Reducing health impacts due to air pollution

Addressing the "Peringe Grennfelt question"

Z. Klimont, G. Kiesewetter, F. Wagner, et al.

GAINS training workshop, IIASA, Laxenburg, 6-10 November 2023
Based on the presentation at the 9th joint session of the Steering Body to EMEP and the Working Group on Effects, 11-15, September 2023, Geneva

Ideas for new targets…

- One of the recommendations from the Saltsjöbaden 2023 Workshop:

  Define a target for reduction of PM/ozone related mortality of 50% in the next decades

- Is this feasible for example in the UNECE region?
  - Depends on where?
  - Depends on the base year chosen
  - Depends on the exact indicator (attributable deaths? Or risks per 100k?)
  - Depends on health impact calculation methodology (linear CRF? Including natural PM? Cutoff? Dynamic demography?, deaths or YOLL?, morbidity?, ozone?)

- Target ambition
  - Absolute target for the whole domain?
  - Absolute target for each country?
  - Relative target for each country (“gap closure”)?
  - Target for each country with additional city targets?
  - …

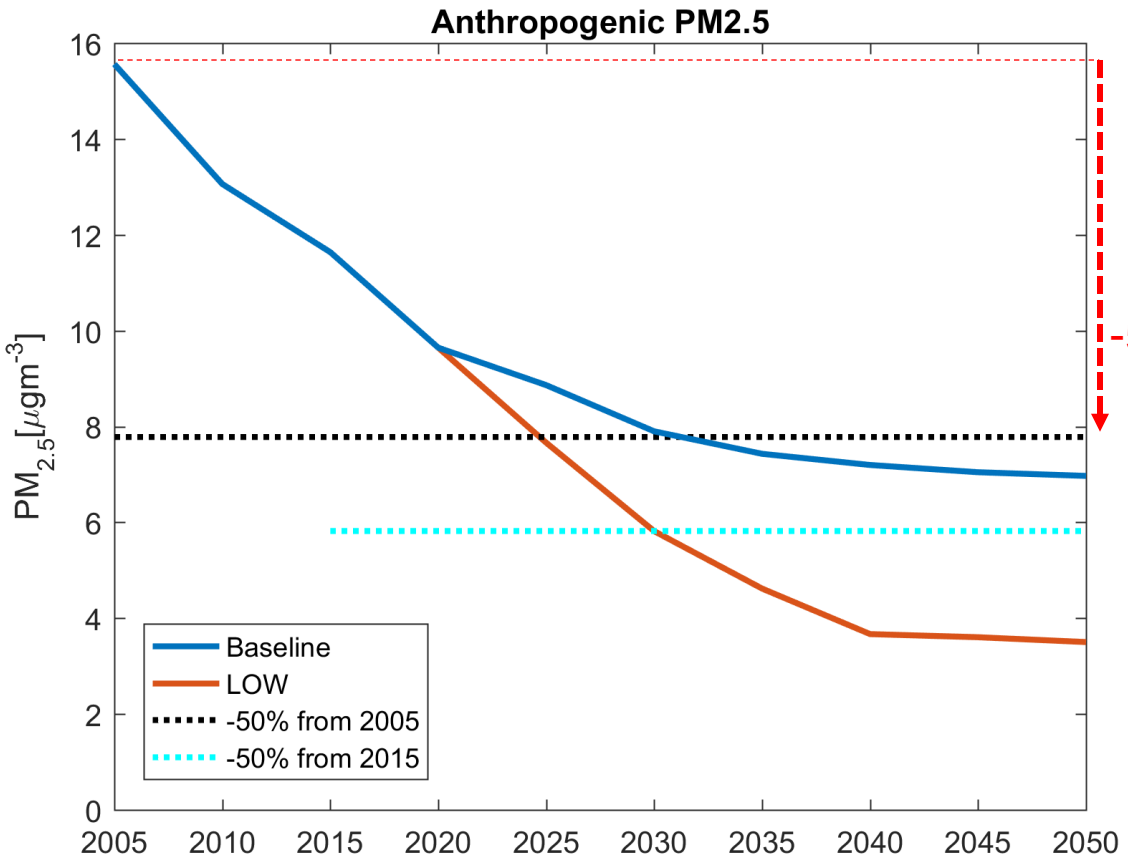
Key scenarios analyzed during review of Gothenburg Protocol

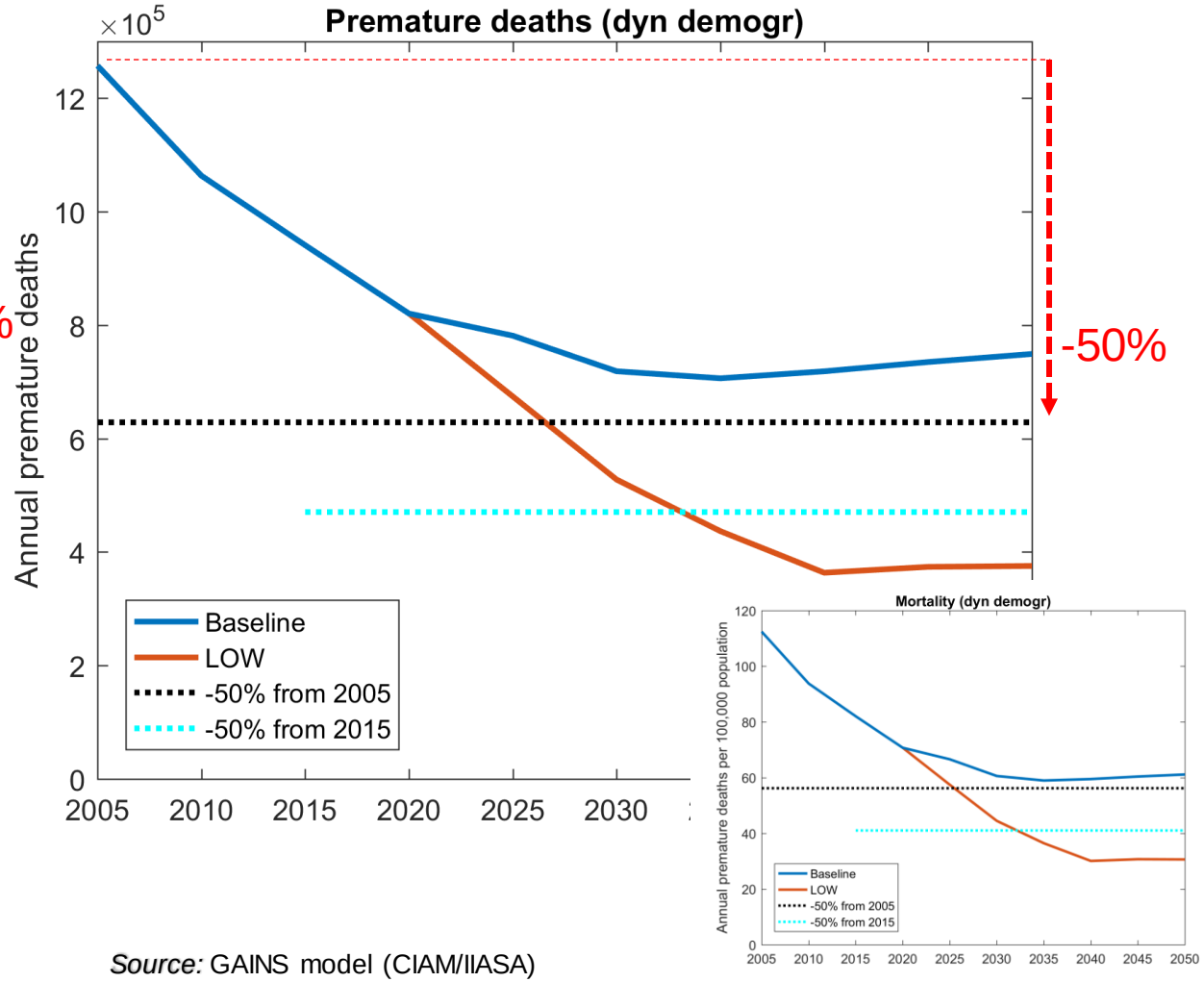
All scenarios developed for air pollutants and methane up to 2050

- *Baseline*
  - Review of the recent policies and measures and national implementation progress and plans
  - Energy, industry, and agriculture for (i) the EU – Green Deal (Fit for 55), (ii) West Balkan and selected EECCA using the same modelling tools as for EU, (iii) remaining countries – IEA &FAO
- Maximum technically Feasible Reduction '*MFR*'
- Alternative '*LOW*' scenario
  - Climate policies compatible with Paris goals; for the whole region
  - *MFR* for air quality, including shipping sources
  - Behavioural changes - dietary changes (lower meat protein consumption)

Scope for further mitigation in the UNECE region

Exploring attainability of health improvement 'goals'



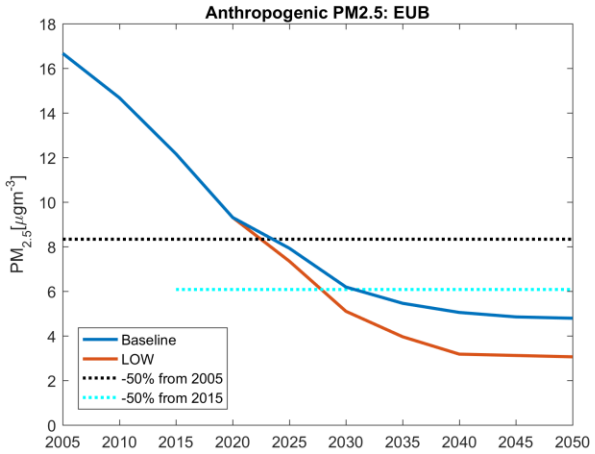


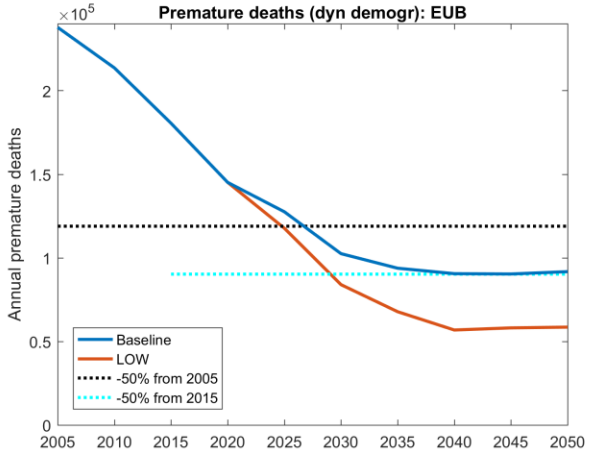
Source: GAINS model (CIAM/IIASA)

Scope for further mitigation in the UNECE region (2)

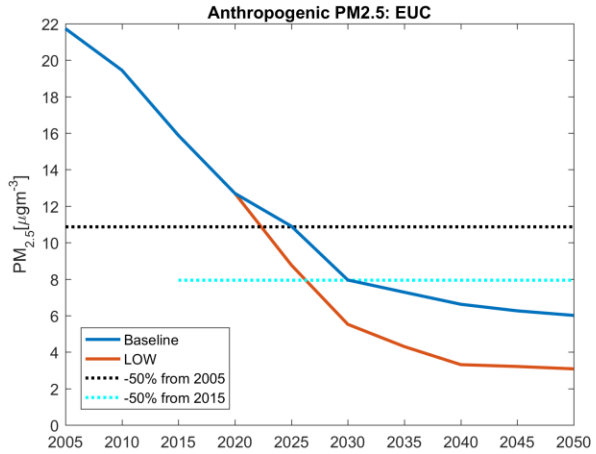
Exploring attainability of health improvement 'goals'

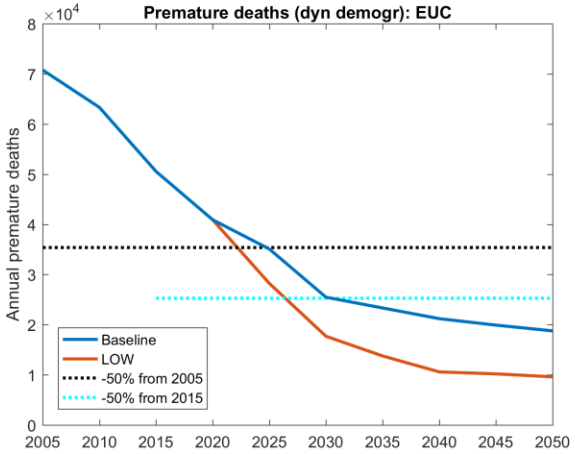
European Union (excluding group 2 + UK)



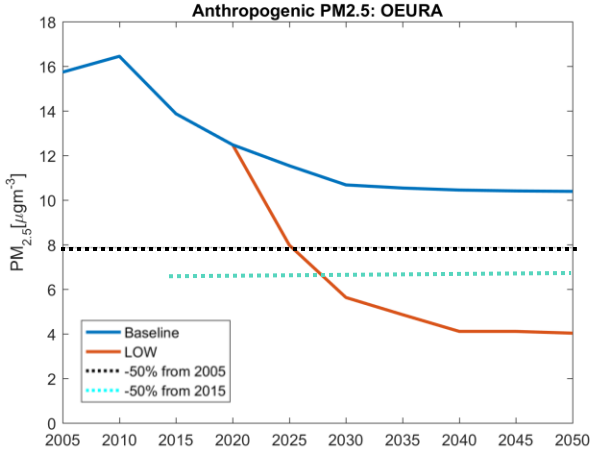


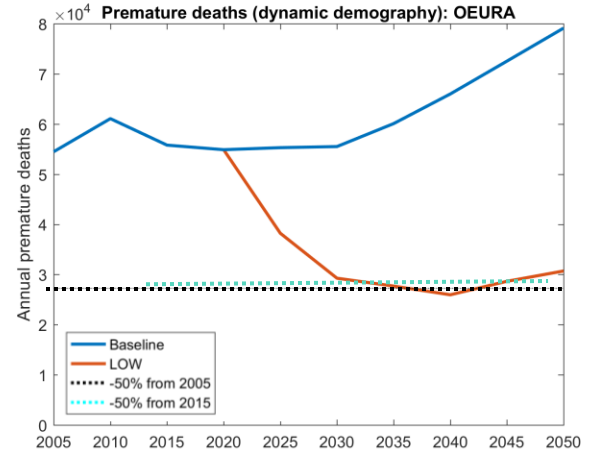
European Union (group 2 – BG, HR, CY, MT, RO)



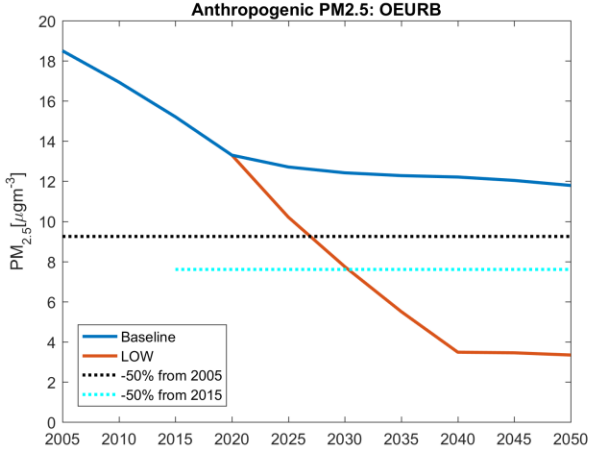


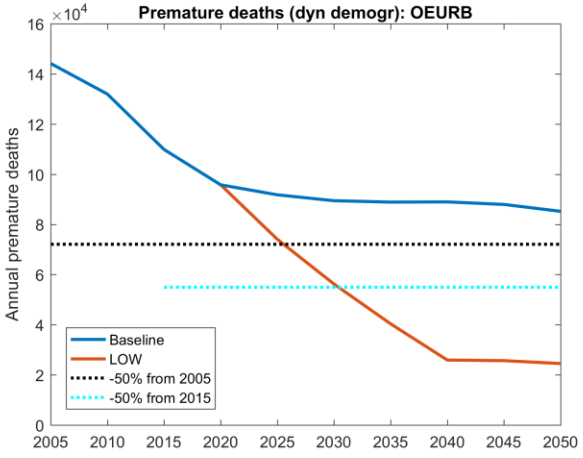
Türkiye*





West Balkan, Ukraine, Belarus





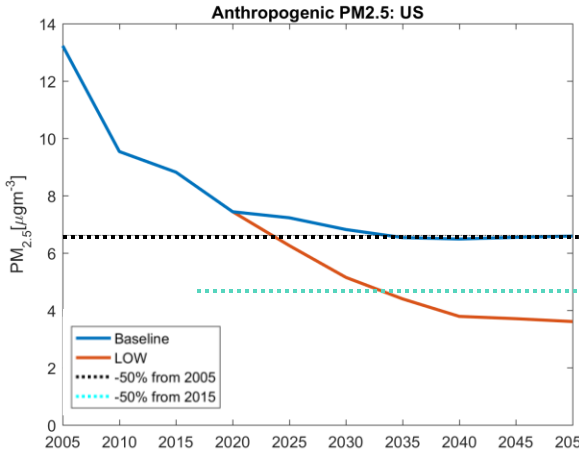
*also IS, NO, CH, IL

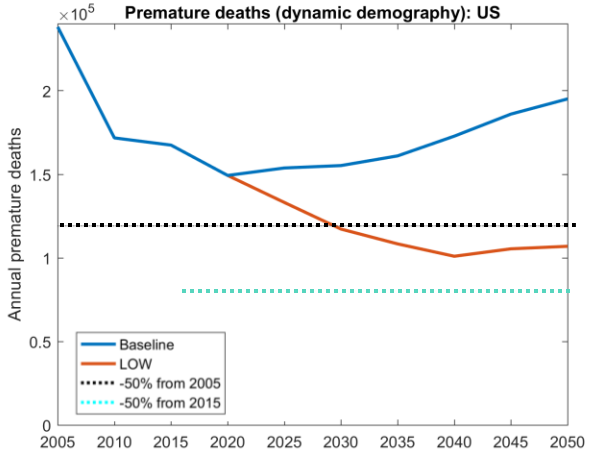
Source: GAINS model (CIAM/IIASA)

Scope for further mitigation in the UNECE region (3)

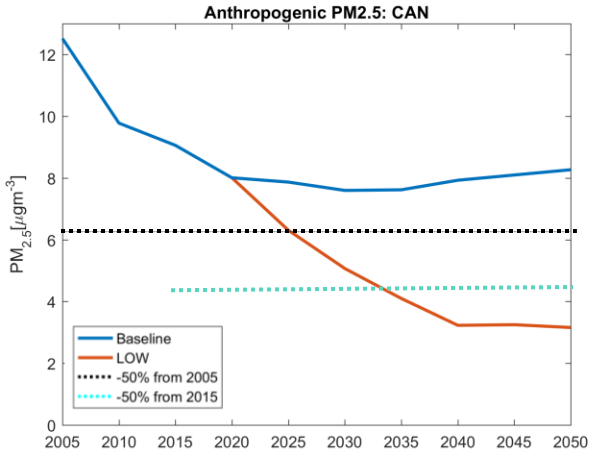
Exploring attainability of health improvement 'goals'

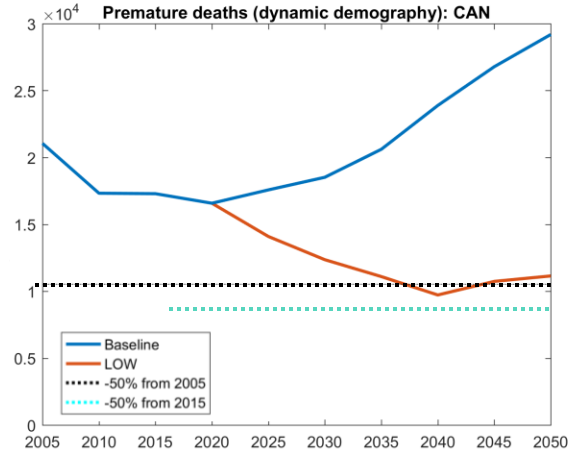
United States



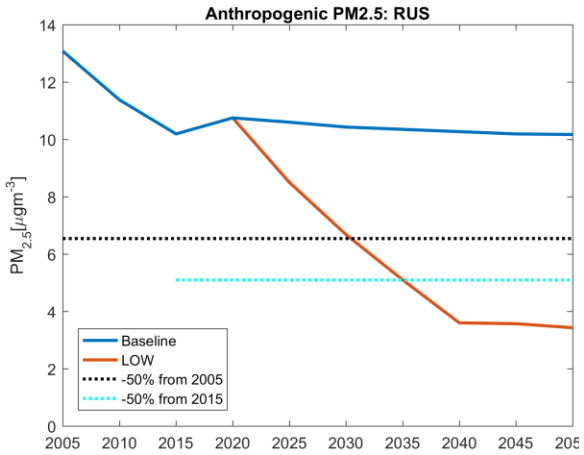


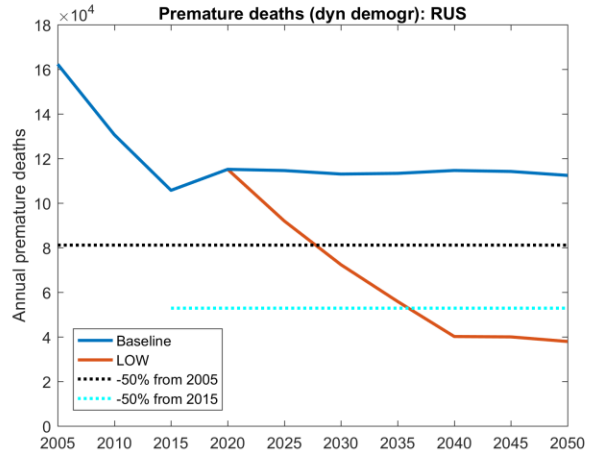
Canada



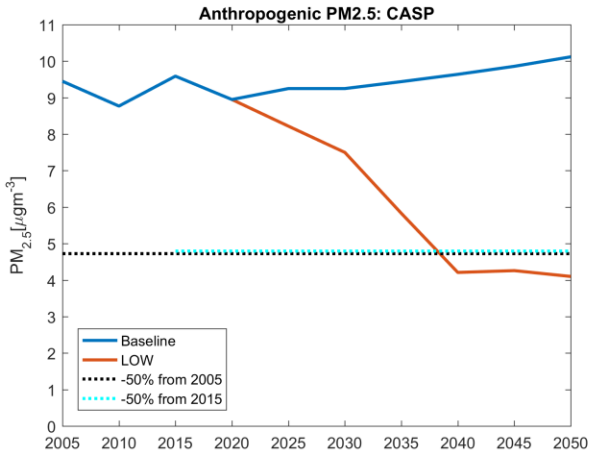


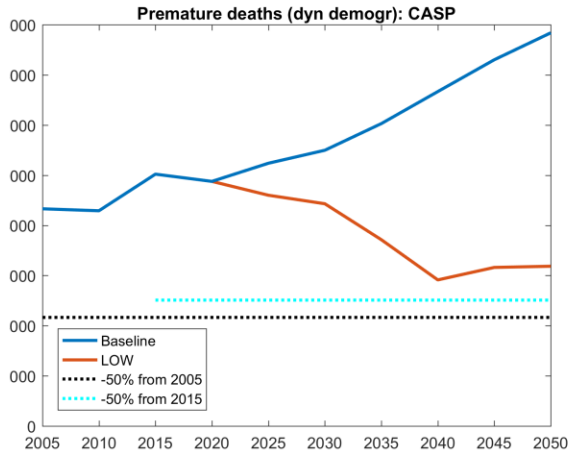
Russian Federation





EECCA (excl Belarus, Russia, Ukraine)

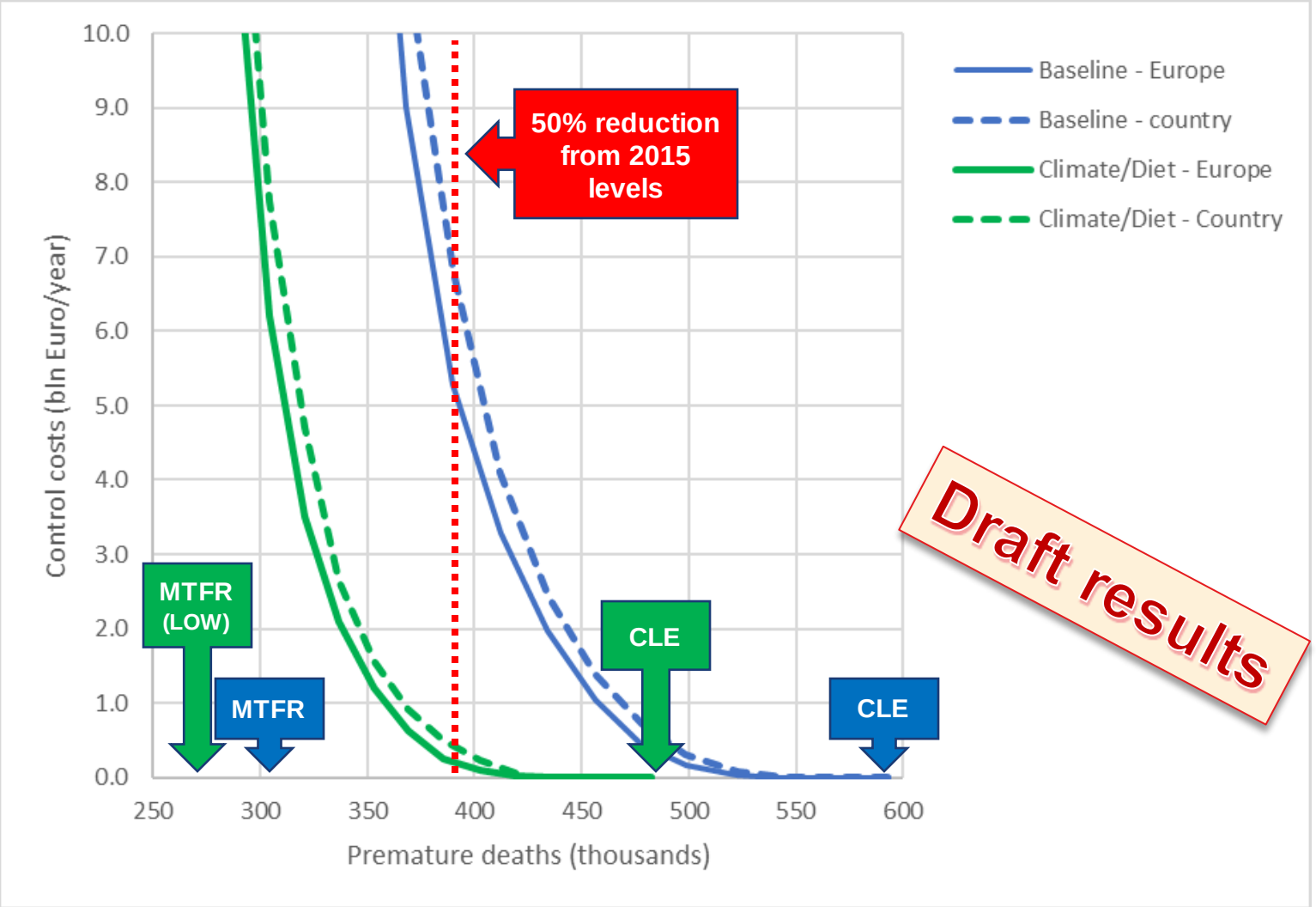




Source: GAINS model (CIAM/IIASA)

Least-cost reduction of PM health impacts in UNECE (excl. North America) by 2050

Optimization results for UNECE-wide improvements (——)
Optimization results for equal improvement in all countries (·····)



The analysis considers population growth and aging

- Full enforcement of *Baseline* policies achieves by 2050 over 40% of the target goal
- The 70% reduction of the feasible range ('gap closure') allows to achieve the 50% health target
- Preliminary estimates indicate nearly 30% higher costs for the case where equal improvements in all countries are achieved

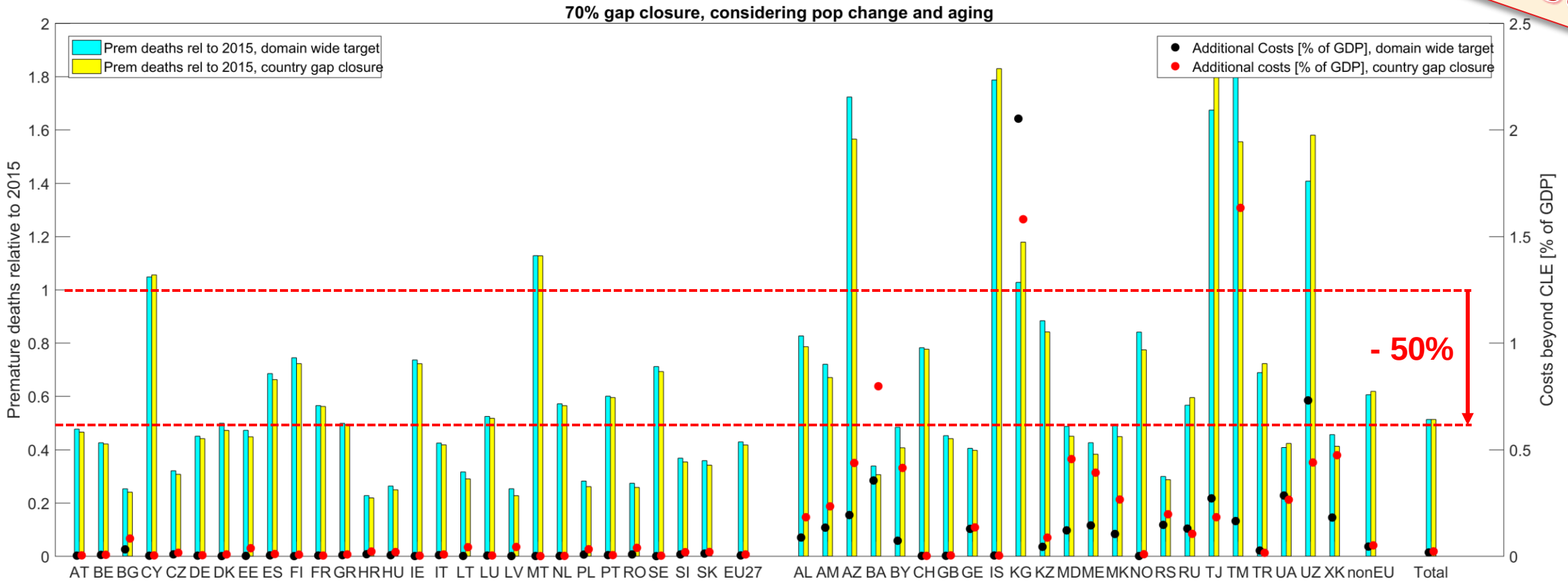
- Introduction of **climate and dietary change policies** could achieve over half of the necessary reduction to reach the 50% health target, compared to the *Baseline scenario*
- Additional air pollution control costs would be over ten times lower, however, the case with equal country improvements would be twice as expensive as UNECE target case
- In either case, some countries are not achieving 50% target or even show increase in premature mortality compared to 2015 (see next slides)

Source: GAINS model (CIAM/IIASA)

Least-cost reduction of PM health impacts in UNECE (excl. North America)

Draft results

Results for the 'Baseline' considering population growth and aging, 2050

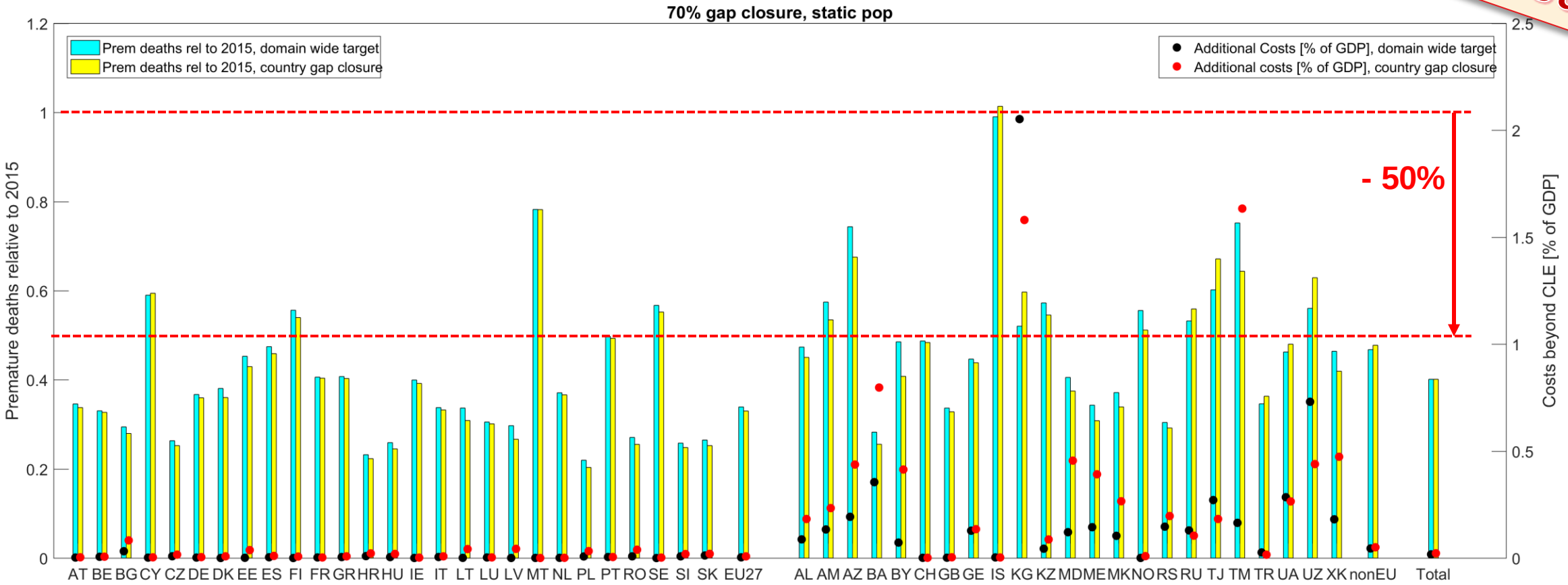


Source: GAINS model (CIAM/IIASA)

Least-cost reduction of PM health impacts in UNECE (excl. North America)

Draft results

Results for the 'Baseline' and assuming static population



Source: GAINS model (CIAM/IIASA)

Summary/Conclusions

- A 50% target appears feasible at the UNECE level, although cannot be achieved for each country for currently analysed scenarios
- A 50% target for the whole region would be more cost-effective than country level gap-closure targets ("equal improvement"), but less equitable
- Pursuing climate and dietary change policies appears essential and could get us *'half-way'* and reduce ten-fold the additional air pollution control costs (compared to *Baseline* case)

Summary/Conclusions [2]

- Comparable ozone target more challenging
  - Current air pollution policies largely offset by global increase in methane emissions
  - Feasibility of the target is more dependent on global cooperation to reduce ozone precursors, including methane
- Further analysis will consider, i.a.,
  - Alternative target setting, including achievement of ‘absolute’ country-based targets and inclusion of hot-spots (cities)
  - Ecosystems targets
  - Validation and improvement of cost estimates and assessment of cost of non-technical measures

Workplan 2024-25 [1]

- Back to **ozone**, review and update in GAINS; *with MSC-W, TFHTAP* [2024] – 1.1.1.6
- Improvements of **spatial representation of emissions,** *with MSC-W, CEIP* [2023-25] – 1.1.2.5
- Contribute to **GP revision** (as mandated by EB) and support the process with **scenario analysis**; *with other TFs and centers* [2024-25] – 1.1.3.1, 1.1.3.2, 1.1.3.4
- **GAINS development** (i.e., agr. NOx and VOC, health impacts, hydrogen economy, mercury, etc.); *with MSC-W, TFHTAP* [2023-25] – 1.1.1.5, 1.1.3.5
- Further work with and on **EECCA, Türkiye, West Balkan countries;** *with MSC-W, CEIP, TFTEI* [2023-25] – 1.2.2 (additional funding available)
- Cooperation with **Arctic Council and AMAP**; *with CEIP, MSC-W, secretariat* [2023-25] – 1.3.8 (additional funding available)
- **Support the Forum (FICAP)** to the extent that is desirable and feasible [2023-25]

Workplan 2024-25 [2]

- Documenting CIAM \GP review **scenarios**; long overdue *journal paper* [2024]
- Contribution to **EMEP** *reports* **and MSC-W** *journal papers* [2023-24]
- Updated **global Hg inventory and projections** in GAINS; *journal paper* [2024]
- **Across the scales** –support development and formulation of effective measures and policies to address regional and local, including rural/urban, interactions; *journal paper* [2024]
- **Feasibility of mitigation of methane** and/or impact of not implementing any further policies; *journal paper* [2024]
- GAINS extension to include **NMVOC speciation**, including also for gridded outputs; *journal paper* [2024]