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CIAM: Progress in 2020/21

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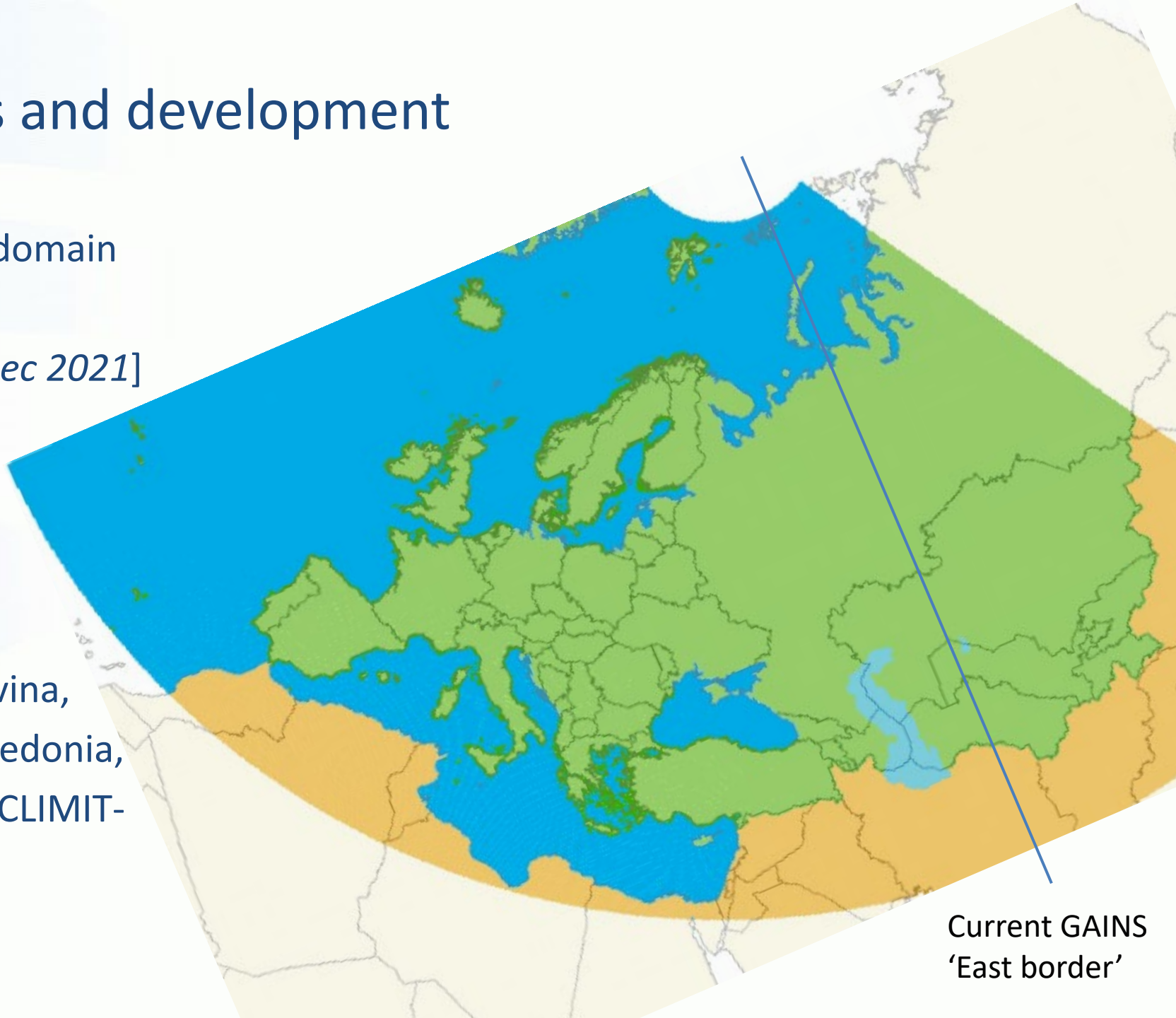
Center for Integrated Assessment Modelling (CIAM)

7th joint session of the Steering Body to EMEP and the Working Group on Effects, 13-17, September 2021

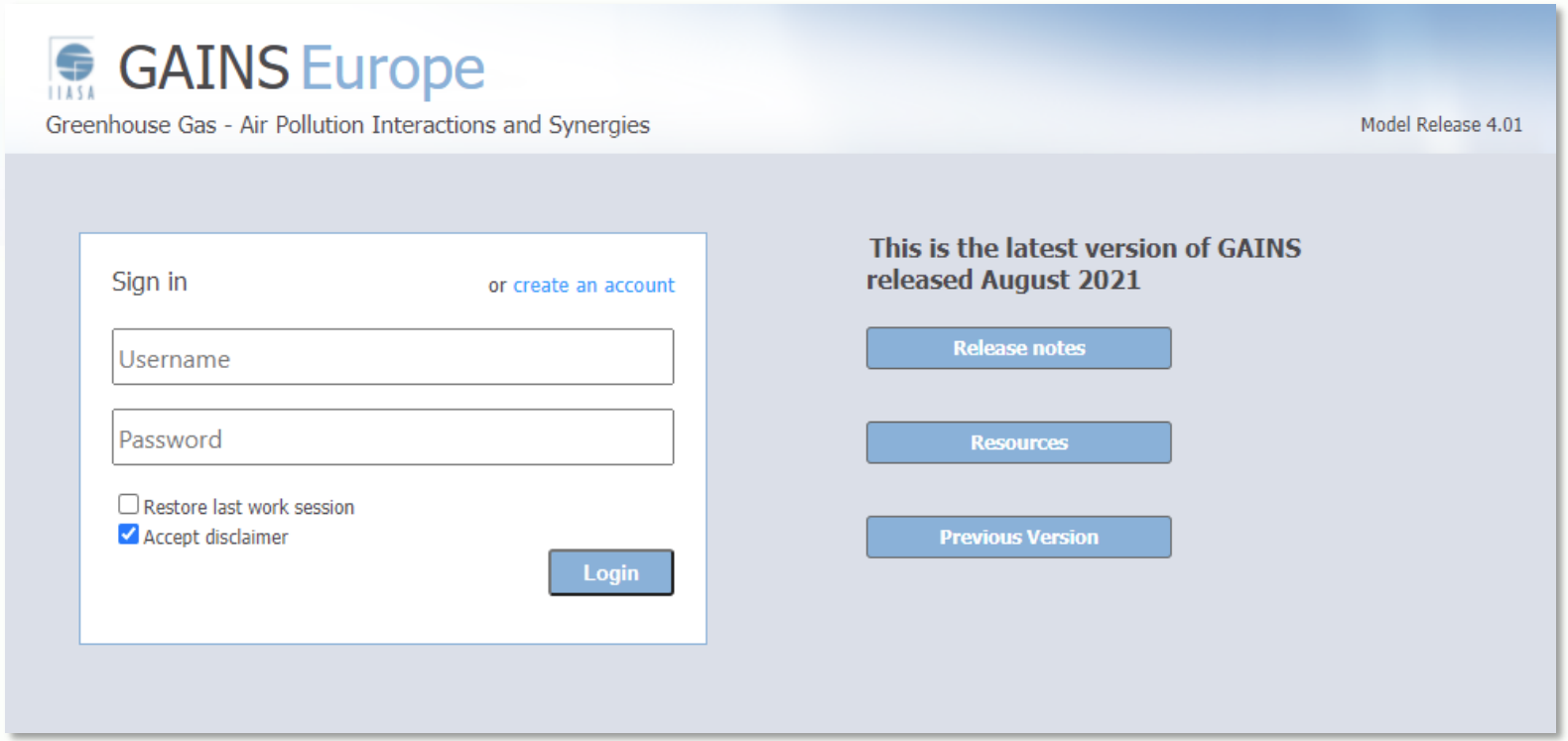
GAINS model updates and development

- Extending GAINS-Europe model domain to include consistently all EECCA countries- jointly with MSC-W [*Dec 2021*]
- Review of data, assumptions and development of new scenarios for some of the EECCA (Georgia, Moldova, Ukraine) and Western Balkan (Albania, Bosnia-Herzegovina, Kosovo, Montenegro, North Macedonia, Serbia) countries - EU funded EUCLIMIT-9EAST project [*Dec 2021*]



…in the meantime…. GAINS v4.01 released

- **Municipal solid waste** updated
- **Urban-rural** split for **residential** combustion
- **High-emitting vehicles** implemented
- **International shipping** choice included in scenario definition
- **Forest fires** included in the natural contribution; variable over time following pre-defined storylines that can be selected
- **Soil NOx** included
- **Costs** in Euro 2015
- **New regional allocation** (Serbia, Montenegro, Kosovo, Georgia, Armenia, Azerbaijan)
- Updates to **ambient PM impact** calculations
- Update to **atmospheric calculations in Asia** (0.1x0.1)



GAINS model updates and development

- GAINS global methane mitigation scenarios used in the Global Methane Assessment (UNEP, 2021), AMAP Assessment (2021), and for *TFHTAP*
- Towards implementation of new Source-Receptor matrices – *jointly with MSC-W* [in progress; early 2022]
- Finer (10km) spatial resolution for primary PM dispersion – *jointly with MSC-W* [early 2022]
- Implementation of *condensables* – building on the results of the Nordic Council of Ministers funded project (*led by MSC-W and TNO*) [Spring 2022]
- Further development of multiscale modelling (*joint work with MSC-W*) - building on experience in recent Asian projects (urban/rural interactions) similar analysis could be done for EECCA and West Balkan countries [end 2022]

Building updated scenarios for the UNECE region

- For EU-27 (benefiting from the EU funded activities): 2nd Clean Air Outlook and Green Deal scenario developed within the EU-CLIMIT

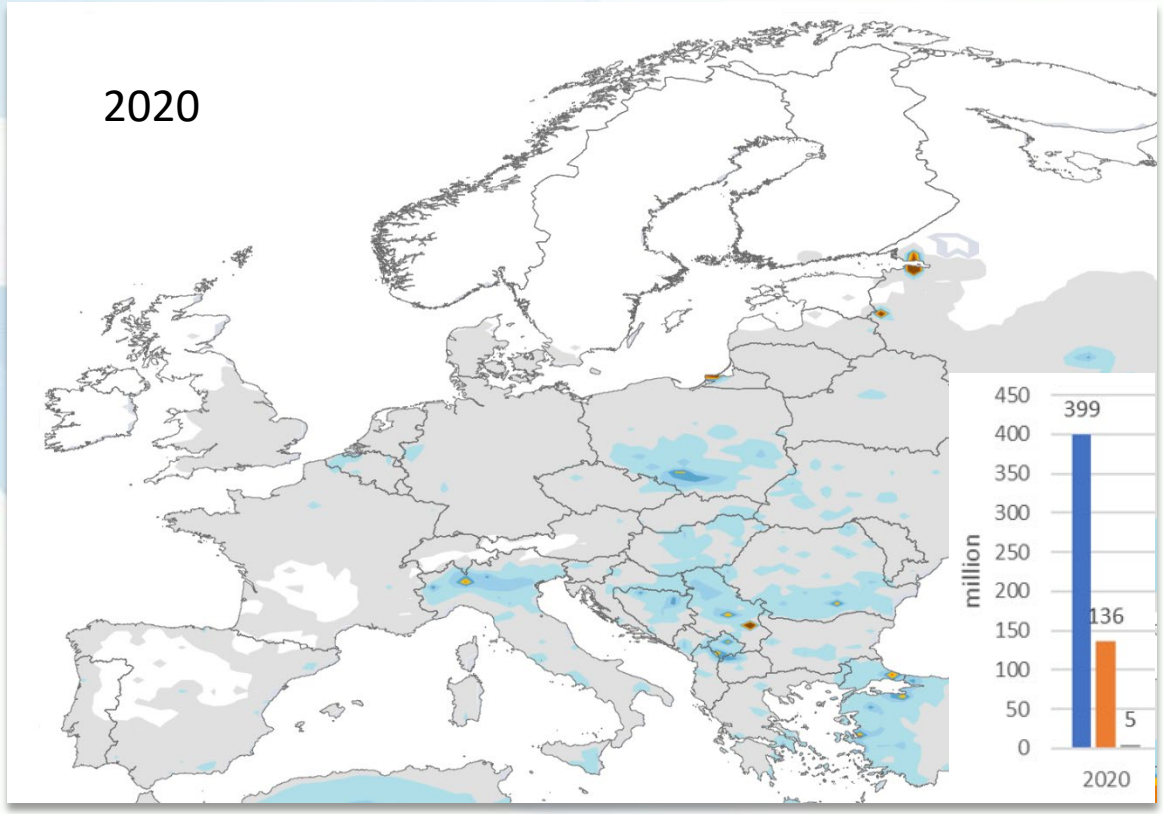
- Under development
  - New results from the EU-funded 9EAST EU-CLIMIT project for West Balkan and selected EECCA (Georgia, R. of Moldova, Ukraine)
  - Revised spatial distribution of emissions for EECCA
  - Other countries – recent World Energy Outlook (IEA, 2021) and FAO for agriculture
  - Update of policies and implementation progress
  - Comparison/validation of historical estimates (*jointly with CEIP*)
  - Maximum Feasible Reduction scenario (review of data and assumptions *in consultation with TFTEI*)

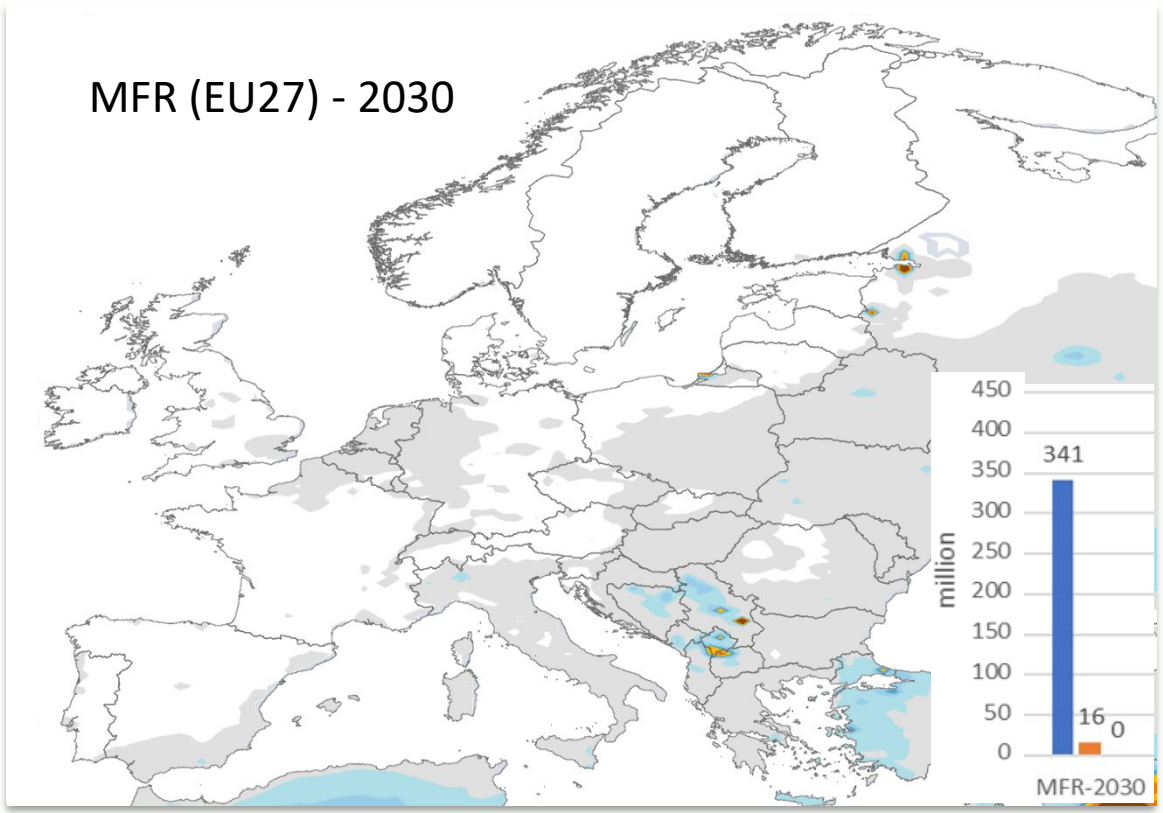
- For 2022/23 – impact assessment using new SR, plus condensables, optimized scenarios, etc.

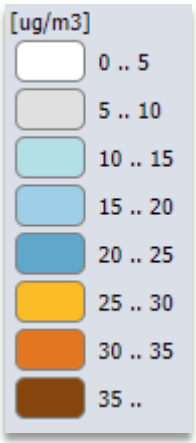
Emission trends – working progress

EECCA* - does not include Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan, Tajikistan; EU27+ includes CH, NO, IS; other include Russia and Turkey

PM2.5 concentrations from GAINS model (incl. natural sources); MFR for EU-27 only – working progress







Population exposure in the EU-27

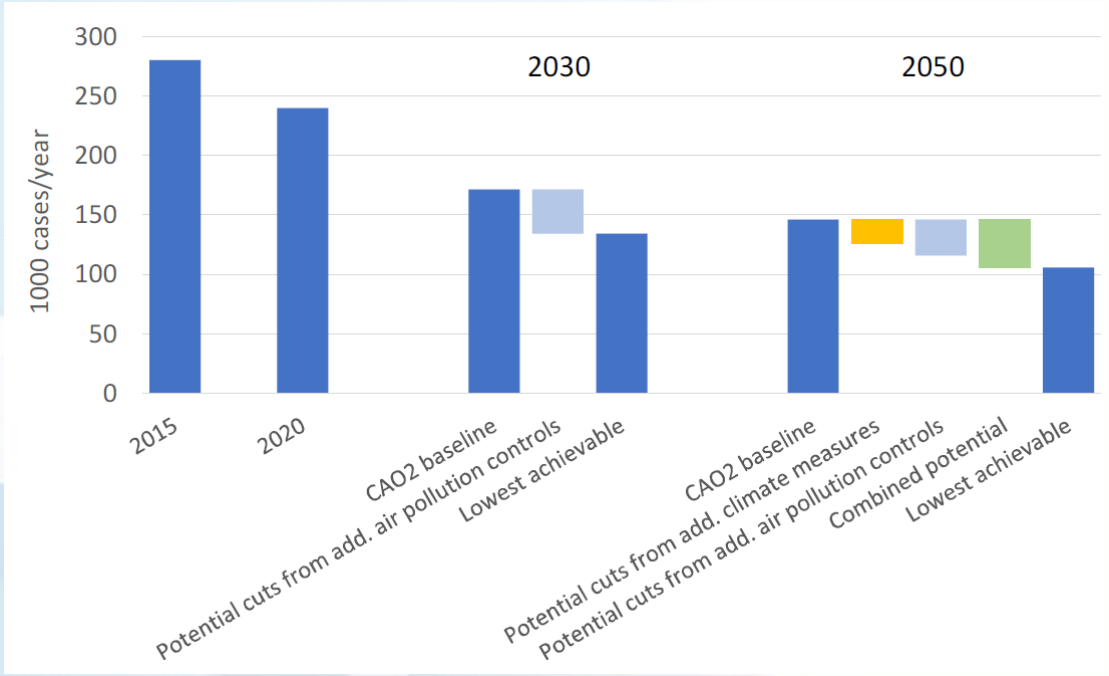
■ > 5 ug/m3 ■ > 10 ug/m3 ■ > 25 ug/m3

Synergies with climate policies - context and key messages

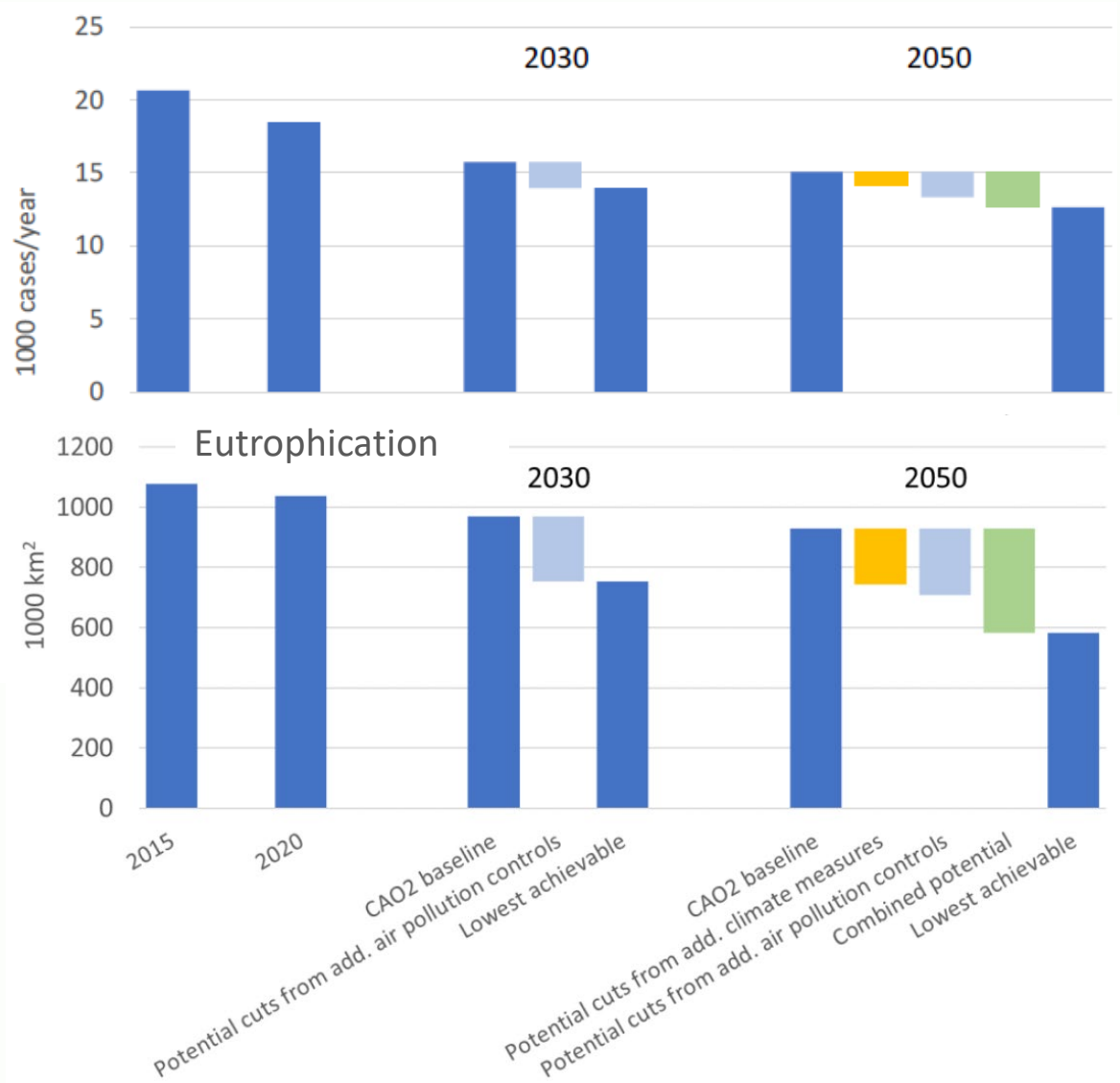
- The ‘new’ and the ‘updated’
  - New EU Clean Air Outlook, Green Deal considering air quality and climate policies
  - New global and regional analysis of methane mitigation and benefits (Hoglund et al., 2020; UNEP, 2021; input to AMAP Assessment 2021, TFHTAP)
  - New analysis of global/regional policies to address simultaneously air quality and climate (Amann et al., 2020)
  - Fossil fuel reduction, as key element of decarbonization policy, not sufficient to release pressure from necessary reductions of air pollutants such as ammonia to reduce ecosystem impacts and in some areas also achieve air quality targets (CAO2 and global analysis)
  - Black carbon mitigation will not save the planet from heating but is nevertheless essential (EU BC Action, IPCC AR6, input to AMAP Assessment 2021)
  - Increasing role of methane mitigation, also from the perspective of air quality co-benefits (collaboration with TFHTAP; input to AMAP Assessment 2021)

Cases of premature deaths attributable to the exposure to $PM_{2.5}$, ozone, and area of terrestrial ecosystems where N deposition exceed the critical loads for eutrophication, EU-27

Premature deaths - PM



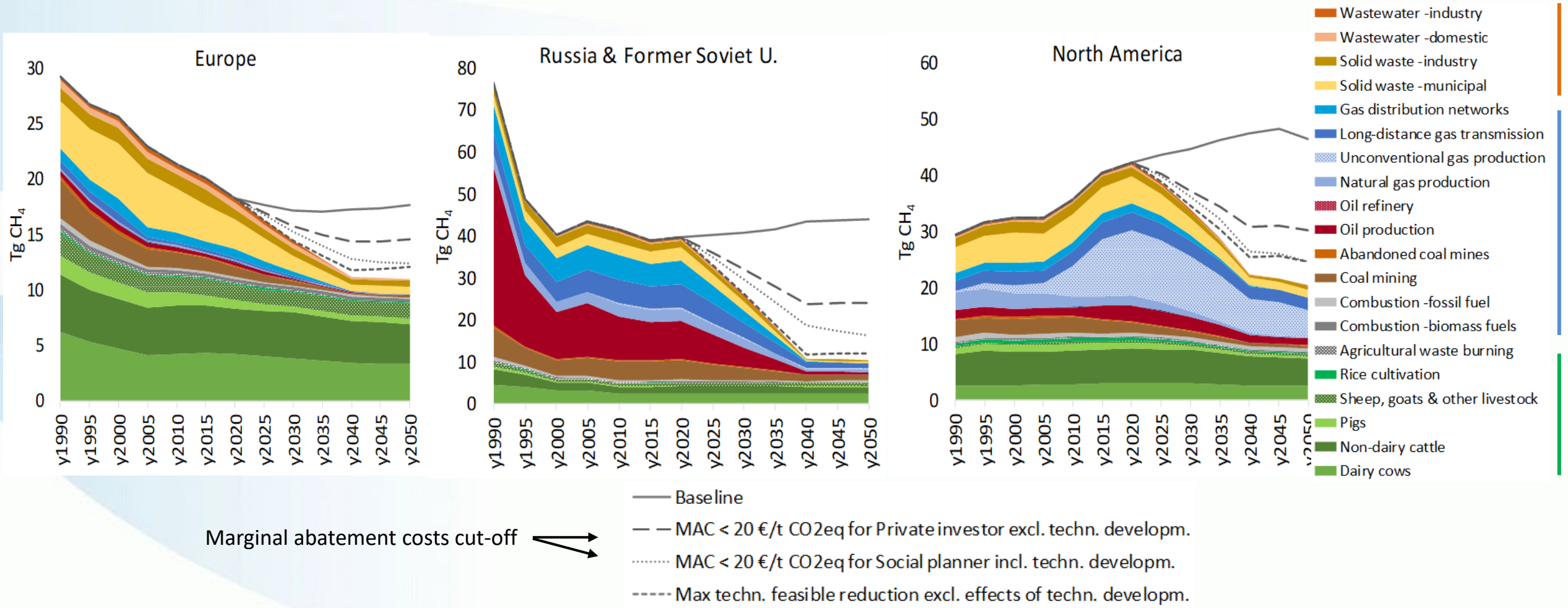
Premature deaths - ozone



Source: GAINS model (IIASA), Second Clean Air Outlook (2020)

Large regional variation in sectoral emissions and mitigation potentials

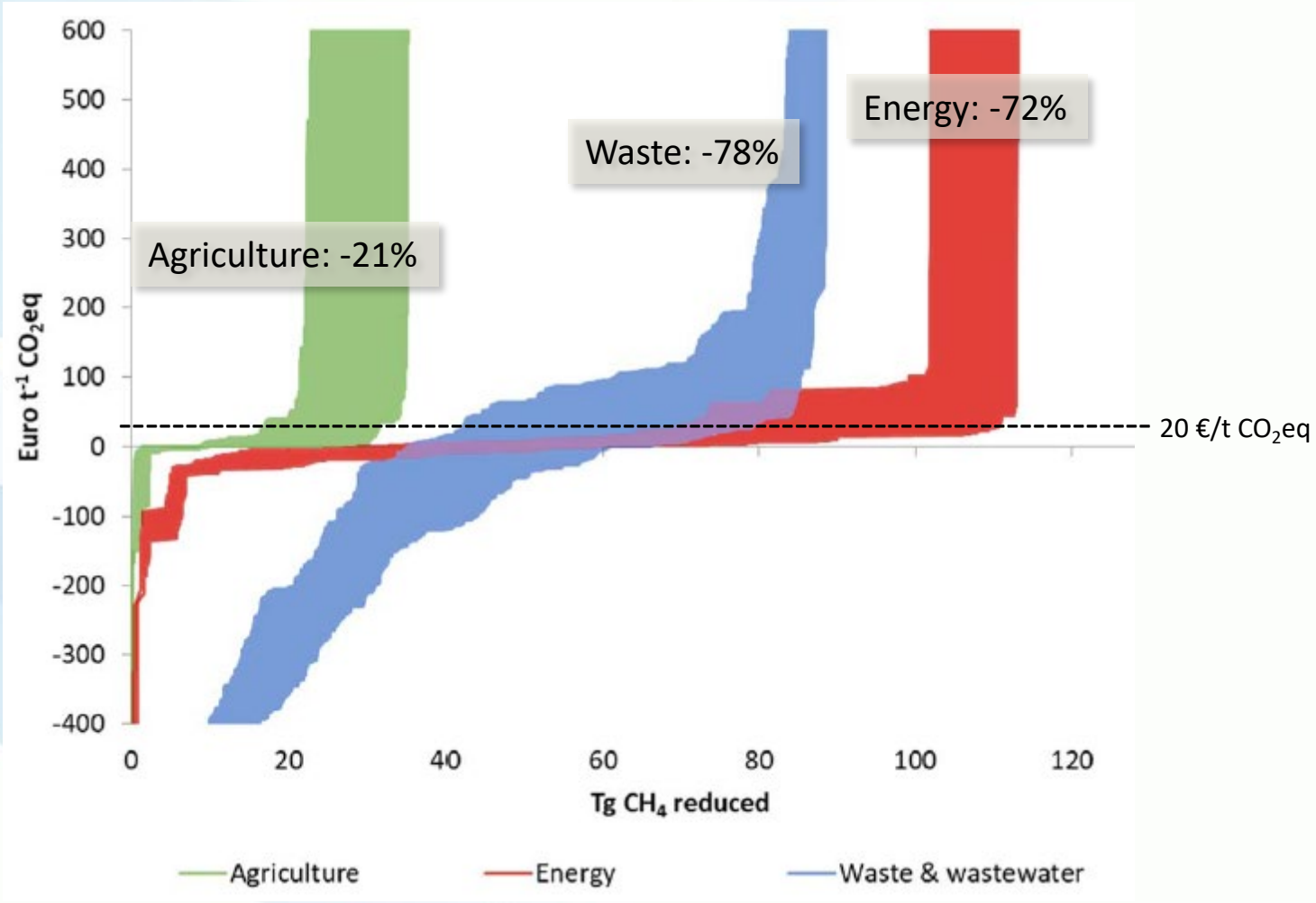
Scenarios (available at a global level) can be used by TFHTAP

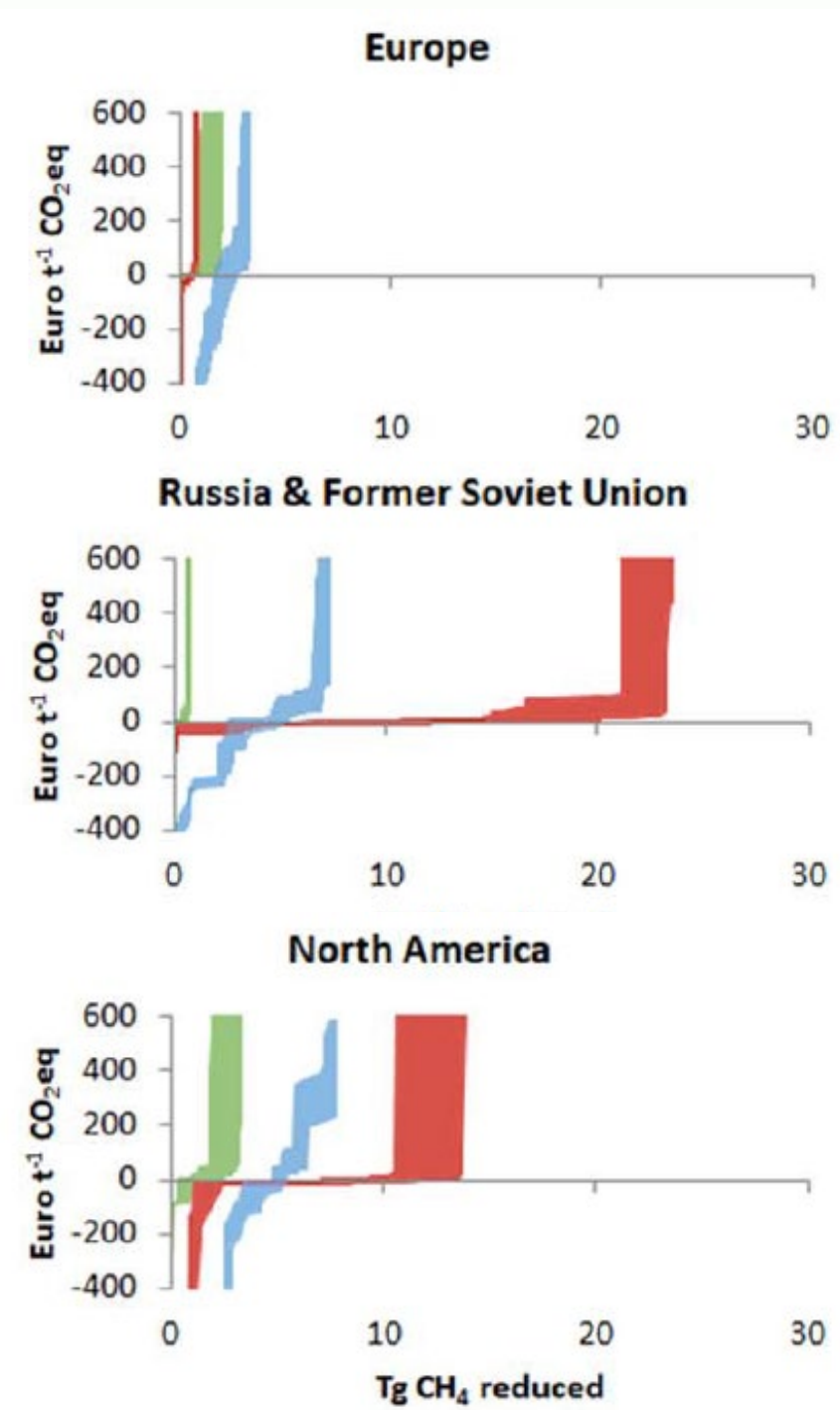


Marginal abatement costs cut-off

Source: GAINSv4; Höglund-Isaksson et al., 2020 (https://doi.org/10.1088/2515-7620/ab7457)

Marginal abatement cost curves (ranges*) for global and regional CH_4 mitigation in 2050





* Ranges reflect private sector (upper) and social planner (lower) investment perspectives as well as inclusion of technological progress/development

Source: GAINSv4; Höglund-Isaksson et al., 2020 (https://doi.org/10.1088/2515-7620/ab7457)

Workplan for 2022/23

- Implementation of new SR matrices and fine spatial resolution for primary PM dispersion; *jointly with MSC-W* [early 2022]
- Evaluation of historical data and projections for EECCA, Western Balkan [Spring 2022]
- Update of technology parameterization (including applicability and costs); *jointly with TFTEI* [21/2022]
- Implementation of sustainable development and MFR scenarios, including assessment of co-benefits [2022]
- Further development and implementation in GAINS Europe of multiscale modelling capacity; *jointly with MSC-W* [end 2022]
- Implementation of *condensables* in GAINS (jointly with *MSC-W and TNO*) [Spring 2022]
- Sensitivity analysis - optimized reduction scenarios considering condensables and potentially deposition targets for marine ecosystems (*support of CCE*) [2022/23]
- Scenarios to assess feasibility of achieving new (not announced yet) WHO guidelines [2022]