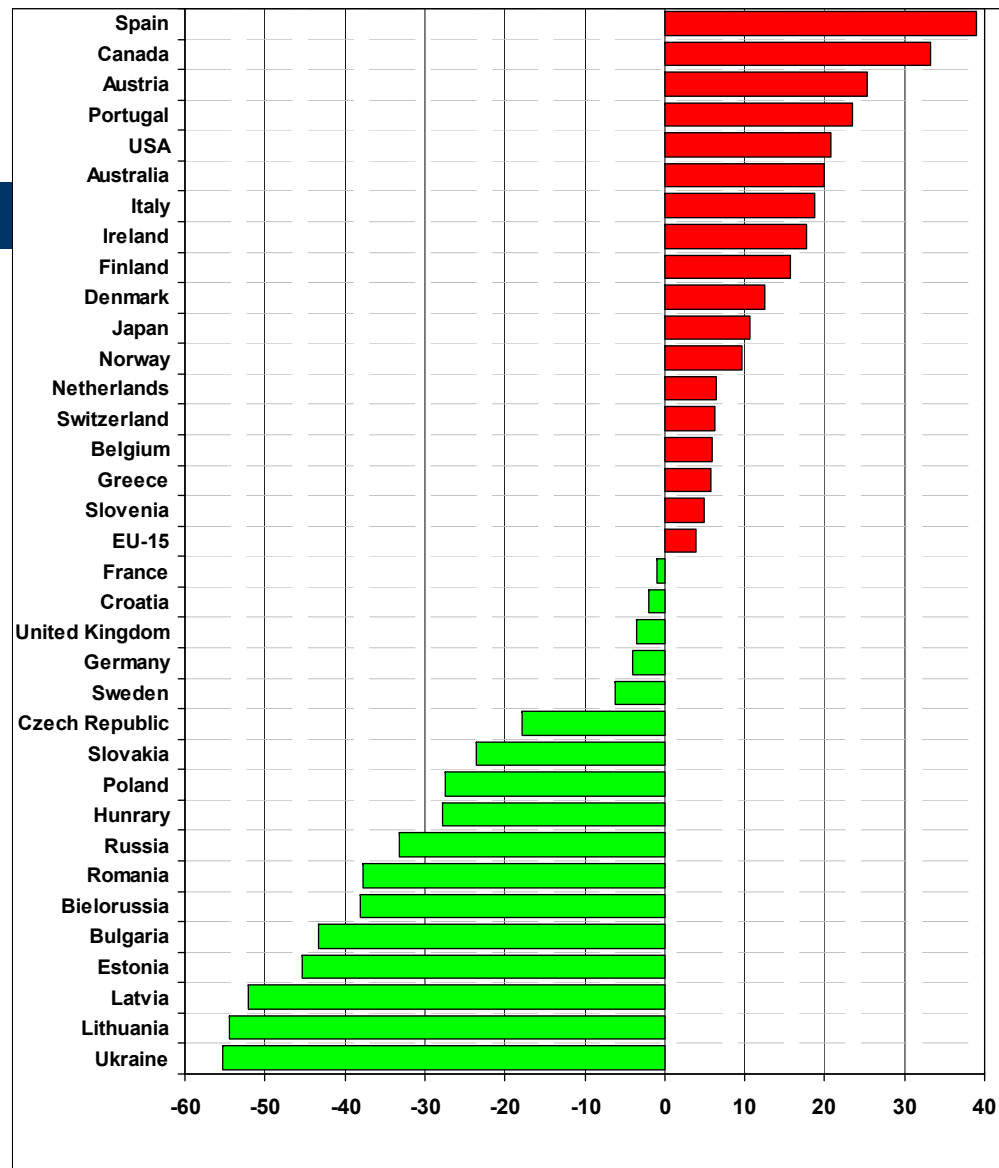
- Undershooting =  $f$  (uncertainty, risk, Kyoto target)

Computer program for application the Und & VT concept

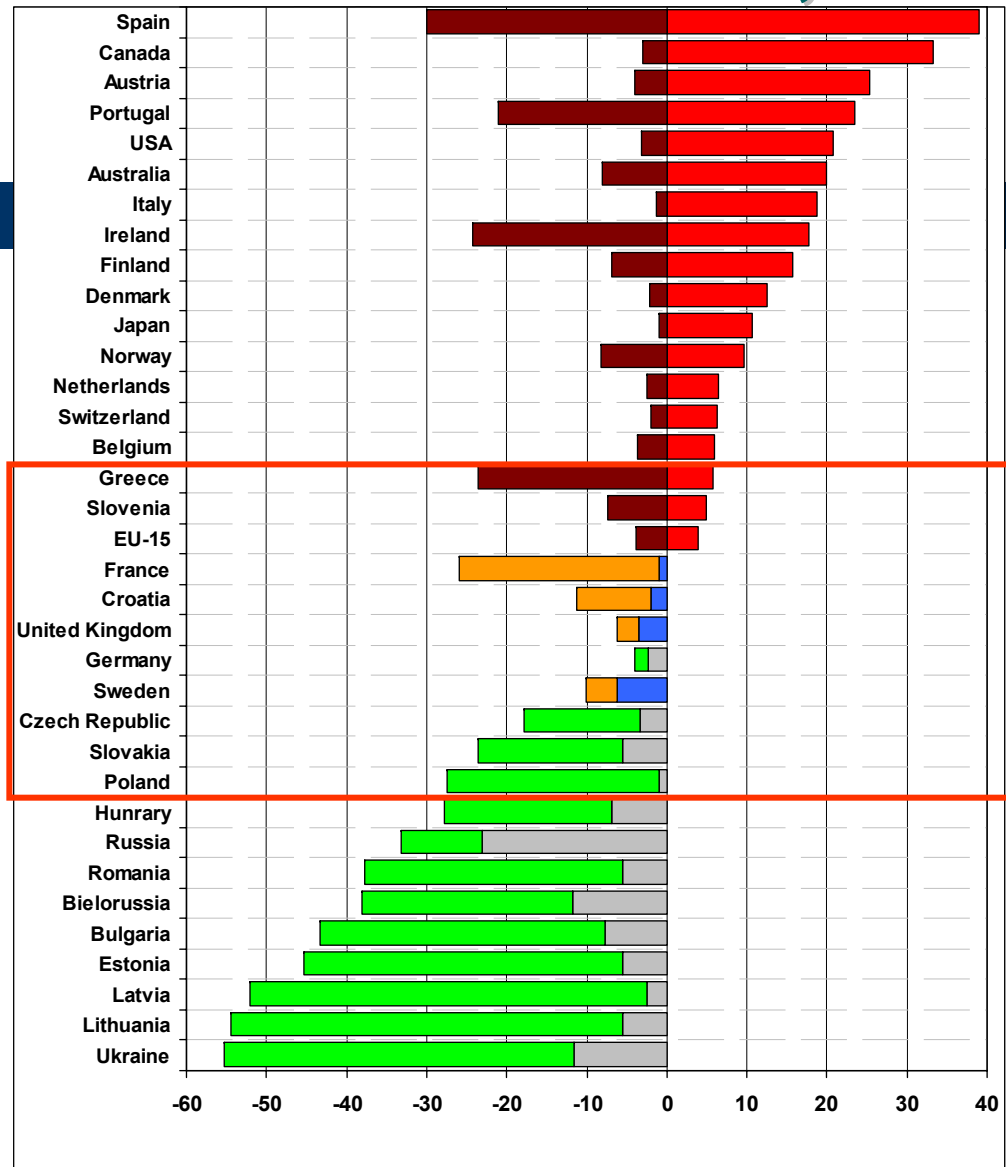
# Basic terms



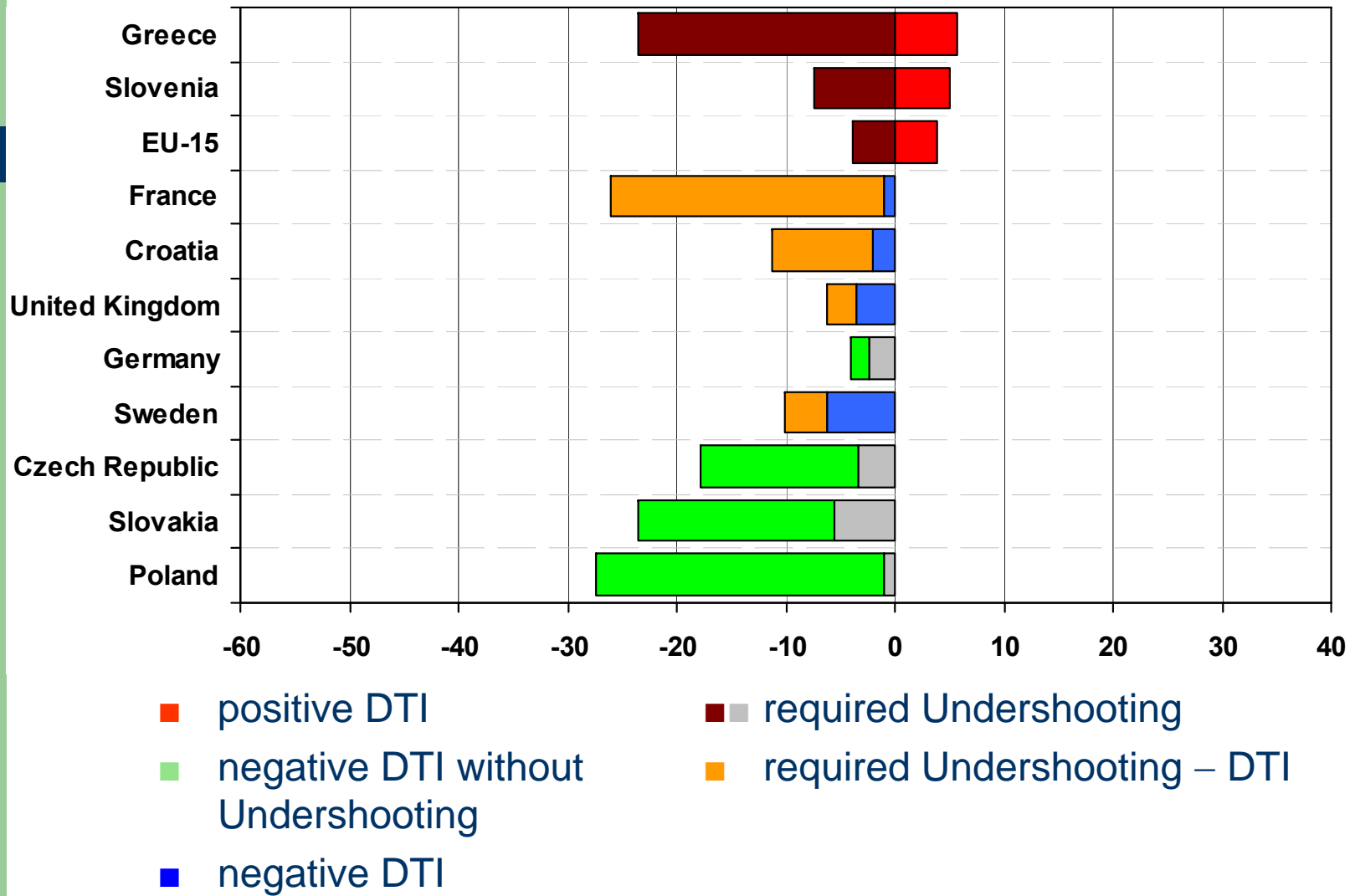
# DTI for the Annex I countries for 2004



# Results: Annex I countries, 2004 ( $\alpha=10\%$ )

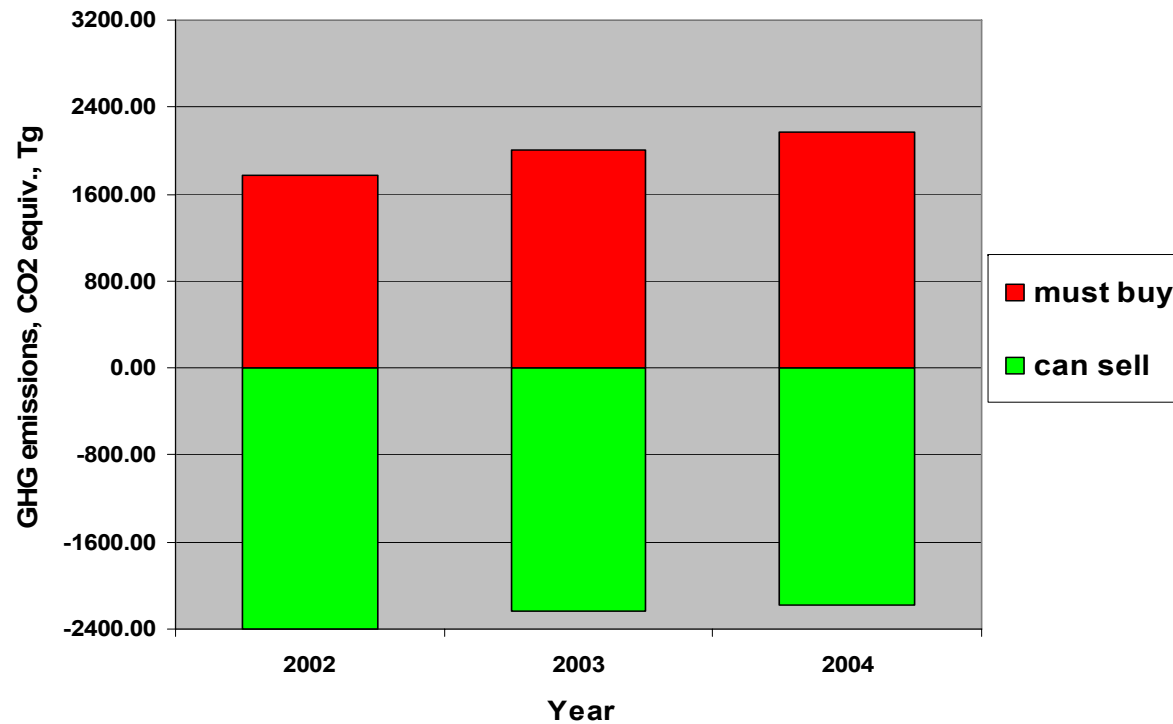


# Results: Annex I countries for 2004

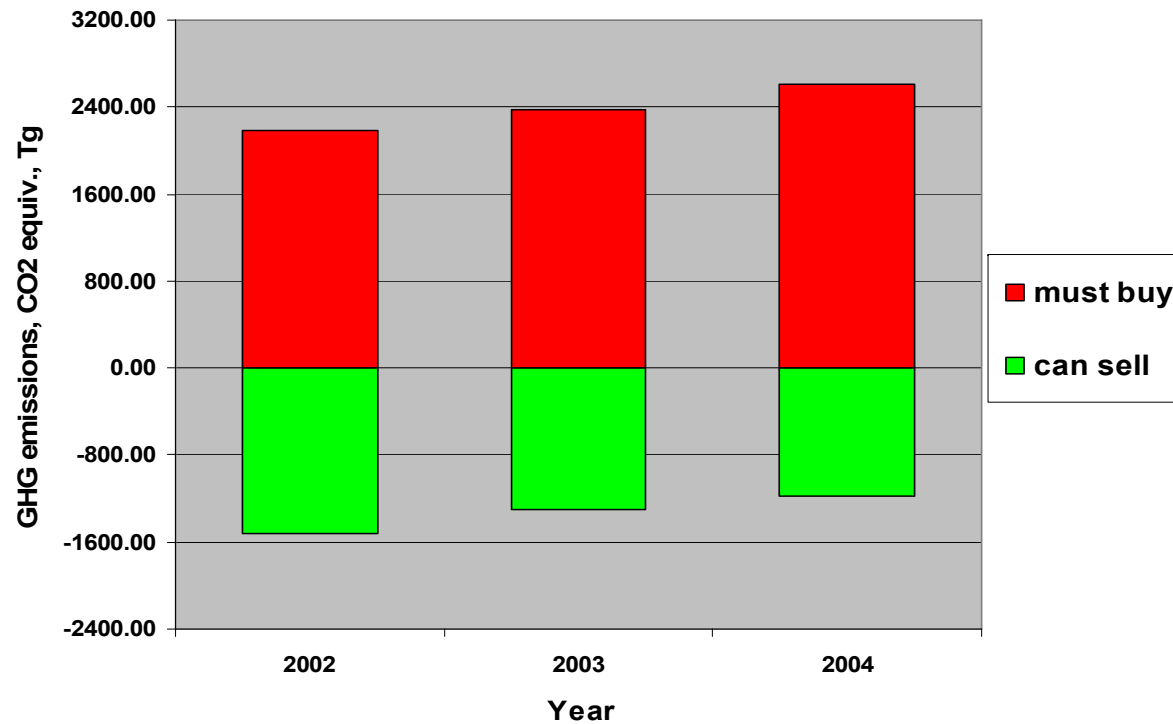




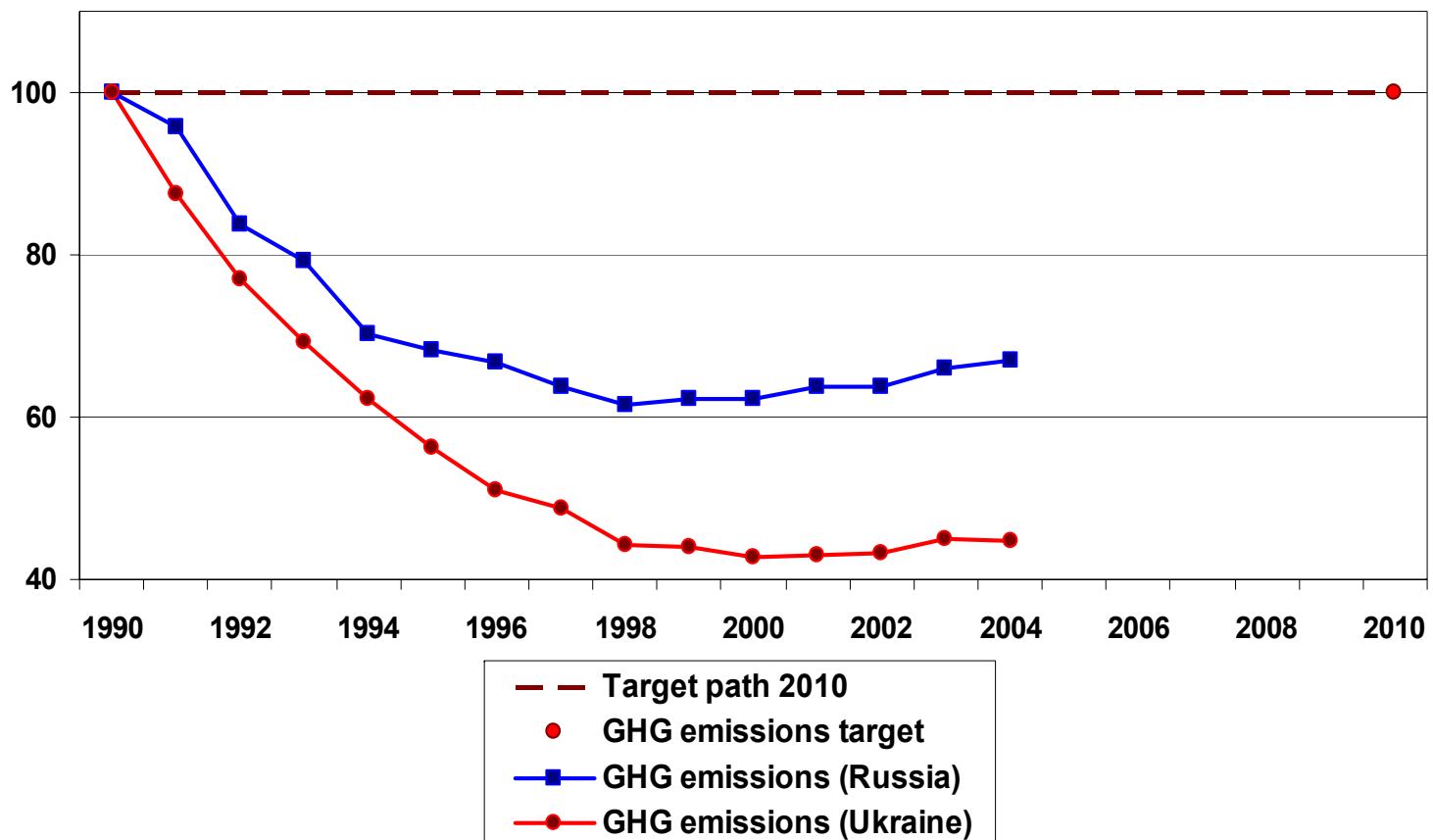
# Annex I countries: can sell vs. must buy (2002-2004)



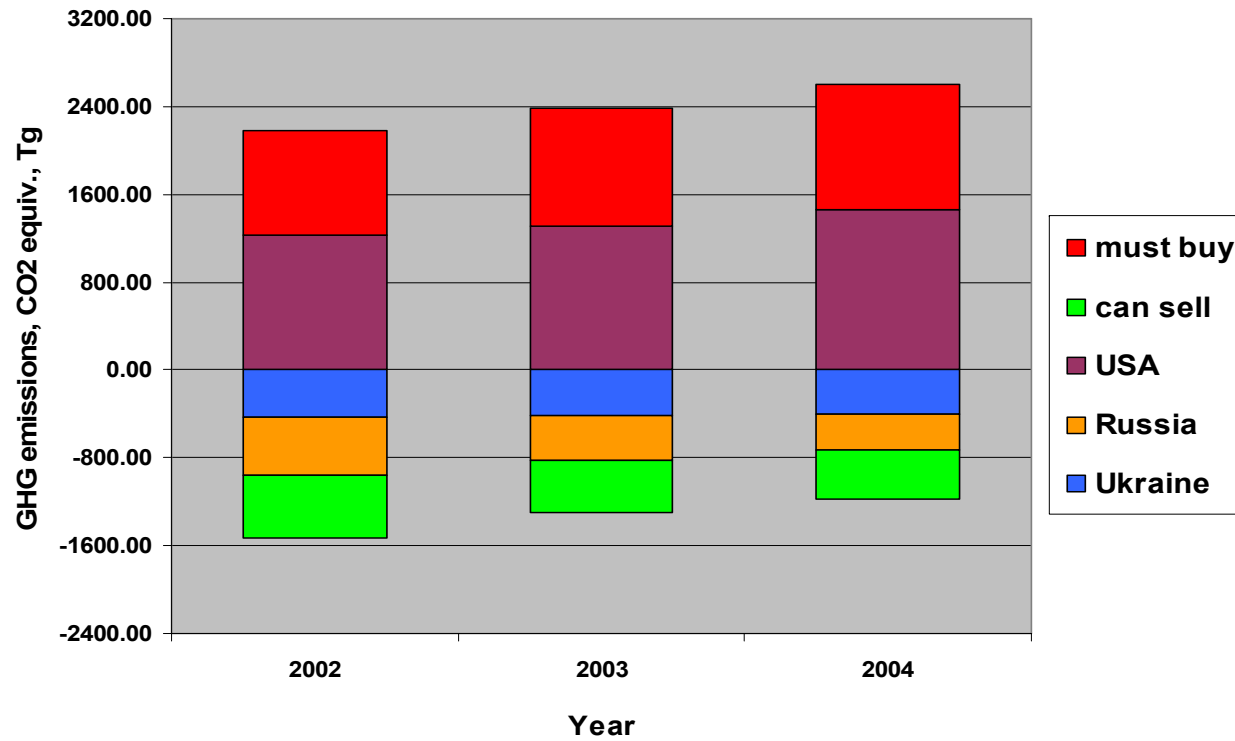
# Annex I countries: can sell vs. must buy including uncertainty (2002-2004)



# Emissions in Ukraine and Russia for 1990–2004 in relation to the Kyoto target



# Results



# Conclusions

- Uncertainty can influence the process of emission trading significantly (France, Croatia, the United Kingdom and Sweden)
- In 2004 17 Annex I countries showed a negative DTI
- 4 of them not enough undershooting  $\Rightarrow$  risk exists
- Some countries show considerable undershooting
- The post-Kyoto treaty should consider emissions uncertainties prior to targets establishing



**Thank you for your attention!**