TFIAM 52

Utrecht - 24-26 May 2023

Changing co-chairs: Simone Schucht (FR) incoming

We discussed:

1. Scenarios from CIAM and TF HTAP that could support further policy development
2. Differences in national assessments
3. Input for guidance document on “non-technical measures”
4. TFIAM workplan 2024-2025

Reducing health impacts due to air pollution

Addressing the "Peringe Grennfelt question"

G. Kiesewetter, Z. Klimont, F. Wagner (CIAM) and MSC-W

How to define health impacts?

- Total premature deaths, with/without population growth and aging?
- Mortality risk per 100.000
- PM2.5 + Ozone?

Developments in GAINS and EMEP modelling

- GAINS is made ready to assess sectoral policies (“staged approaches”)
  - ***In which order will sectors be addressed?***

- GAINS and EMEP-model are ready to assess local air quality & policies

- GAINS is now ready for cost-optimized scenarios for the whole UNECE region

- Meeting critical loads for nitrogen proves to remain a challenge in several parts of Europe – what can efficient nitrogen use contribute?

Lessons from national modelling

1. There are different views on what current legislation for climate and energy policy entails
2. There are different views on the impact of some of the climate measures for air quality: e.g.: CCS and the use of hydrogen or ammonia as energy carriers
3. Different methodologies are used to estimate health improvements
4. The are different approaches to the application of bias corrections of models, in air quality projections

Guidance on non-technical measures

- Definitions, assessment methodologies , link with policy instruments:
  - *Awareness raising*
  - *Regulation*
  - *Pricing*
  - *Infrastructure (nudging)*

2. Successful examples for heating, mobility, dietary change

3. Estimates of potential contribution to meeting air quality targets

Work plan 2024-2025

- TFIAM and CIAM are prepared for supporting policy development with **scenario analyses**:   which ?
- TFIAM will work on a **guidance document** on “non-technical” measures to be ready in 2024
- TFIAM will report on progress in clean air policies in **cities** (EPCAC)

- On the long-term agenda: how to best address **equity** issues?

Reducing health impacts due to air pollution

Addressing the "Peringe Grennfelt question"

G. Kiesewetter, Z. Klimont, F. Wagner (CIAM) and MSC-W

Ideas for new targets…

- One of the recommendations from the Saltsjöbaden 2023 Workshop:

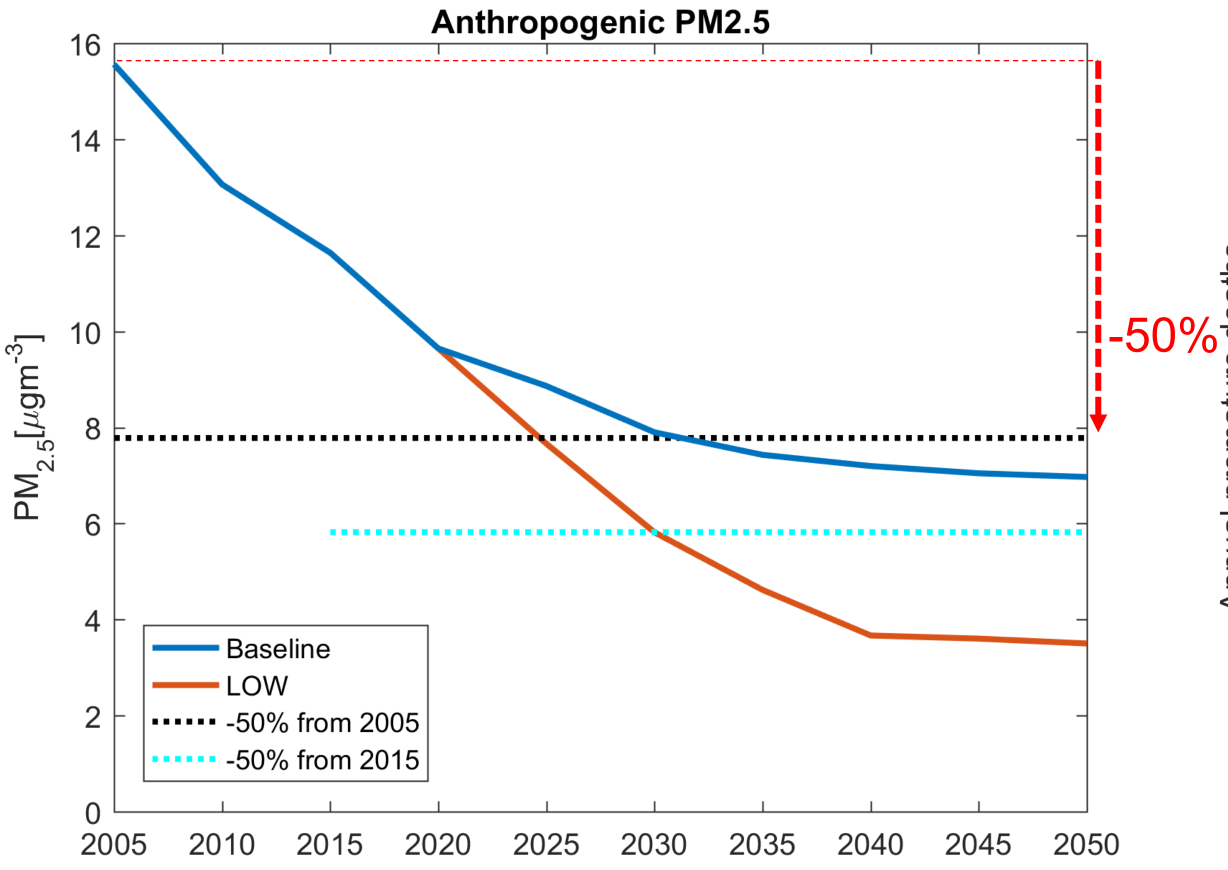
  Define a target for reduction of PM/ozone related mortality of 50% in the next decades

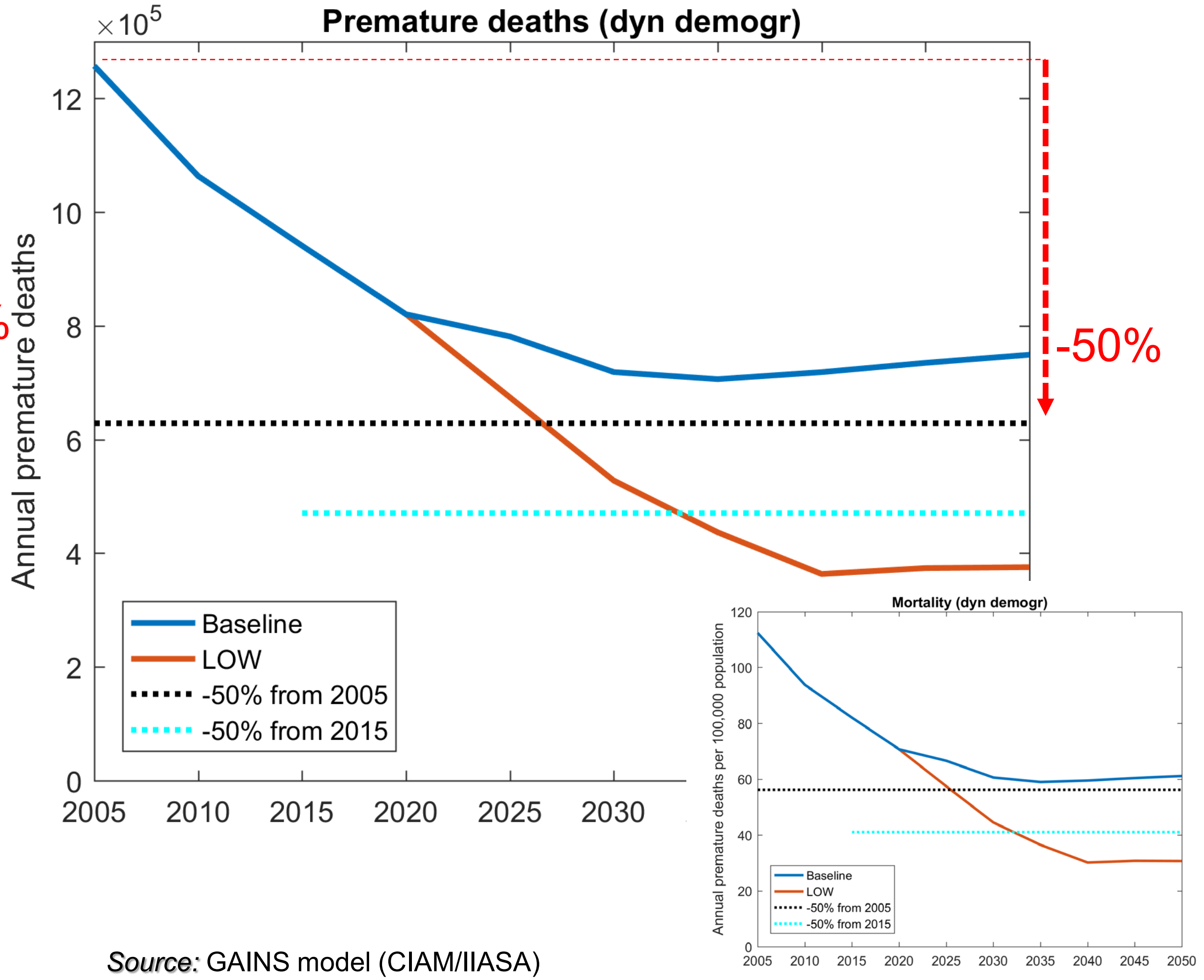
- Is this feasible for example in the UNECE region?
  - Depends on where?
  - Depends on the base year chosen
  - Depends on the exact indicator (attributable deaths? Or risks per 100k?)
  - Depends on health impact calculation methodology (linear CRF? Including natural PM? Cutoff? Dynamic demography?,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

Scope for further mitigation in the UNECE region

Exploring attainability of health improvement 'goals'



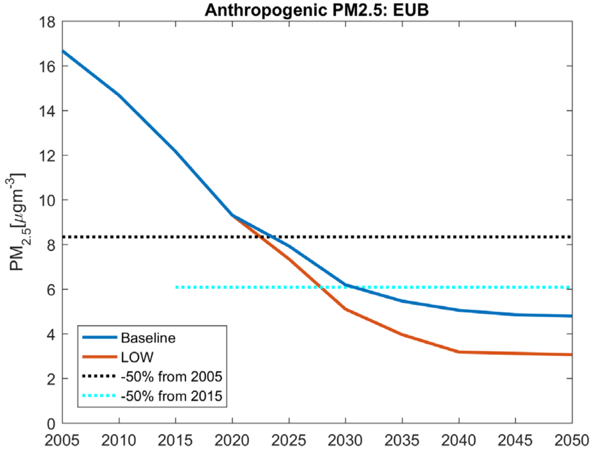


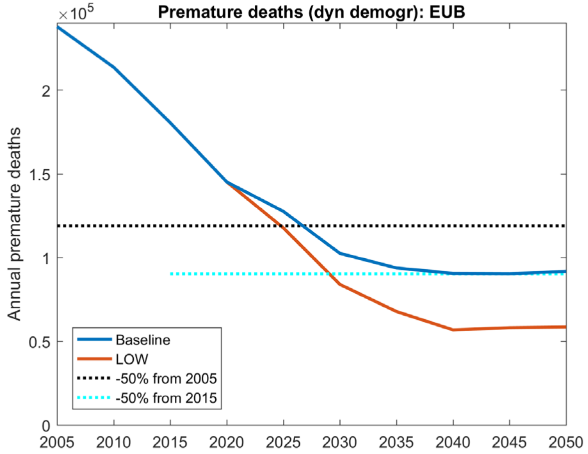
Source: GAINS model (CIAM/IIASA)

Scope for further mitigation in the UNECE region (2)

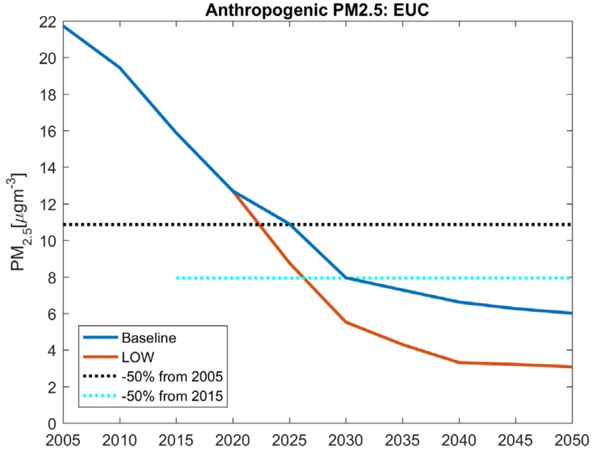
Exploring attainability of health improvement 'goals'

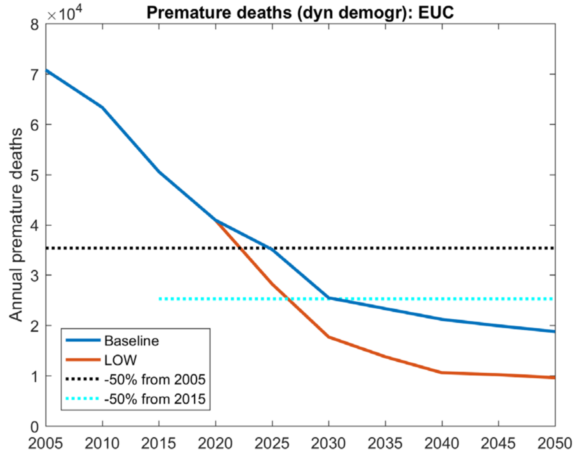
European Union (excluding group 2 + UK)



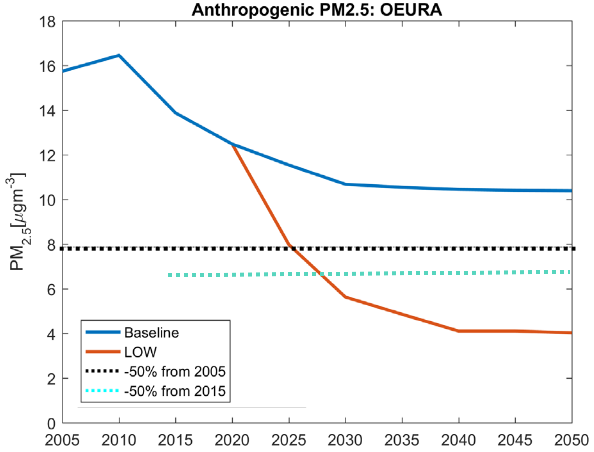


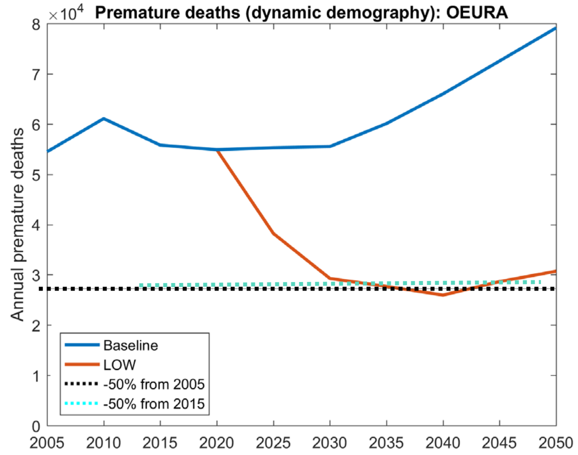
European Union (group 2 – BG, HR, CY, MT, RO)



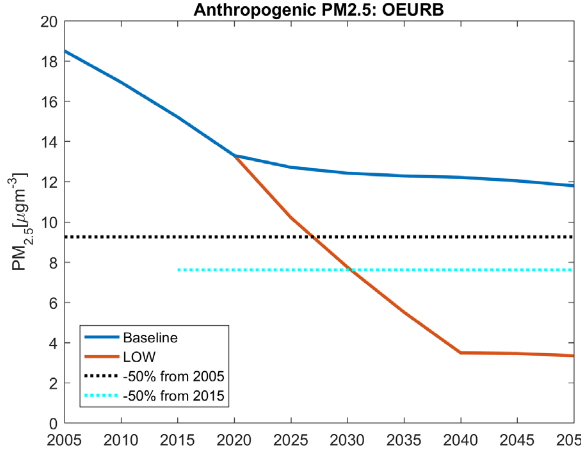


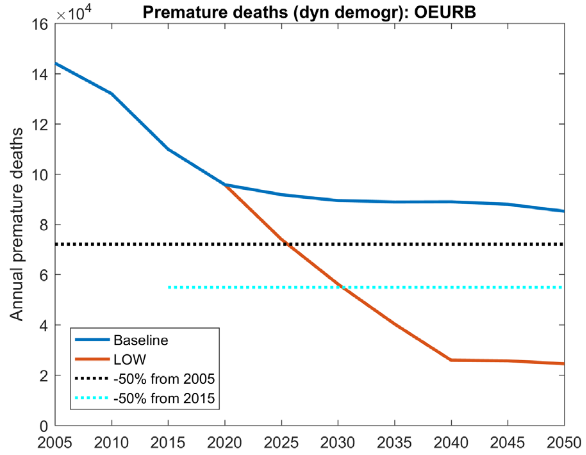
Türkiye (also IS, NO, CH, IL)





West Balkan, Ukraine, Belarus



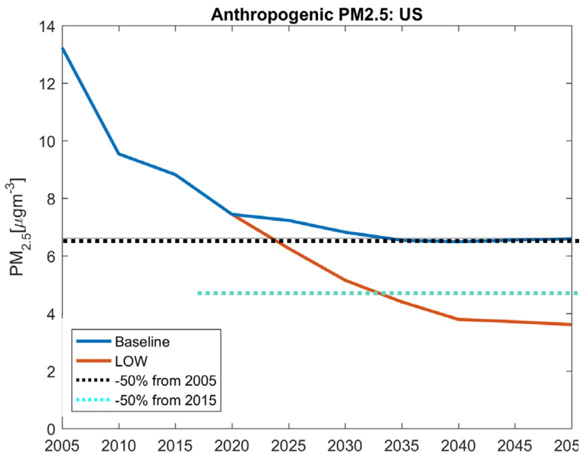


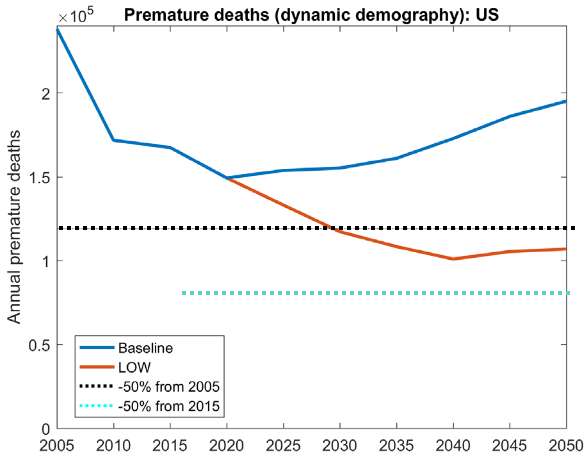
Source: GAINS model (CIAM/IIASA)

Scope for further mitigation in the UNECE region (3)

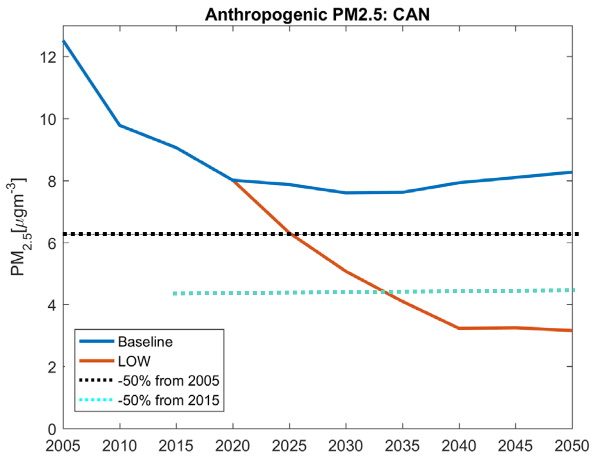
Exploring attainability of health improvement 'goals'

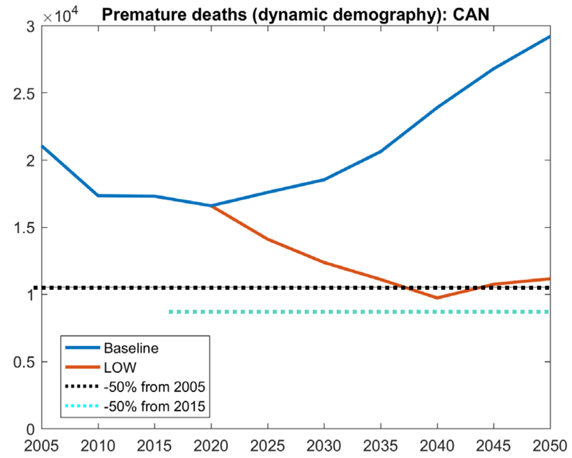
United States



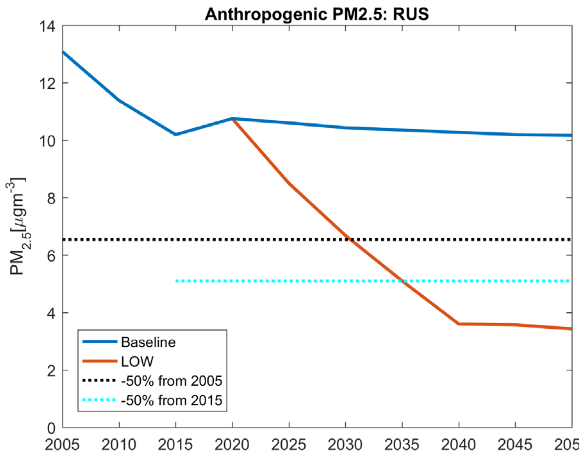


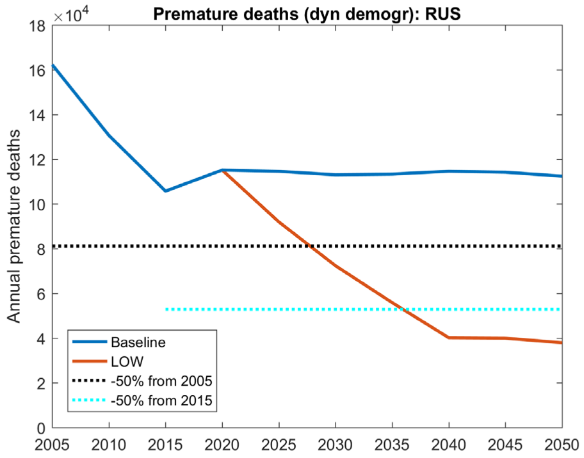
Canada



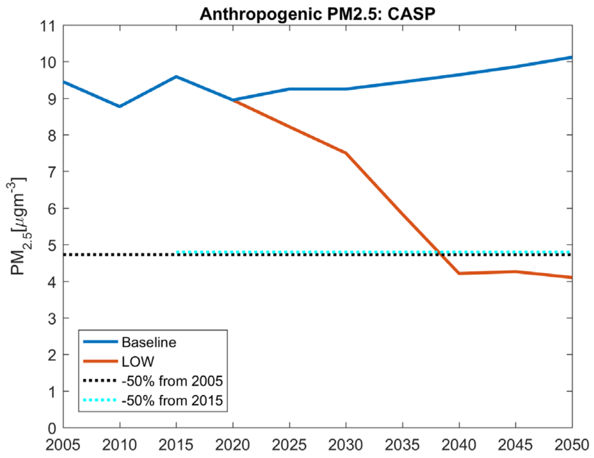


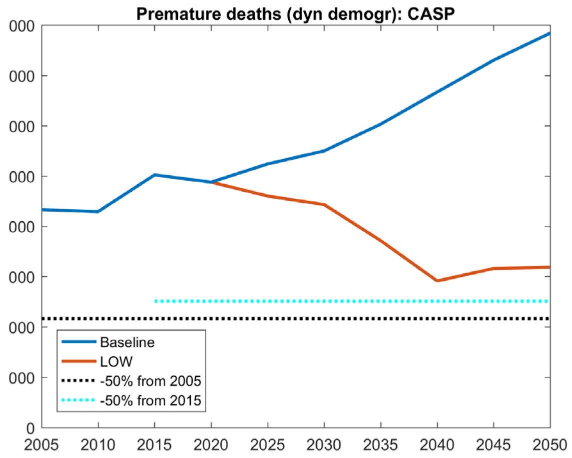
Russian Federation





EECCA (excl Belarus, Russia, Ukraine)

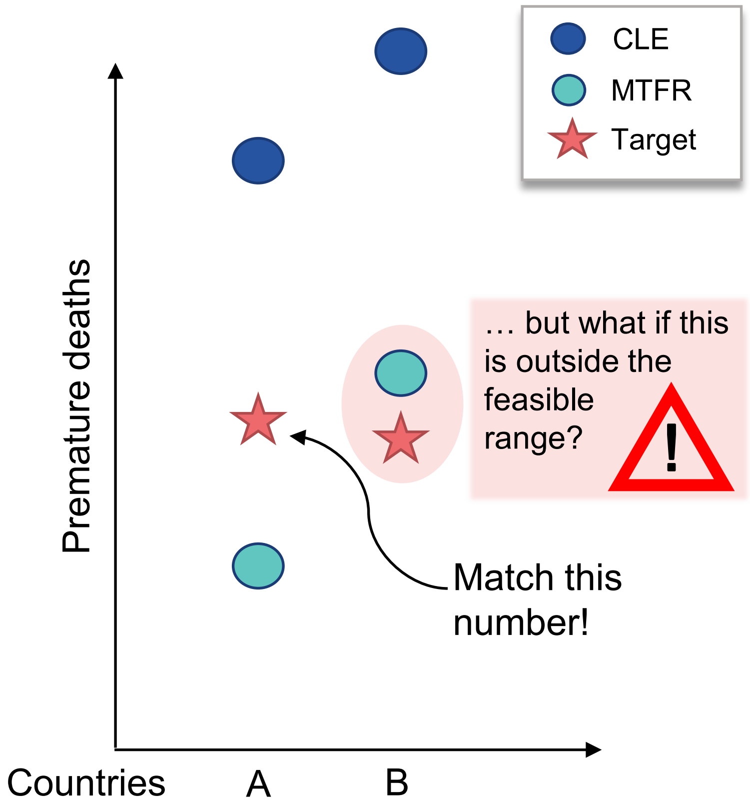




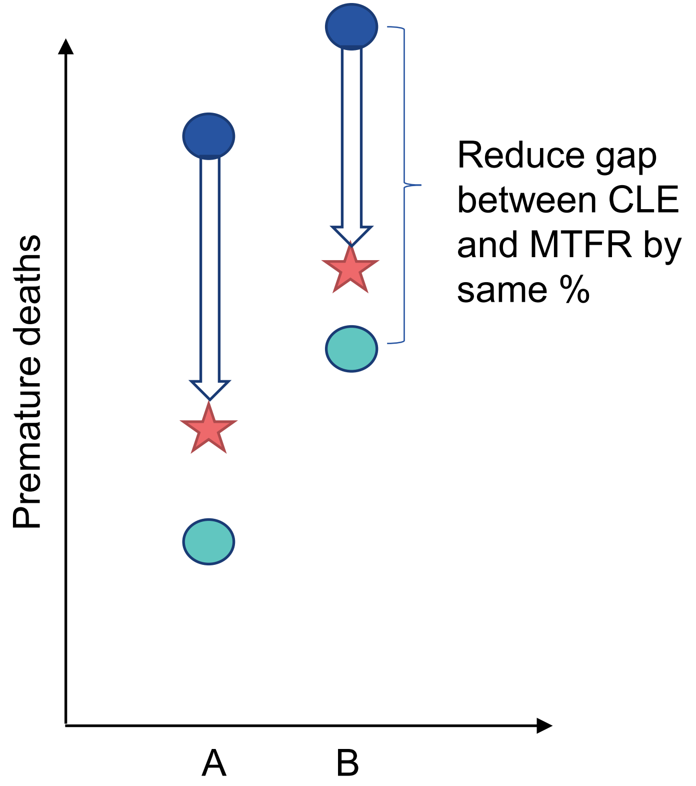
Source: GAINS model (CIAM/IIASA)

Target setting approaches

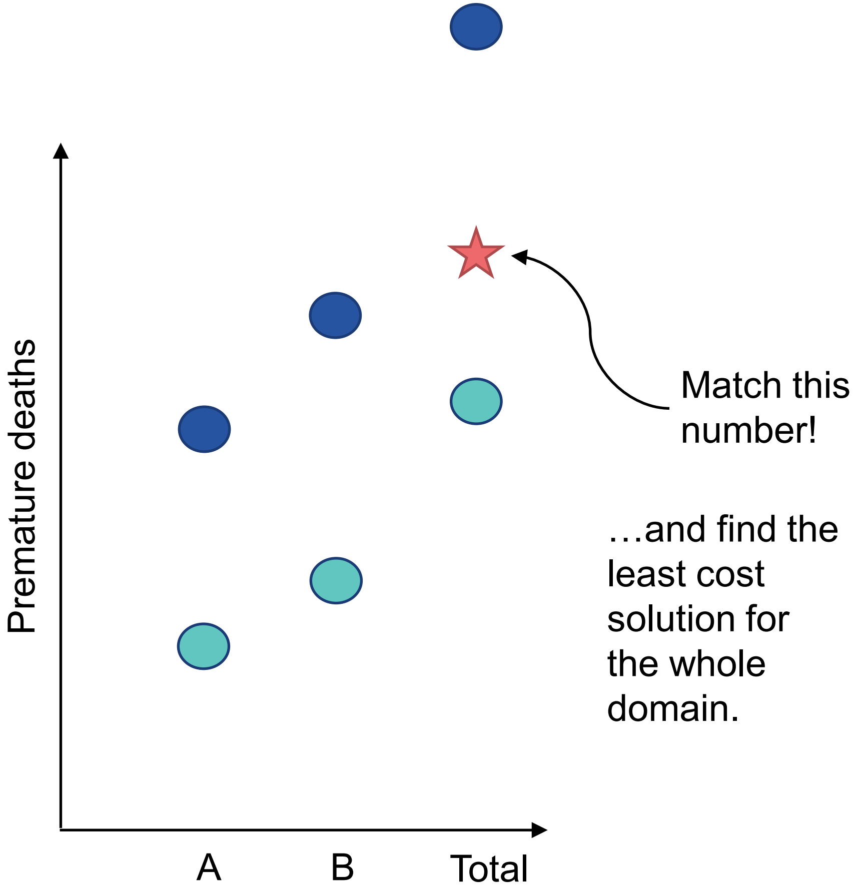
1. Absolute -50% target per country



2. Gap closure approach – Equal progress



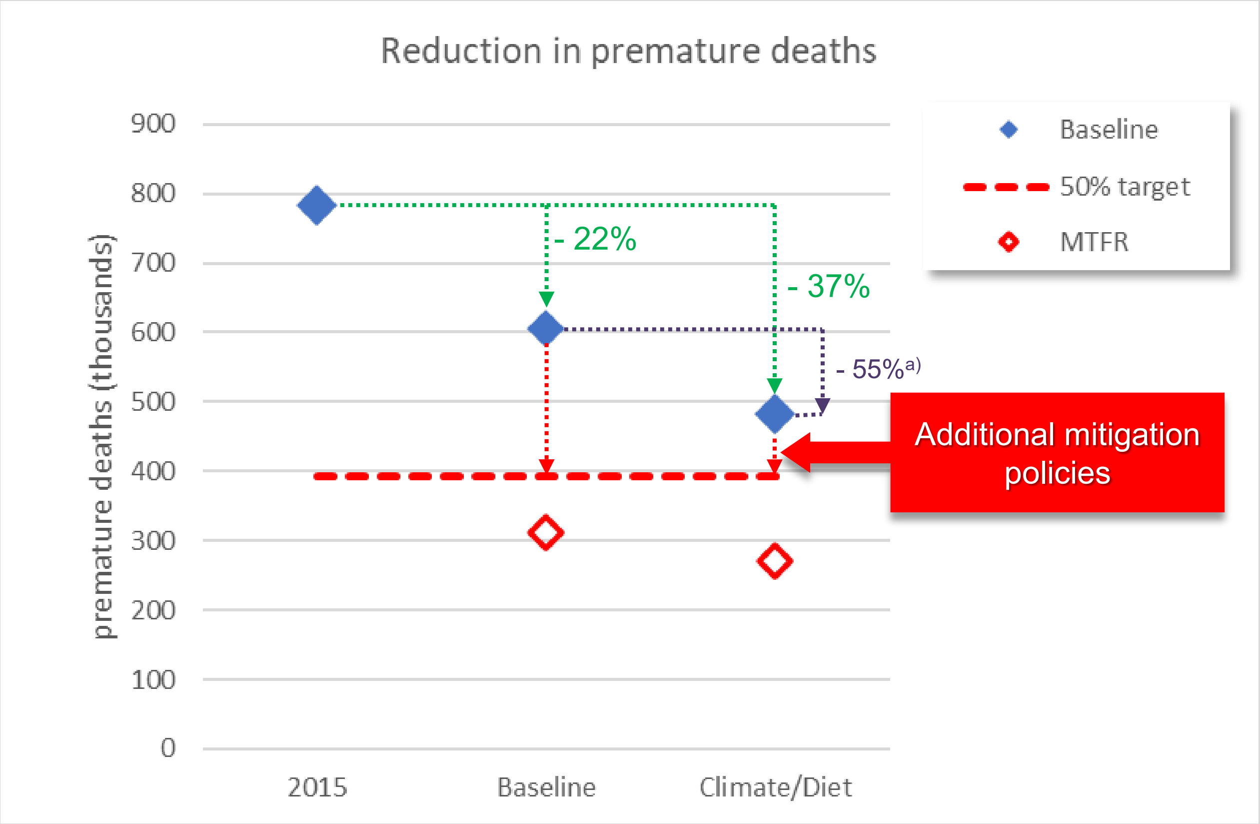
3. Domain wide target – least cost

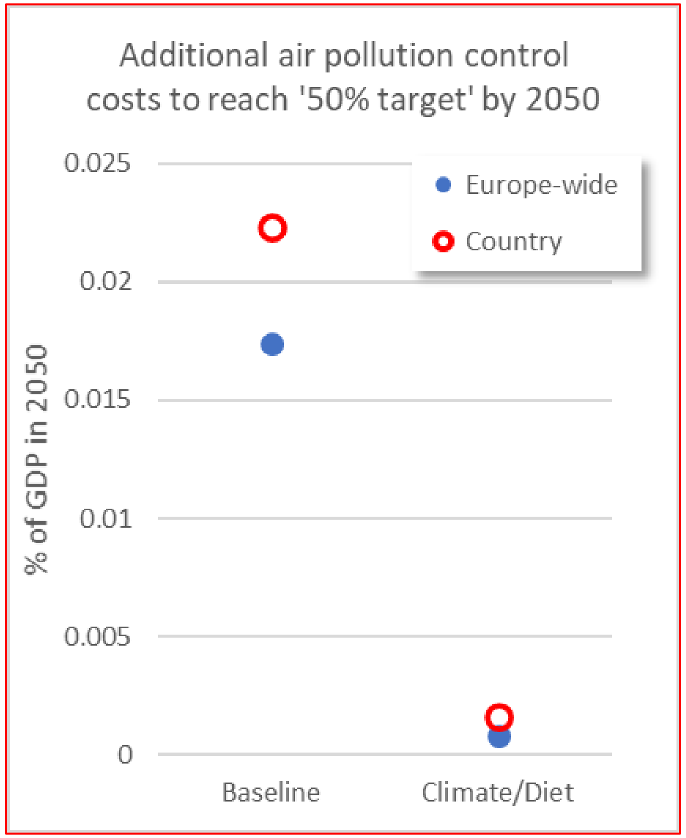


Pathway to reduction of PM health impacts in UNECE* by 2050

Draft results

This analysis includes population growth and aging





50% target appears **feasible** at the European scale

Successful **implementation of current policies** will be essential

Climate and dietary policies would play a key role providing for several co-benefits and reducing additional pollution control costs

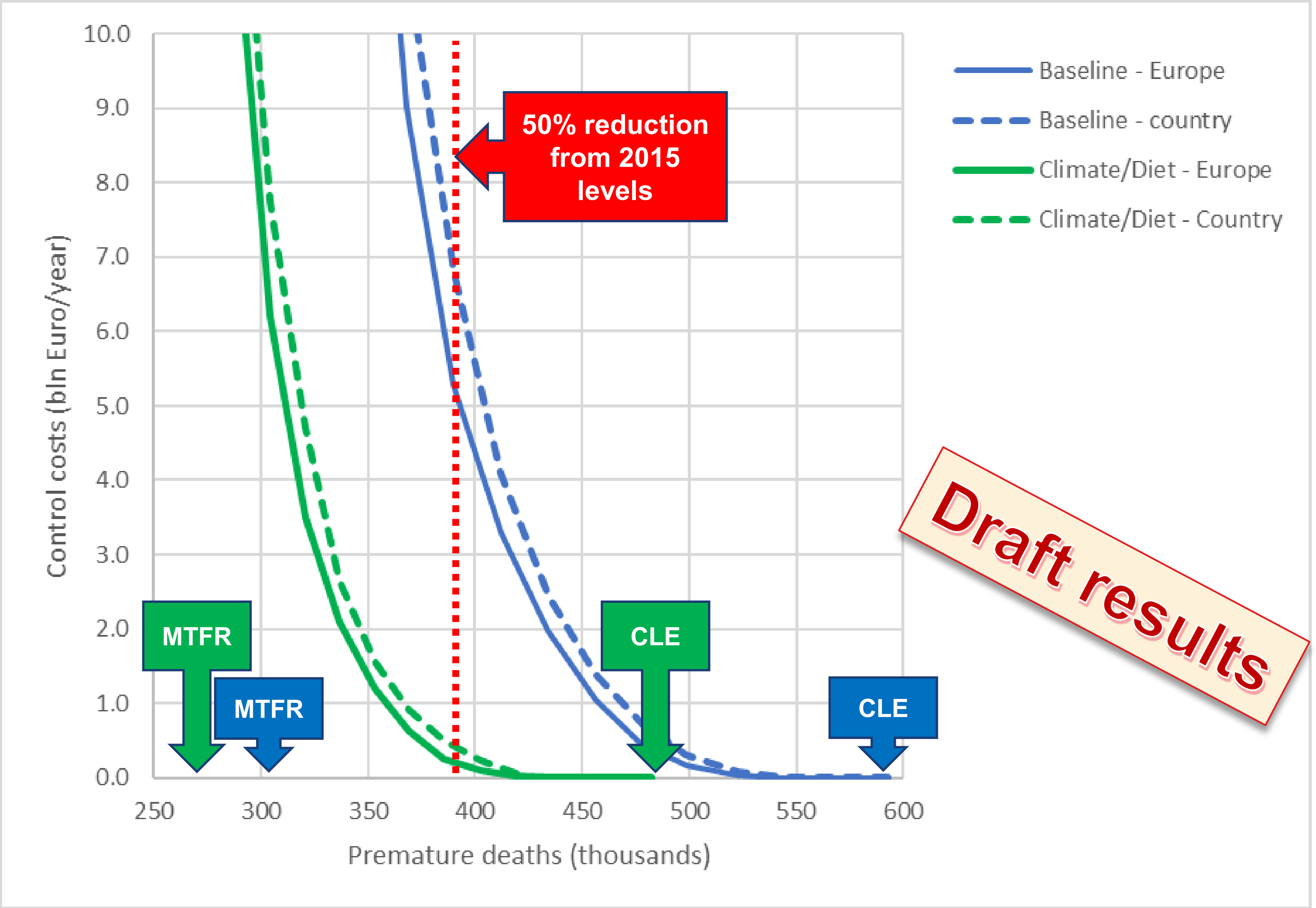
[a] % reduction refers to reduction necessary from the *Baseline* case (in 2050) to reach the target

* Excluding North America

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 (·····)



- 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 European 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)

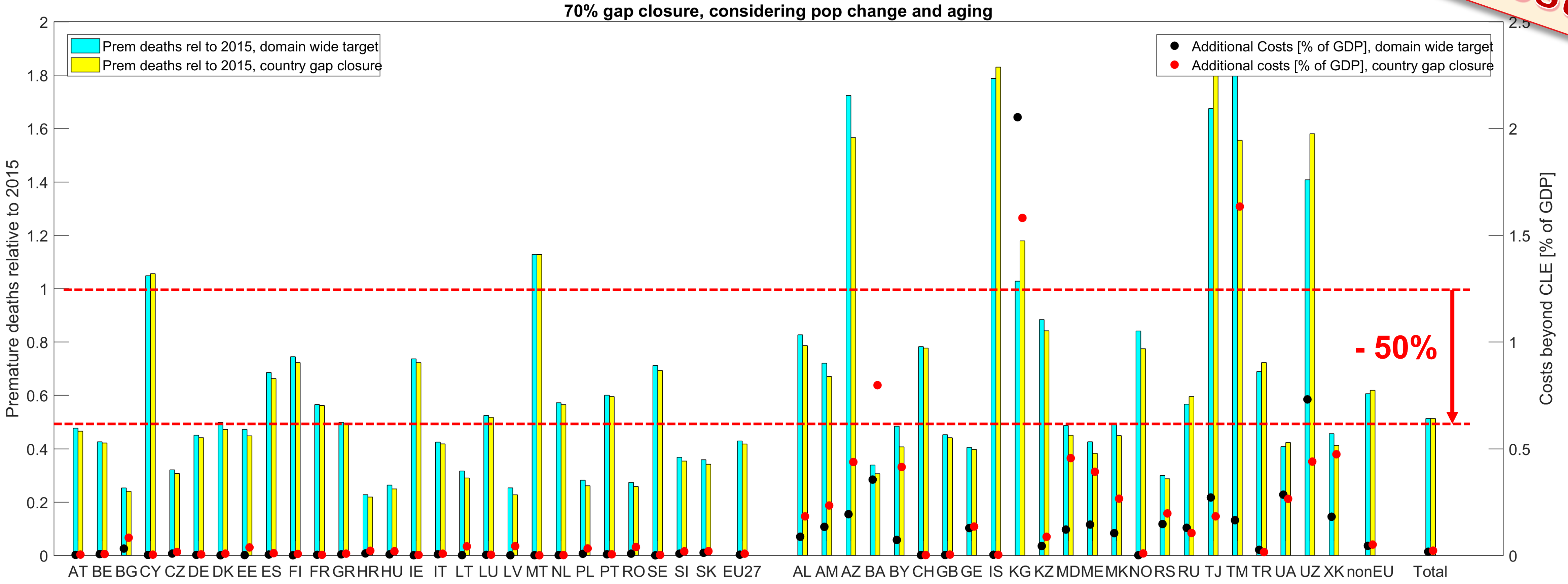
The analysis considers population growth and aging

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

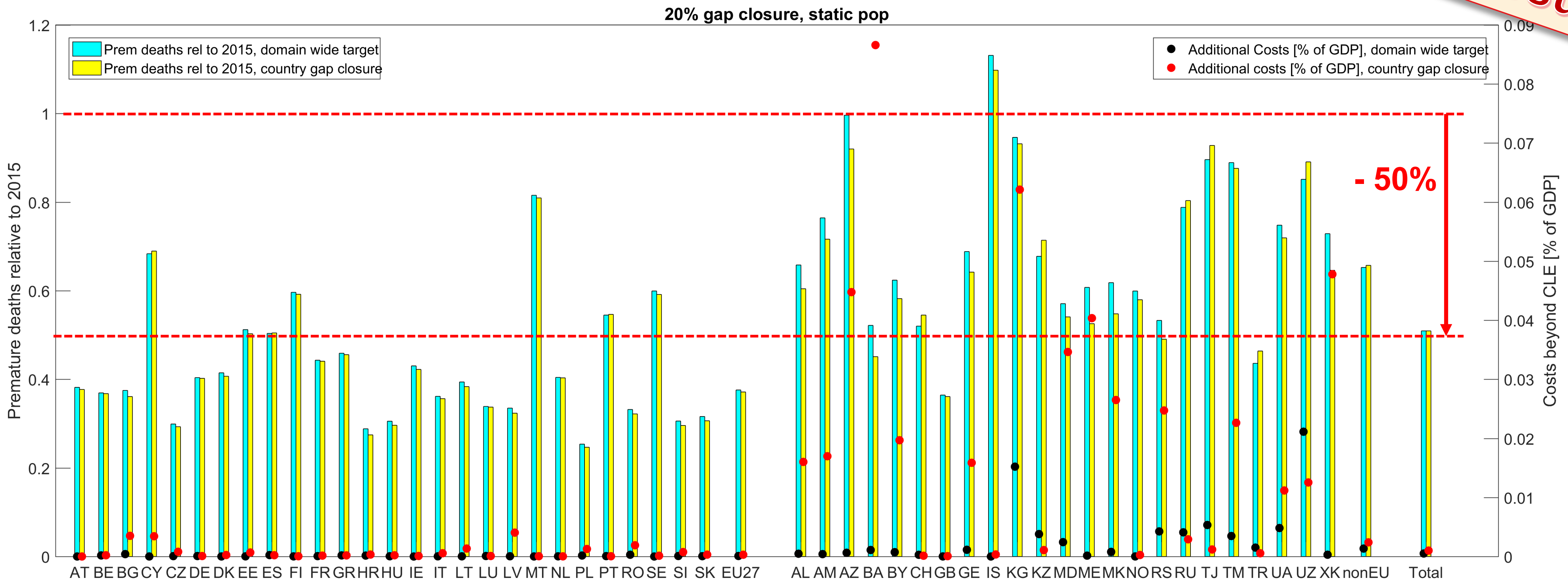


Source: GAINS model (CIAM/IIASA)

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

Draft results

Results for the ‘Baseline’ and assuming static population

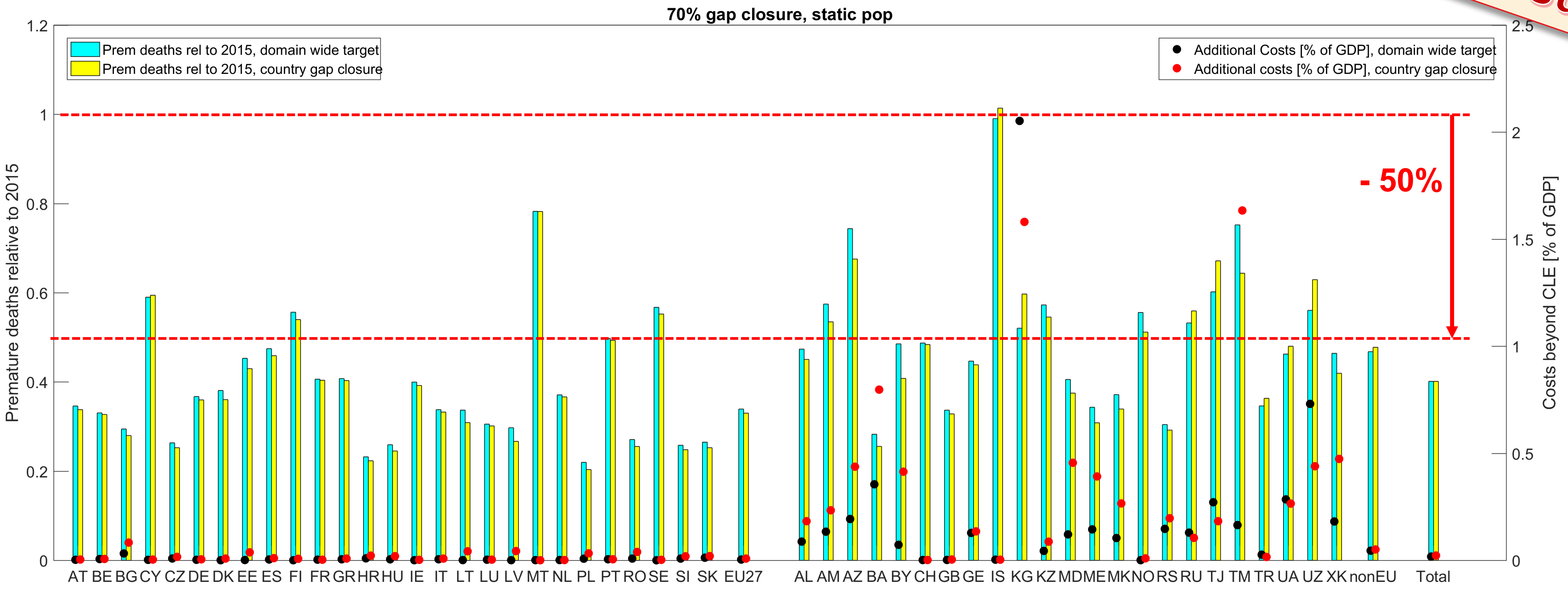


Source: GAINS model (CIAM/IIASA)

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

Feasibility of a '-50% health target (premature deaths due to PM)'

Appears achievable in the UNECE region as a whole and in most but not all countries. Feasibility depends on details of the calculation, reference year, formulation of potential other targets (e.g., for cities, adding morbidity)

- For EU the target is already achieved in the baseline scenario
- Some non-EU countries may struggle to achieve such a target for themselves
- A target (roughly) proportional to anthropogenic $PM_{2.5}$ exposure seems more achievable
- A 50% target for the whole region would be more cost-effective, but less equitable
- Pursuing climate and dietary change policies appears essential and could get us *'half-way'* and reduce ten-fold additional air pollution control costs (compared to *Baseline*)

Ozone - impact of future emission policy

Action on methane would only be part of the solution; NOx/VOC emission reductions would still be very important to reduce surface O_3

- **Baseline**
  - Average ozone concentrations in Europe will **increase** by 2-5% between 2015 and 2050. Peak season concentrations will be **reduced** around 5-10%. In both cases, CH_4 emission increase in the baseline scenario hampers the reductions expected from NOx/VOC declines

- **From 2015 baseline to 2050 LOW** (including global 50% CH_4 emission reduction) would:
  - **Reduce** average ozone concentrations by around 15% and peak season concentrations by around 25%
  - About 20% of the annual mean ozone reduction is driven by reductions in CH_4, compared to only 12% for peak season
  - For ozone mean, transcontinental non-CH_4 sources dominate over European sources, whilst for peak season European non-CH_4 sources dominate

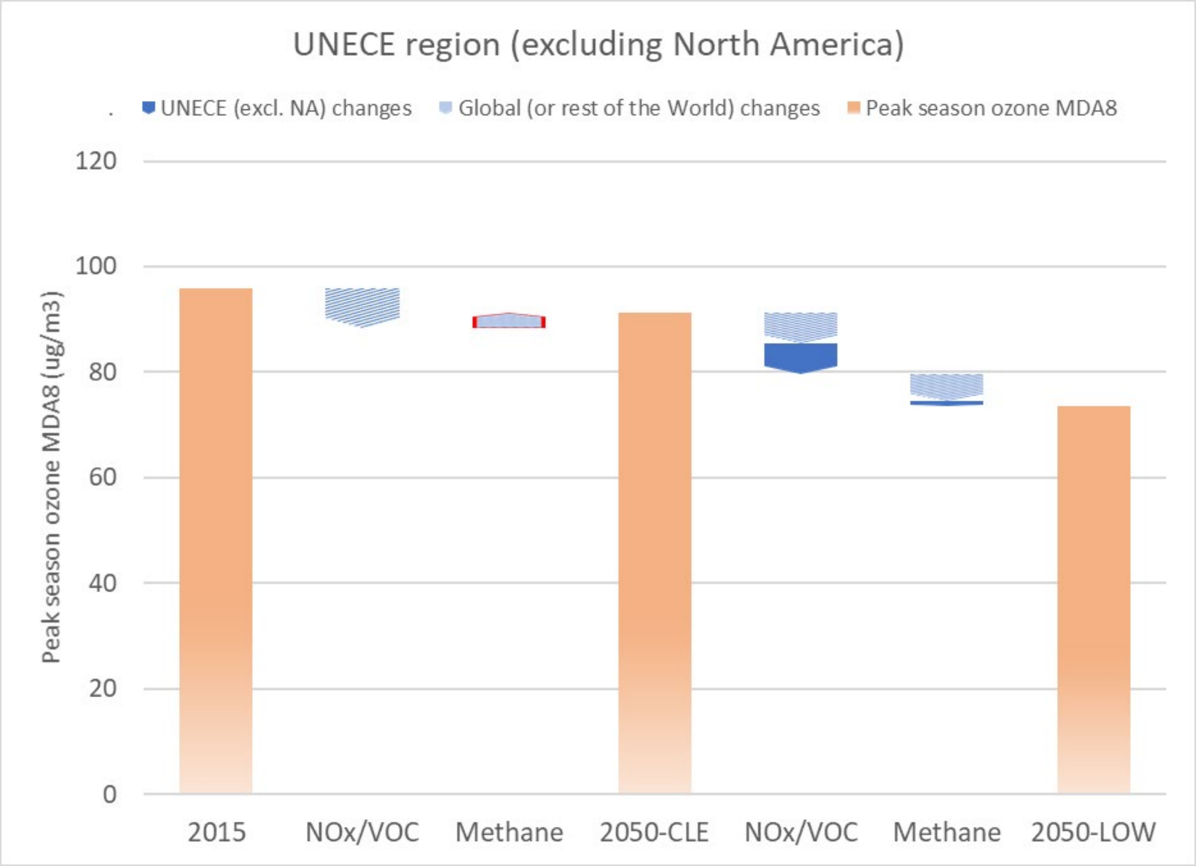
- **The difference between the 2050 CLE and 2050 LOW** scenarios can be attributed to roughly ⅓ from reduction in global methane emissions, ⅓ from reduction in European precursor emissions and ⅓ from reduction of precursor emissions outside Europe, both for ozone mean and peak season

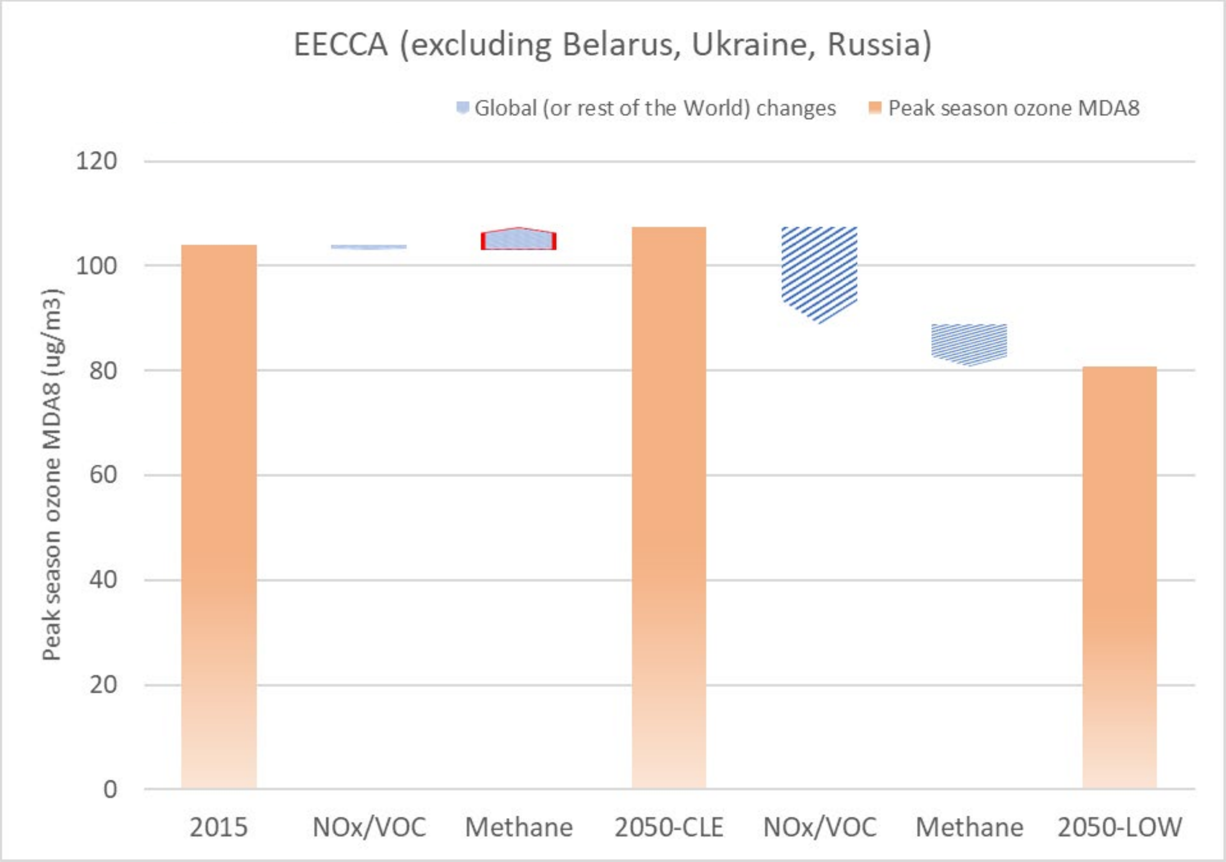
- CIAM estimates that methane emissions can be reduced (in the UNECE region) by almost 70% between 2015 and 2050, when **dietary change** and livestock reductions are included (2050 LOW scenario)

2050 LOW scenario - Ambitious global action on air pollution and methane, including non-technical measures

Based on TFHTAP/TFMM/MSC-W/CIAM work

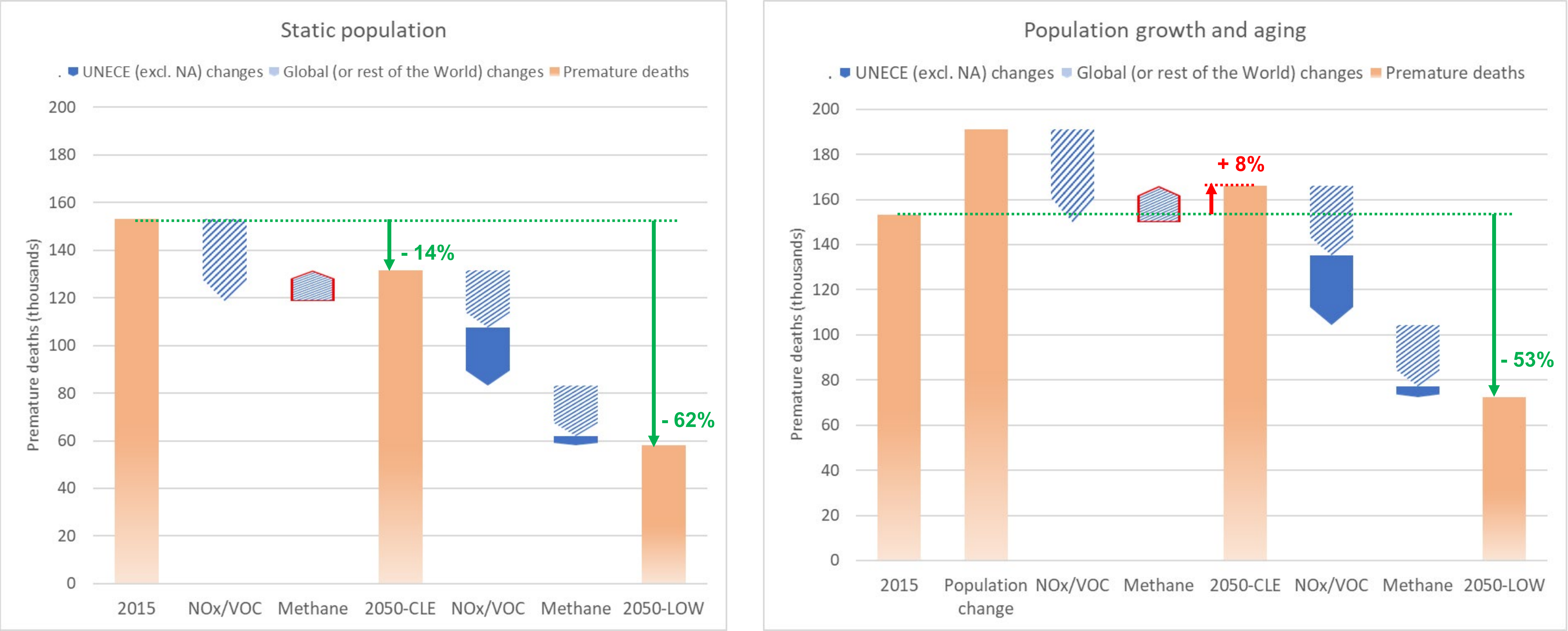
Peak season ozone [µg/m³]





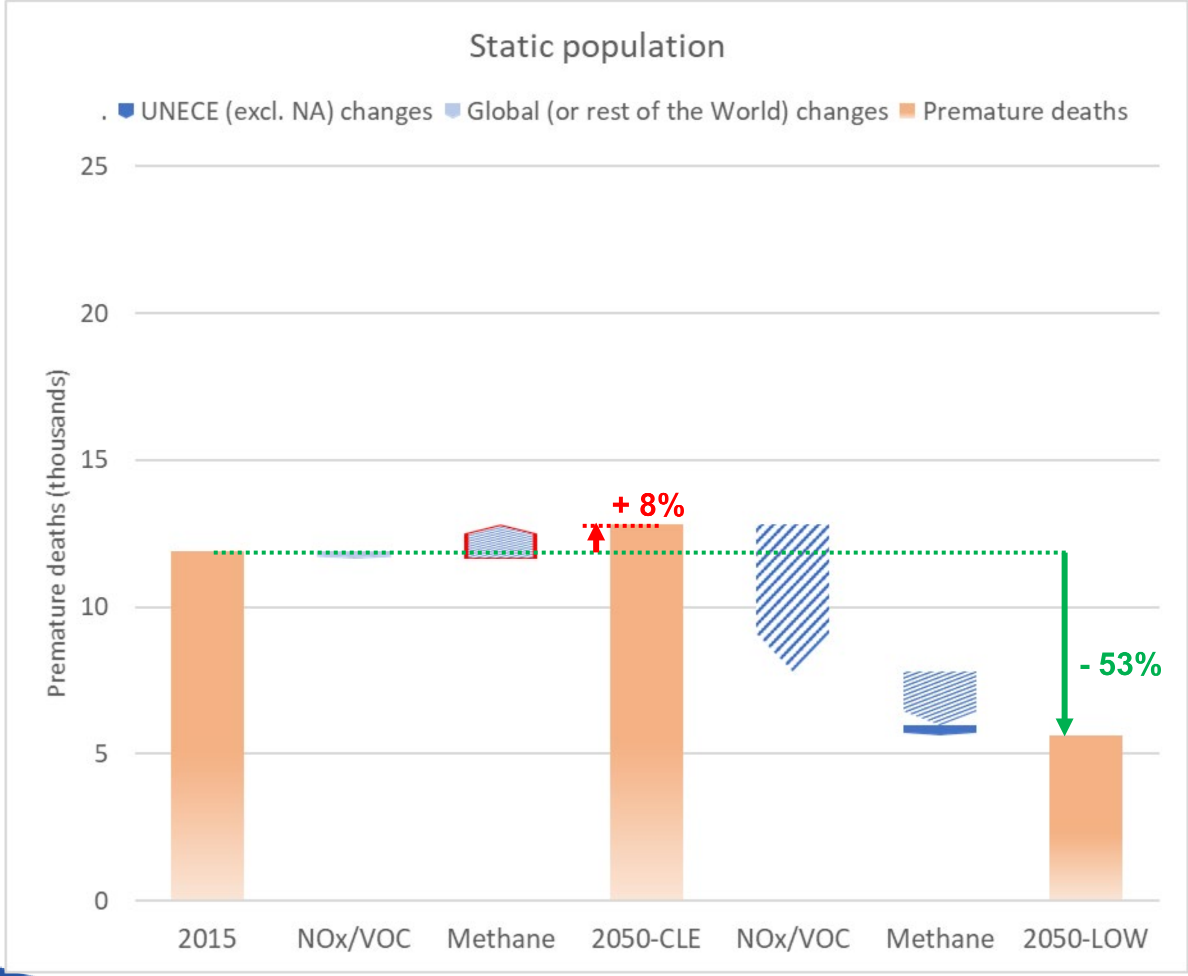
Source: EMEP model (MSC-W);
Split of impacts from UNECE vs global NOx/VOC reductions preliminary and not yet available at regional scale

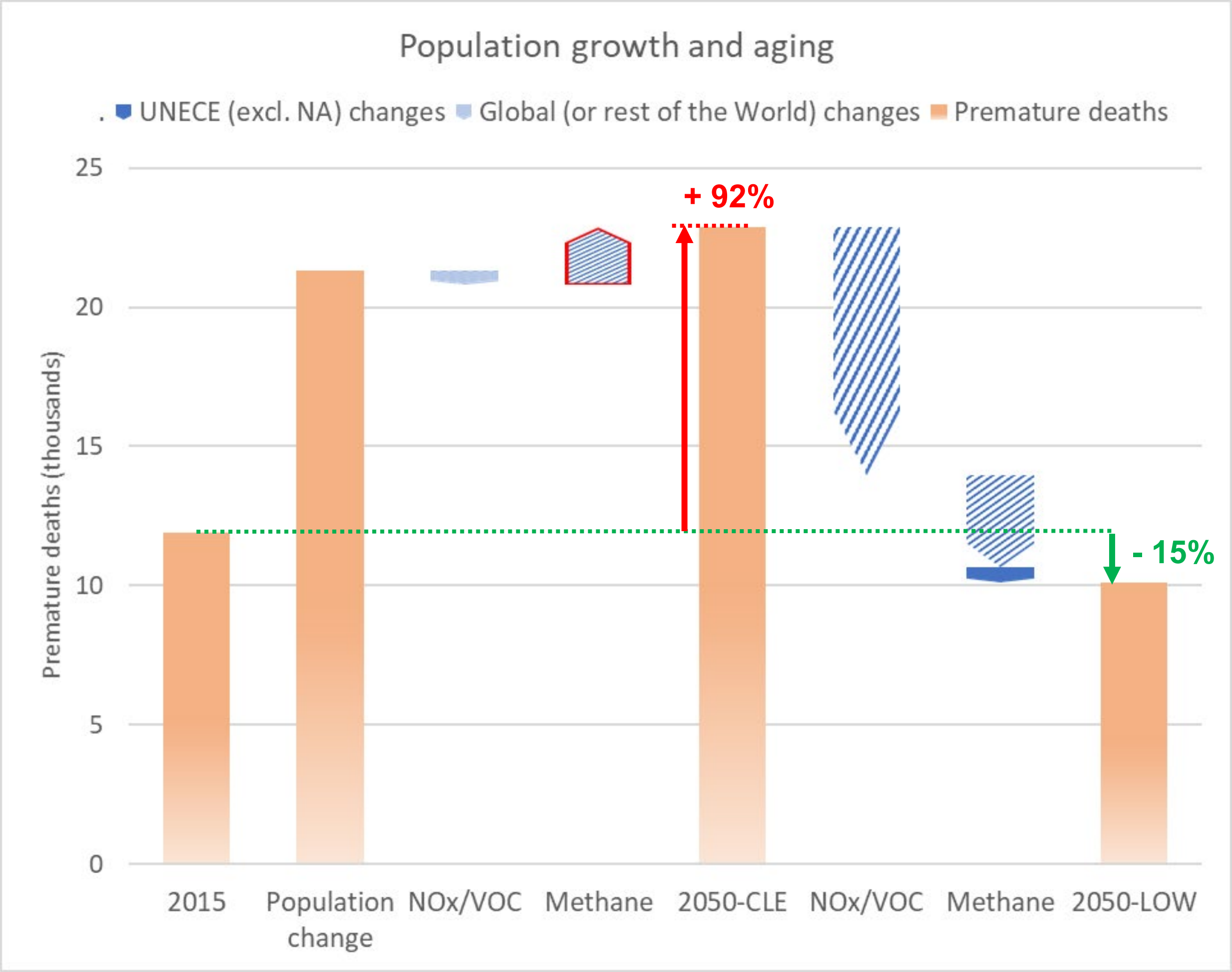
Potential health benefits in the UNECE (excluding North America) of (global) ozone policies



Source: EMEP and GAINS models (MSC-W/CIAM);
Split of impacts from UNECE vs global NOx/VOC reductions preliminary and not yet available for 2015 to 2050CLE case
Preliminary results pending further updates to health impact calculation methodology (HRAPIE2 upcoming).

Potential health benefits in the EECCA (excluding Belarus, Ukraine, Russia) of (global) ozone policies





Source: EMEP and GAINS models (MSC-W/CIAM);
Split of impacts from UNECE vs global NOx/VOC reductions preliminary and not yet available at regional scale
Preliminary results pending further updates to health impact calculation methodology (HRAPIE2 upcoming).

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)
- 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)
  - Validation and improvement of cost estimates and assessment of cost of non-technical measures