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International Institute for Applied Systems Analysis (IIASA)

Integrated assessment modelling for the revision of the Gothenburg Protocol

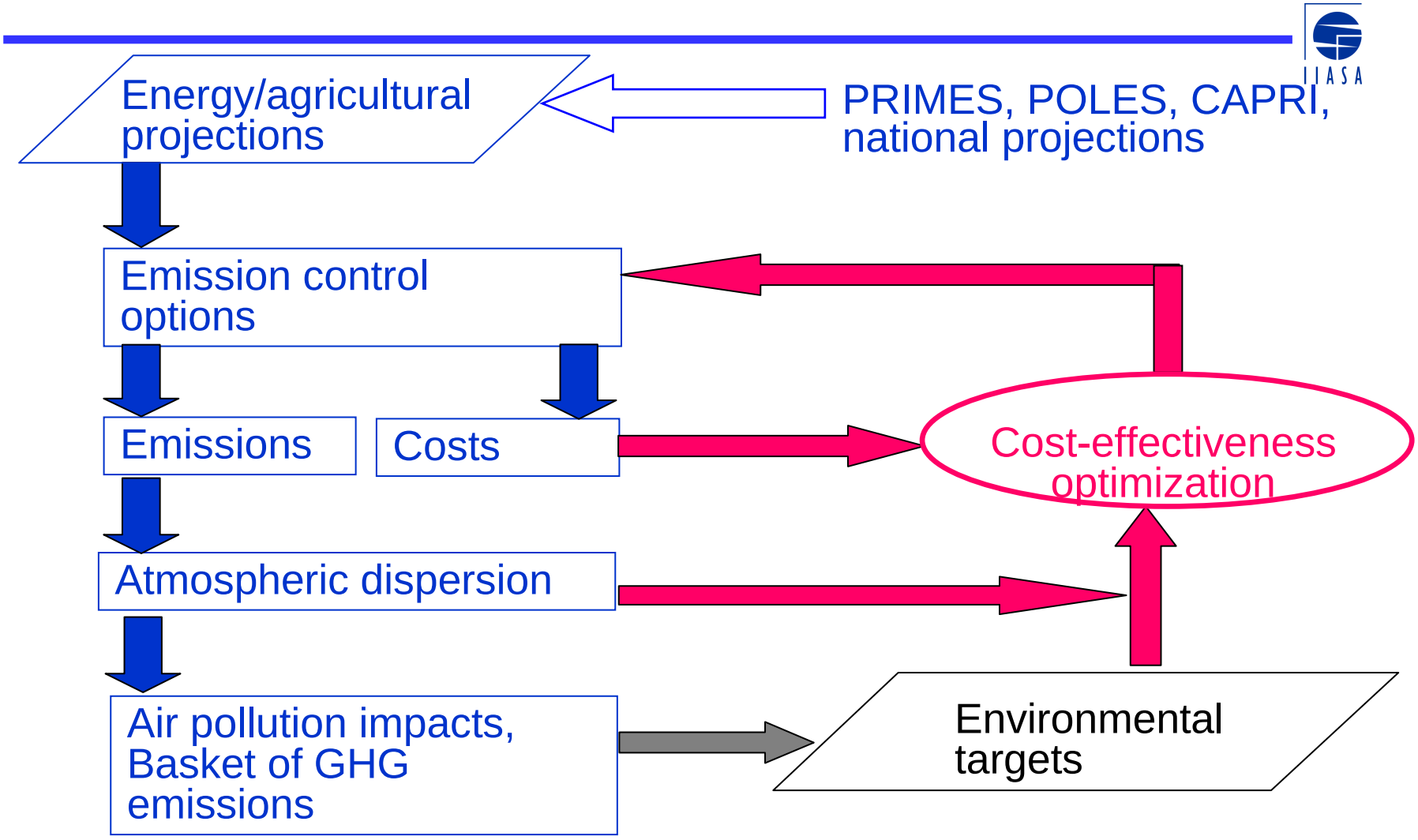
34th Session of the EMEP Steering Body

Geneva, Sep 13-15, 2010

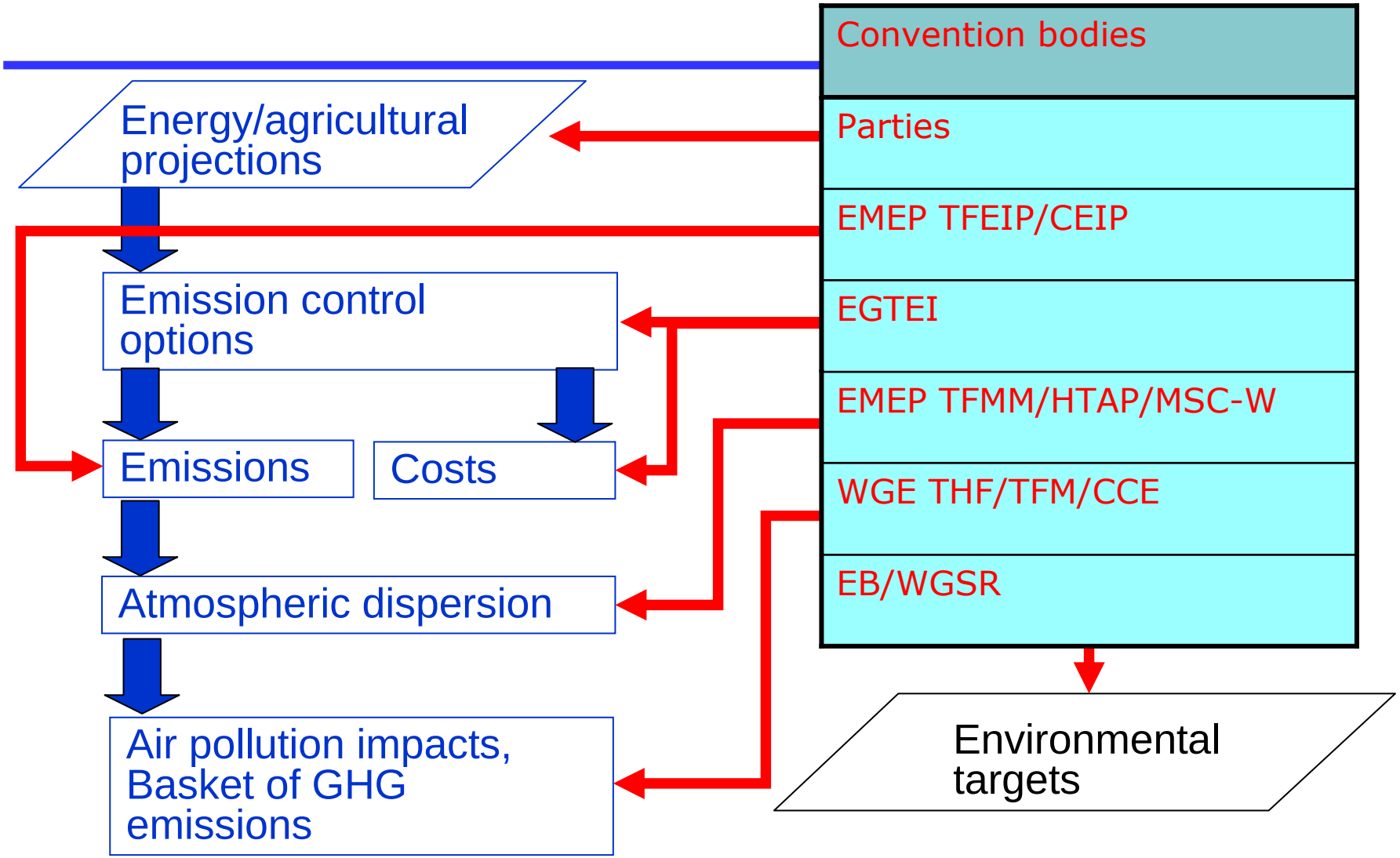
emep

Co-operative programme for monitoring and evaluation of the long-range transmissions of air pollutants in Europe

Information flow in the GAINS model



Input of Working Groups under the Convention to GAINS



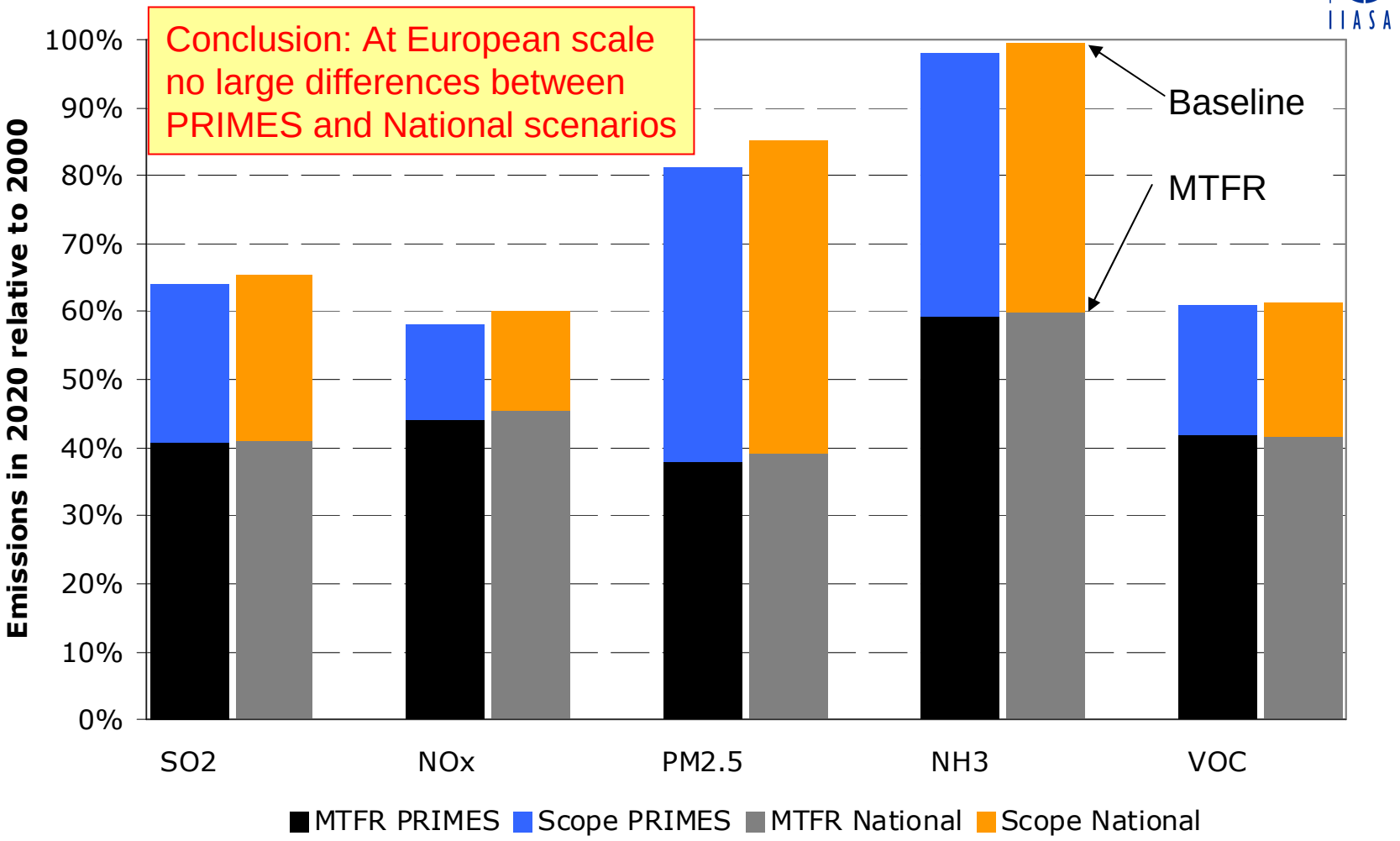
Recent CIAM interactions with other working groups

- *Task Force on Hemispheric Transport of Air Pollution:*
  - *Contribution to chapter on emissions and projections*
- *Working Group on Effects*
  - Update of recent health impact assessment methodology, ozone fluxes, dynamic modelling, ex-post analysis
- *Task Force on Reactive Nitrogen*
  - Annex IX for Gothenburg Protocol on costs of measures
  - Hosting of meeting of the Expert Panel on Nitrogen Budgets
- *Expert Group on Black Carbon*
  - GAINS inventories for BC/OC submitted to national experts
- *Expert Group on Techno-economic Issues (ETGTEI)*
  - Analysis of options for emission limit values
- *TFIAM, Working Group on Strategies and Review, Executive Body*
  - Baseline scenario for revision of Gothenburg Protocol
  - Target setting options (CIAM Report 1/2010)

Baseline projections for the revision of the Gothenburg Protocol

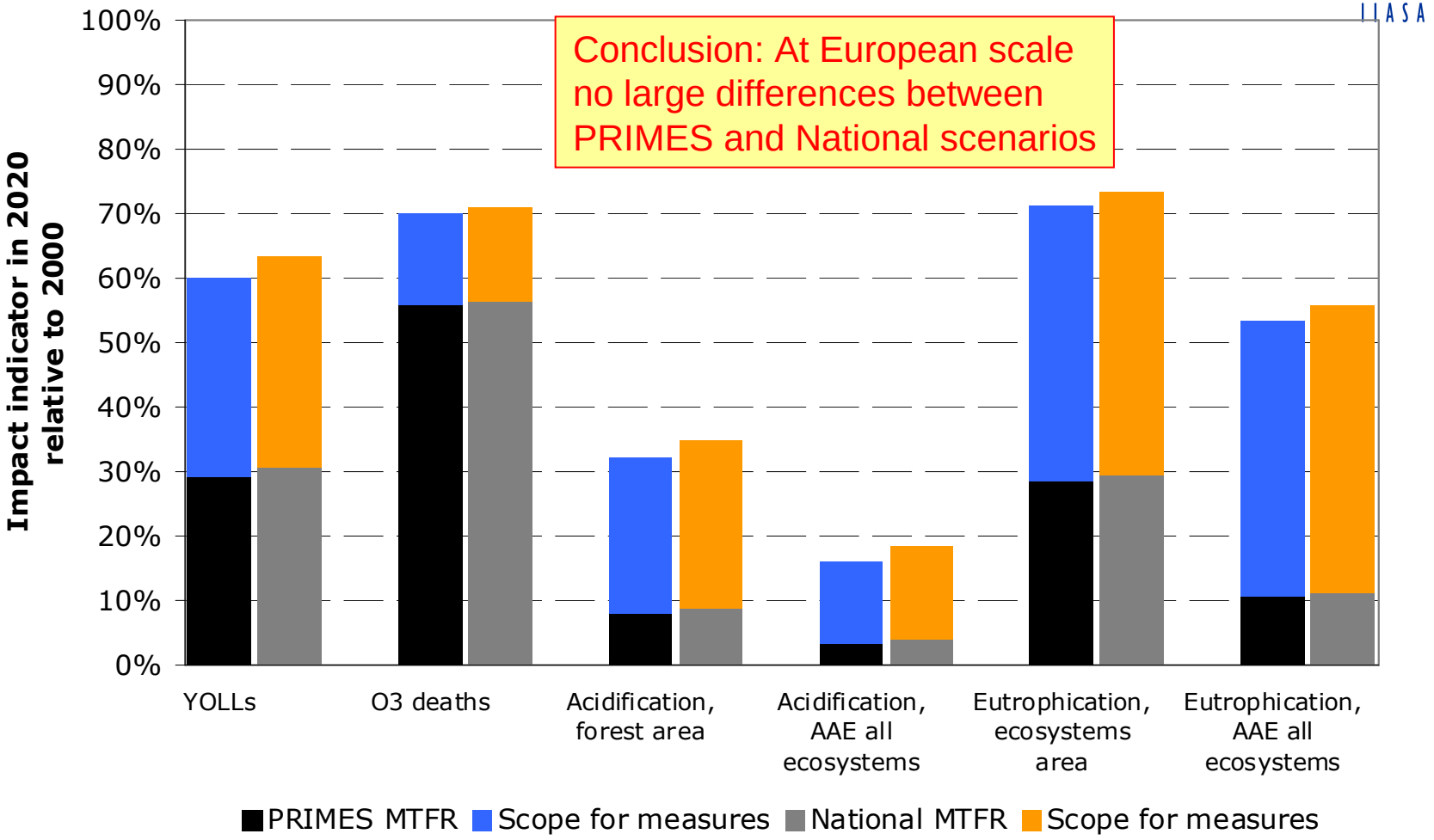
Scope for further emission reductions in 2020

relative to 2000



Scope for further environmental improvements

2020 relative to 2000



The cost-effective distribution of efforts depends on the distribution of environmental targets: Four options for target setting

In an effects-based approach, the equity concept is applied to perceived equity in environmental benefits.

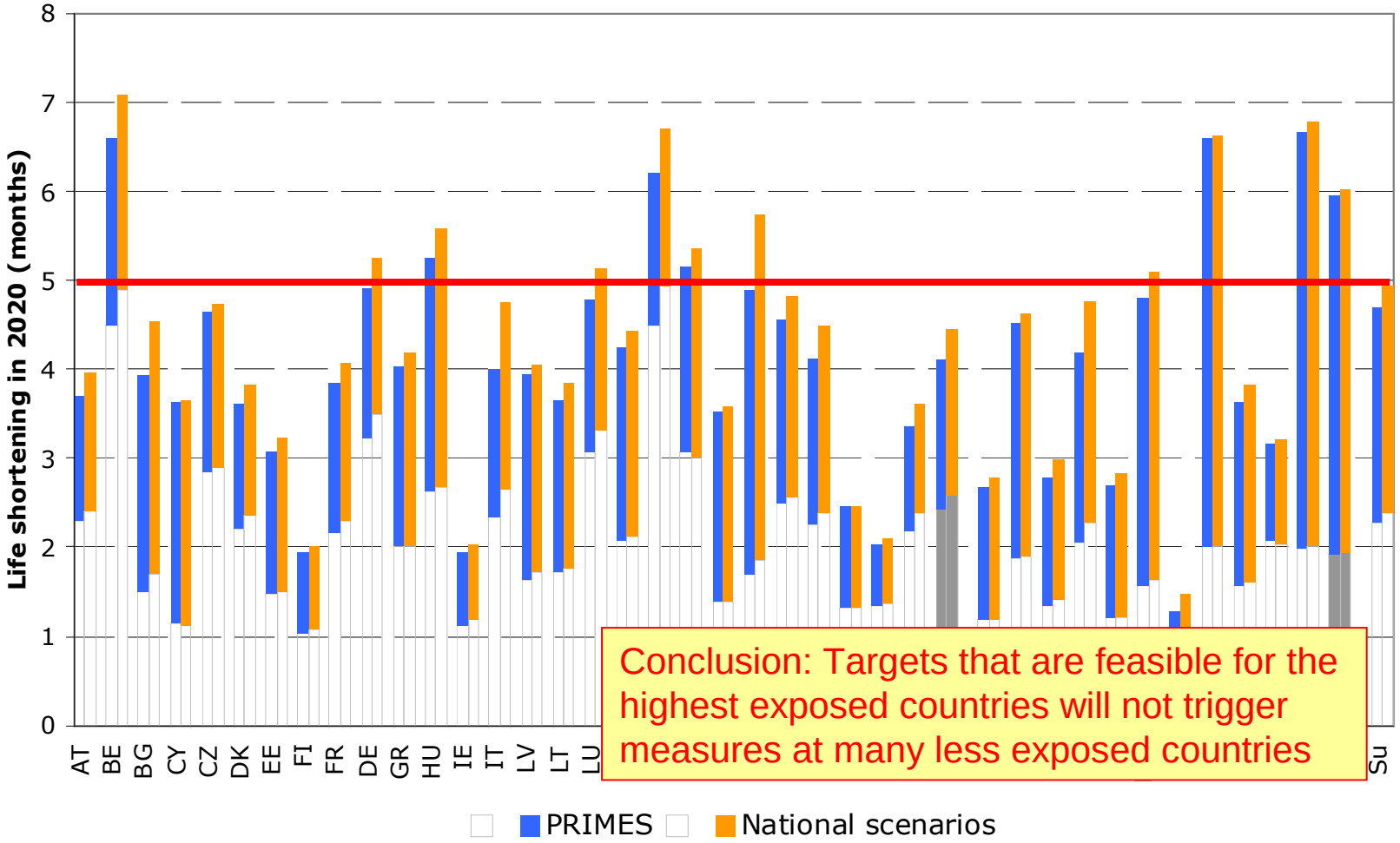
- Environmental targets for a cost-effectiveness optimization
  - must be achievable in all countries,
  - should result in internationally balanced costs and benefits.

Four options analyzed with GAINS:

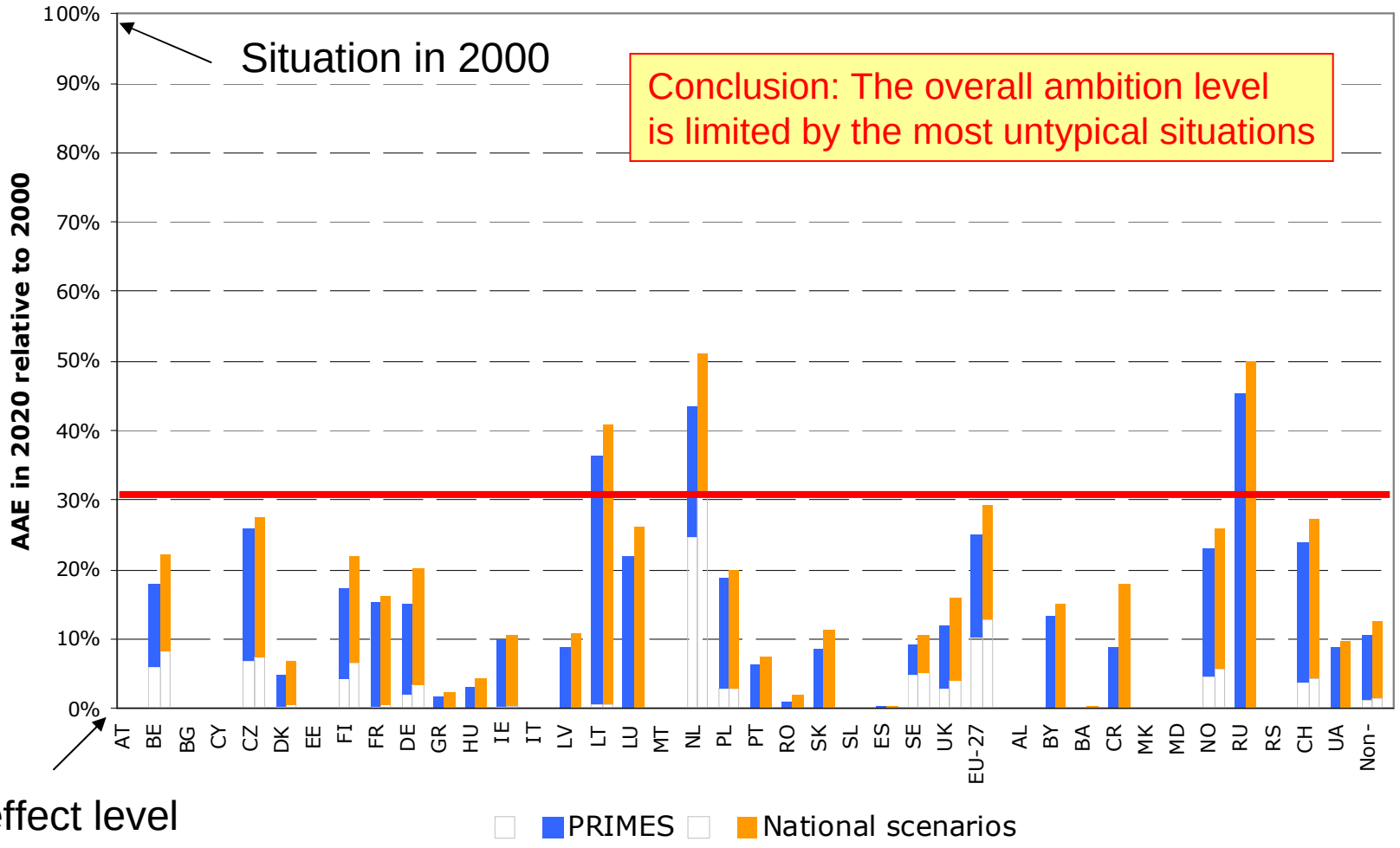
1. Uniform absolute targets ('caps') on environmental quality (in terms of impact indicators)
2. Equal relative change ('gap closure') in impact indicators compared to a base year
3. Equal portions of the possible improvements in each country (equal 'gap closure' between Baseline and MTFR)
4. Europe-wide improvements at least cost

Option 1: Uniform cap of impact indicators

Loss in statistical life expectancy from PM2.5 (months)



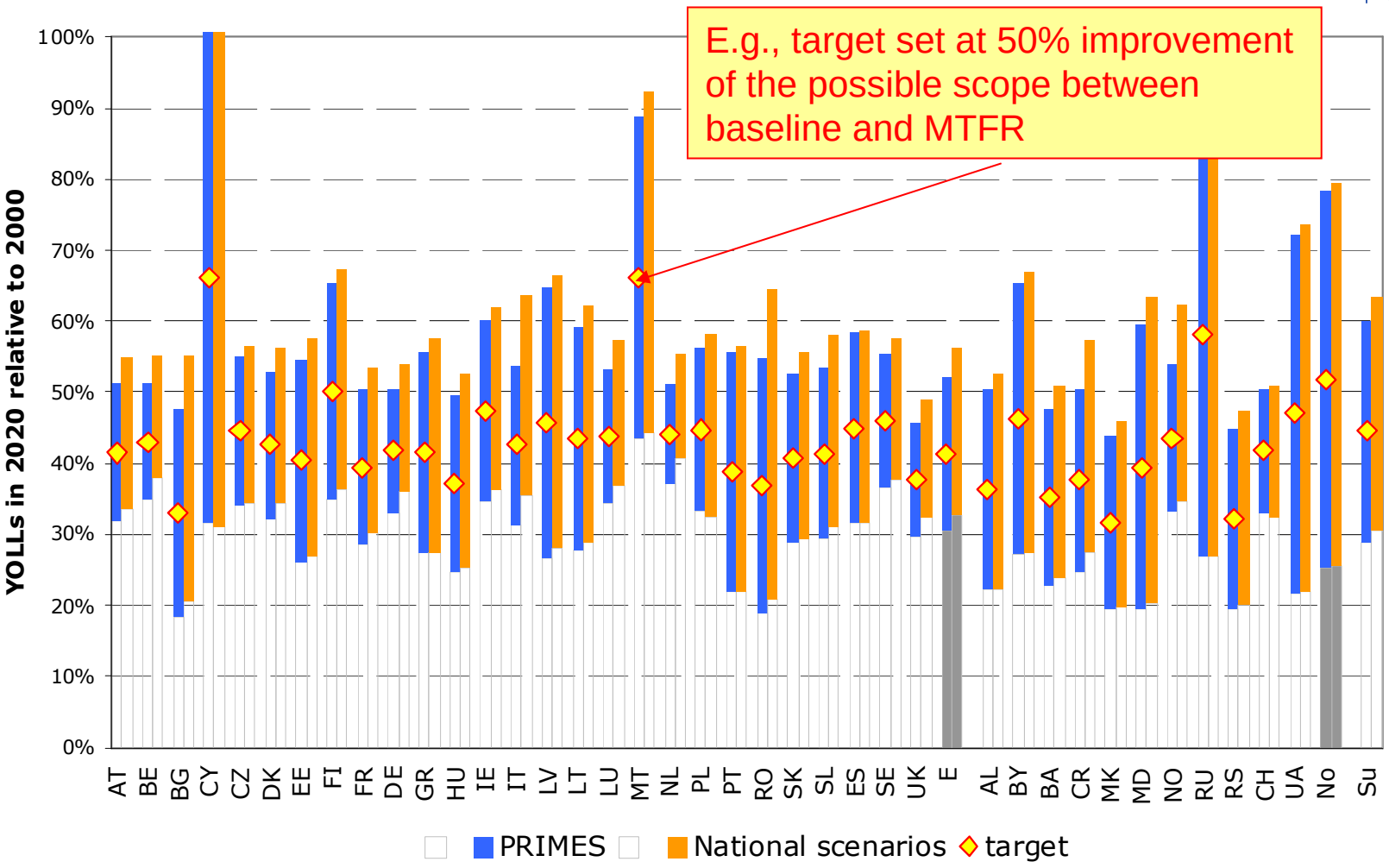
Option 2:
Equal relative improvements compared to 2000
Acidification, accumulated excess deposition



Option 3:

Equal progress of the feasible improvement

Mortality due to PM2.5 (YOLLs)

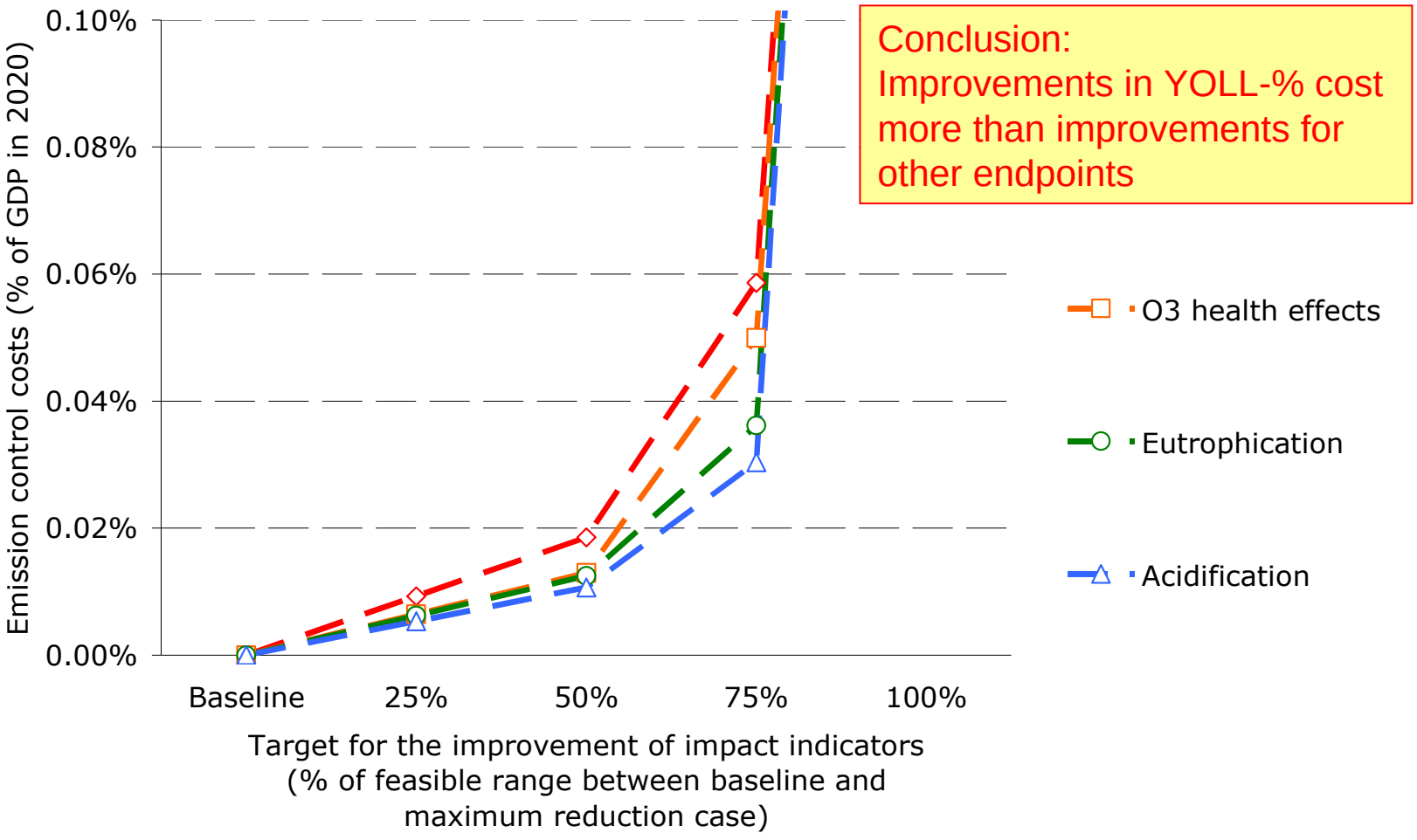


Provisional results!

Option 3:

Costs for different gap closure targets

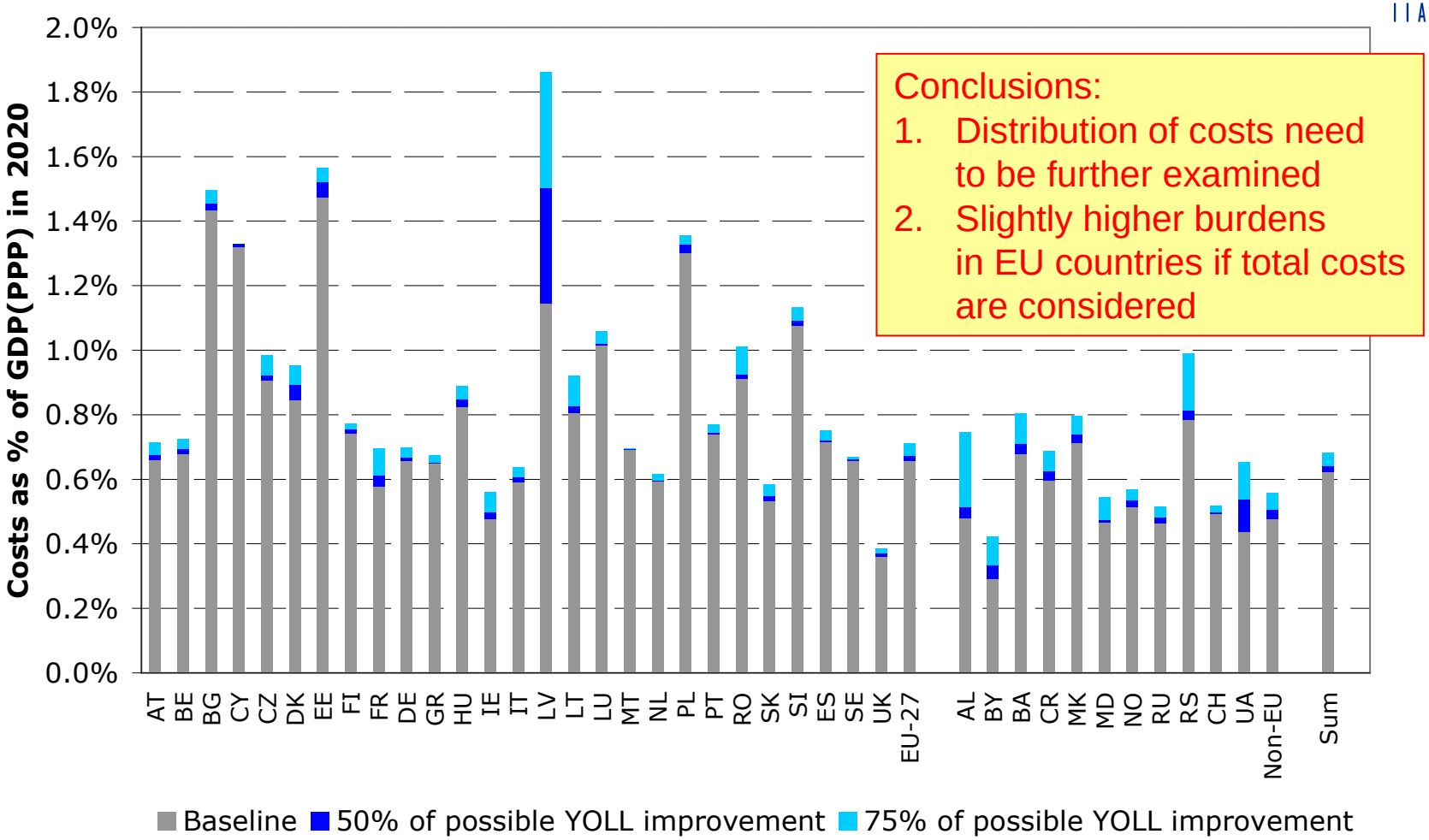
between baseline and MTFR



Conclusion:
Improvements in YOLL-% cost more than improvements for other endpoints

Provisional results!

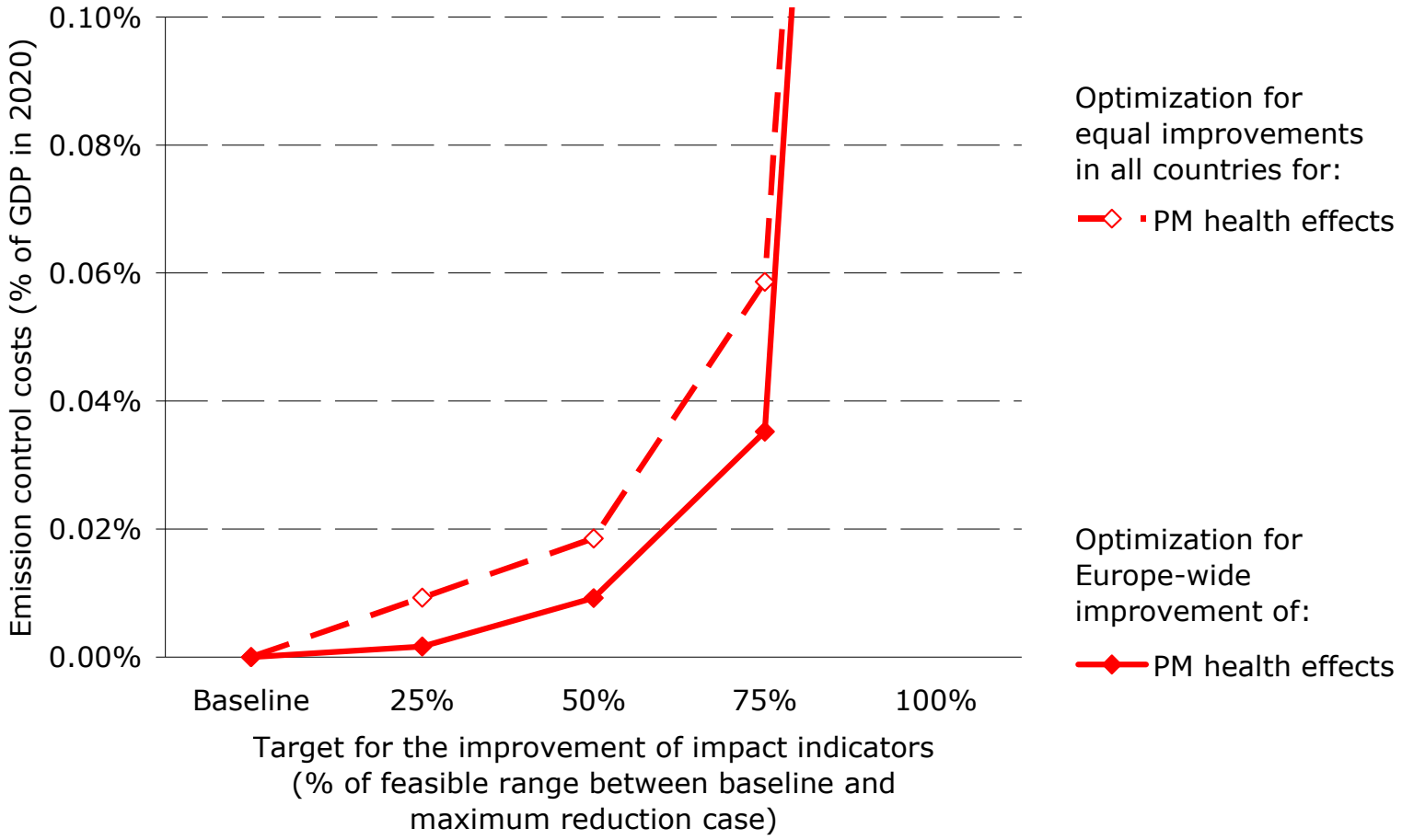
Option 3:
Emission control costs (% of GDP-PPP)
for YOLL targets (for PRIMES baseline)



Conclusions:
1. Distribution of costs need to be further examined
2. Slightly higher burdens in EU countries if total costs are considered

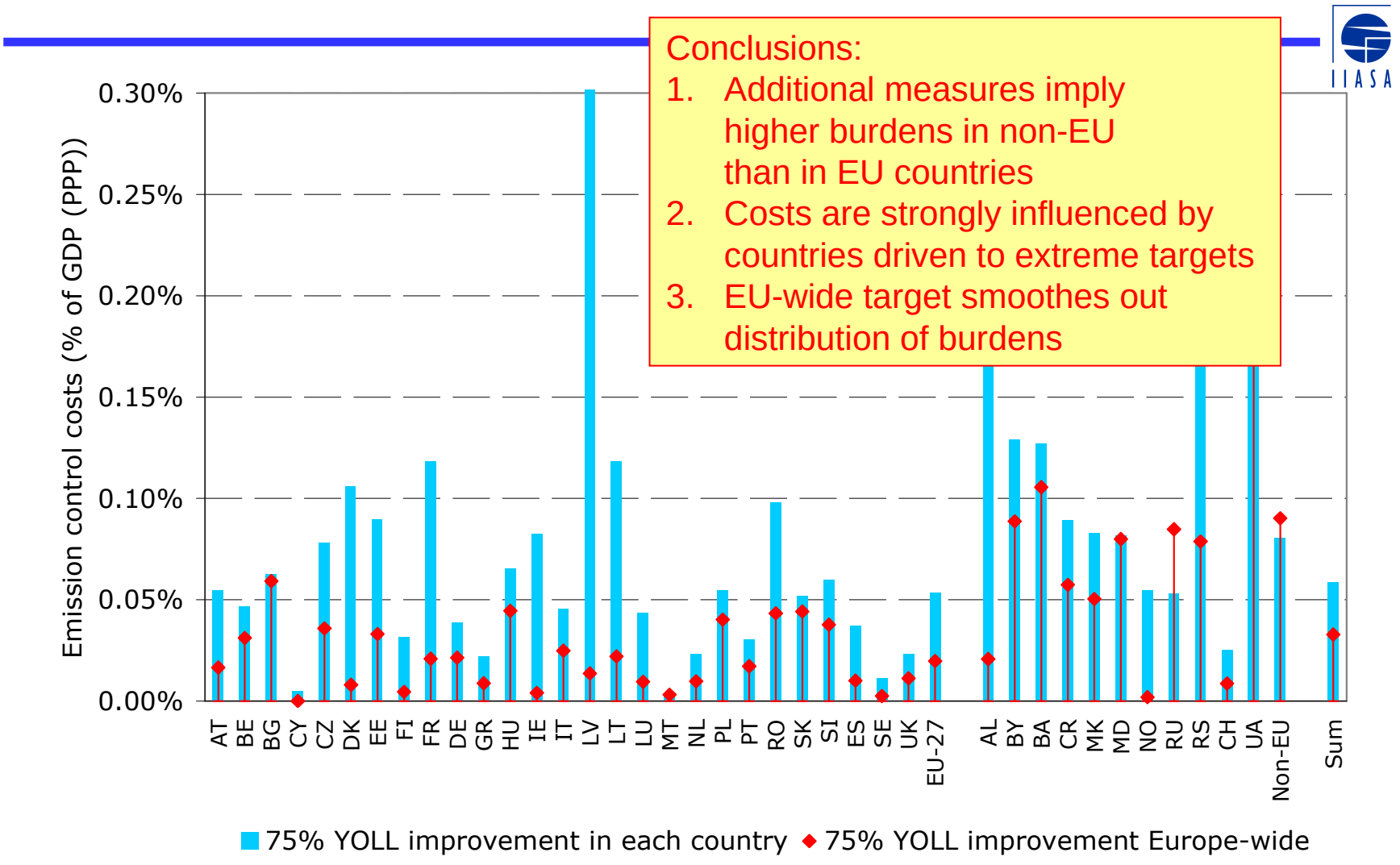
Provisional results!

Option 4:
Achieve improvements Europe-wide at least costs
Costs for YOLL target



Provisional results!

Emission control costs (on top of CLE, per GDP)
75% improvement in YOLL, country-specific vs. Europe-wide



Provisional results!

Conclusions

- Provisional results, do not include urban increments for PM and O_3

- The target setting approach will determine the ambition level and distribution of costs:
  1. Uniform absolute caps on environmental quality indicators will not produce equitable distributions of reduction costs.
  2. Equal relative improvements compared to a base year (e.g., 2000) are constrained by countries with untypical situations.
  3. 'Equal portions of the possible improvements' targets lead to more equitable distributions of costs, but are sensitive to weakly defined baselines and MTFRs.
  4. Larger spatial flexibility will reduce total costs, but result in uneven environmental benefits. (Might be acceptable for YOLLs, but questionable for ecosystems.)