EEB
European Environmental Bureau

Margherita Tolotto, Policy Manager Air Quality and Noise

UNECE Air Convention (LRTAP)
6th Expert Panel on Clean Air in Cities (EPCAC)

Who are we?

The EEB is the largest **network of environmental citizens' organisations in Europe**.

It currently consists of over 185 member organisations in 41 countries, including a growing number of networks.

Our vision

A better future where people and nature thrive together.

Our mission

We advocate for progressive policies to create a better environment in the European Union and beyond.

EEB's work on Air Quality

Horizontal EU instruments:

- Ambient Air Quality Directive
- National Emission reduction Commitments Directive
- Key policies (including Zero Pollution Action Plan)

Source legislation (including):

- EcoDesign standards for heating appliances
- Relevant agricultural policies and legislation (focus on ammonia and methane)

International:

- Long-Range Transboundary Air Pollution Convention (Gothenburg Protocol)

EXISTING EU COMMITMENTS

- Updated Ambient Air Quality Directive (air quality standards) entered into force on 10 December 2024 with objectives to be achieved **by 2030**
- Existing obligations to reduce overall national emissions **by 2030** set by the National Emission reduction Commitments Directive (NECD) – EU instrument mirroring the Gothenburg Protocol;
- Zero Pollution ambition **by 2050** under the Zero Pollution Action Plan
- EU Climate Neutrality objective **by 2050**

How to achieve them?

Overall study objective

Climate impact of air pollution levels aligning with the new Ambient Air Quality Directive objectives, EEB, Feb 2025

To assess the capacity of **the EU (and 6 MS)** to comply with the newly agreed air quality standards by 2030 (AAQD compliance gap) and how achieving them can also contribute to climate objectives, through the implementation of a set of 10 technical and non-technical measures.

Key pollutants had been considered (NO_2, O_3, $PM_{2.5}$, PM_{10}, NH_3), some of them also acting as climate forcers – BC.

Structure of the study

Modelling exercise for the EU as a whole.

The study has also provided:

- An assessment of the impact of the measures upon 6 Member States: (France [FR], Sweden [SE], Spain [ES], Italy [IT], Bulgaria [BG], Poland [PL])
- The climate co-benefits, estimated through expected emission reductions of GHGs (CO_2, BC and CH_4)
- The impacts of the measure implementation, including economic costs, health benefits and environmental benefits

Methodology of the study

The baseline scenario in 2030 reflects, for each MS, the most ambitious projection scenario that was provided under the NECD reporting exercise* (i.e. WM or WAM). Where Member States reported a WAM scenario, the study assumed that all additional policies selected for adoption are implemented in full in accordance with the timeline presented in the NAPCPs.

The **2030 baseline** scenario is resulting from the **implementation of measures that MS have identified in their NAPCPs**

* 2023 NECD projections Horizontal Review Report

Methodology of the study

To estimate the change in air pollutant concentrations (as a result of emission reductions) the study assumes that **emission reductions are distributed evenly across each sector and Member State territory** (which is not the case).

This, and the **regional-level resolution of the modelling (50 x 50 km grid cells),** results in uncertainties (as **underestimations**): the spatial scale will not accurately display the highly localised impact in both emission reduction and more importantly improvement in air pollutant concentrations in areas exceeding AAQD or WHO limit values.

Key measures identified

Sector	Measure
Energy	Strengthened Introduction of Non-Combustion Renewable Energy
	Ban on Solid Fuel Heating
	Improved Energy Efficiency
Agriculture	Meat consumption and production reduction
	Improved manure management
	Tax on pollutants in agricultural sector
Transport	More support for active mobility
	Low or zero emission zones for traffic
	Full Emission Control Areas (ECAs for SO_2 and NO_X) in all European seas
	Introduction of Low emission zones for NRMM

Energy sector

Measure title	Measure description
Strengthened Introduction of Non-Combustion Renewable Energy	This measure assumes existing EU legislation is implemented in a manner which maximises reductions in air quality pollutant emissions. The Renewable Energy Directive (EU/2023/2413) sets a binding target of 42.5% of EU energy demand to be met from renewable energy sources by 2030. The measure seeks to achieve this target through the transition to non-thermal renewables only.
Ban on solid fuel heating	A ban on solid fossil fuels such as coal and coal-based solid smokeless fuels for residential buildings by 2030. The measure assumes there will be no net growth in use of either biofuel or fossil fuel consumption as a result of the ban.
Improving energy efficiency	The Energy Efficiency Directive (EU/2023/1791) sets a binding target for Member States to collectively reduce energy consumption by at least 11.7 by 2030. The measure assumes existing legislation is implemented in a way which maximises reductions in air quality pollutant emissions by prioritising the reduction of the most emissive forms of energy to achieve the reduction in energy consumption.

Agriculture sector

Measure title	Measure description
Meat consumption and production reduction	This measure is a hypothetical scenario in which beef production is decreased, with a transition towards fewer housed beef cattle, but maintenance of systems that produce meat extensively on land that is unsuitable for crop production. The focus is on beef production, (cattle husbandry for meat) with the aim of reducing production in intensive systems. Land use change would influence emissions because less grassland would be needed to produce cattle feed (e.g. silage). This measure assumes that number of intensively-farmed beef cattle would decrease by 20%; 5% of the grassland used for beef production would be converted to cropland, and 5% converted to forest.
Improving manure management	This measure is a suite of five farm actions that improve emissions from manure management. The farm actions are good dietary practice, covering slurry stores, covering manure storage heaps, rapid incorporation of slurry and solid manure, and acidification of slurry. To ensure the best outcomes, the whole manure management system needs to be improved, from feeding strategies to incorporation into soil, to ensure that nitrogen retained at an early management stage does not then lead to greater losses (and emissions) later.
Agricultural emissions tax	This measure is hypothetical tax on intensive livestock producers that would lead to a reduction in production. It applies to beef, dairy, and pig sectors. As production decreases less grassland would be needed to produce animal feed (e.g. silage) and so it is assumed that land-use change would occur. Some grassland would be converted to cropland, and some to woodland or forest. The measure assumes a decrease intensive production by 50% for beef and dairy farms with cattle housing for more than 50 livestock units.

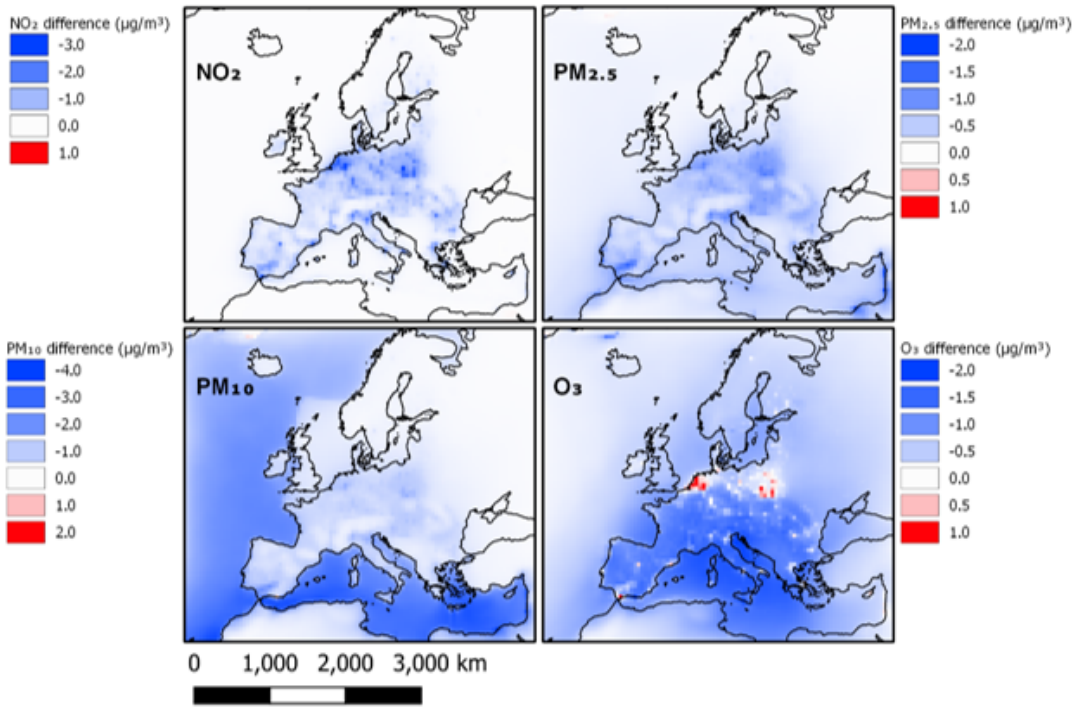
Transport sector

Measure title	Measure description
More support for active mobility	In urban areas, impact of air pollutants produced by transport on human health is greater due to higher population density and lower dilution effects. Cities can reduce emissions by shifting travel from cars to walking, cycling, public transit, and modal shift. This measure assumes that all trips of 7.5 km or less are replaced by active travel, reducing passenger car traffic activity by 9%.
Low or Zero Emission Zones for traffic	Low Emission Zones (LEZs) are a vehicle access regulation scheme that charges the most polluting vehicles to access an area of a city or town or prohibits access altogether. In Zero Emission Zones (ZEZs) vehicles are subject to greater restriction with only zero emission vehicles (such as fully electric or fuel-cell vehicles) allowed access without incurring a charge. This measure assumes that the introduction of ZEZs in towns and cities by Member States reduces traffic activity from road transport by 5% across the EU.
Non-Road Mobile Machinery (NRMM) measures	Non-road mobile machinery (NRMM) covers a diverse range of machinery used for farming, construction, gardening, and some forms off-road transport such as train locomotives. The measure promotes investment in newer, cleaner machinery, or the retrofit of older machinery to meet the required emission standard. The measure assumes that NRMM must meet a minimum Stage IV emission standard within the NRMM LEZ and that widespread use NRMM LEZs in Member States could affect 75% of construction activity.
Full Emission Control Areas in European Seas	This measure implements Emission Control Areas (ECA) for sulphur oxides (SOx) and nitrogen oxides (NOx) to European seas. SECAs establish fuel sulphur limits for ships operating in defined sea areas and this significantly reduces SOx emissions from ships. NECAs require new ships entering the area to be compliant with the strictest 'Tier III' limits on the emissions of NOx to air.

Air quality impacts – all measures

Air Quality Impacts – All Measures –

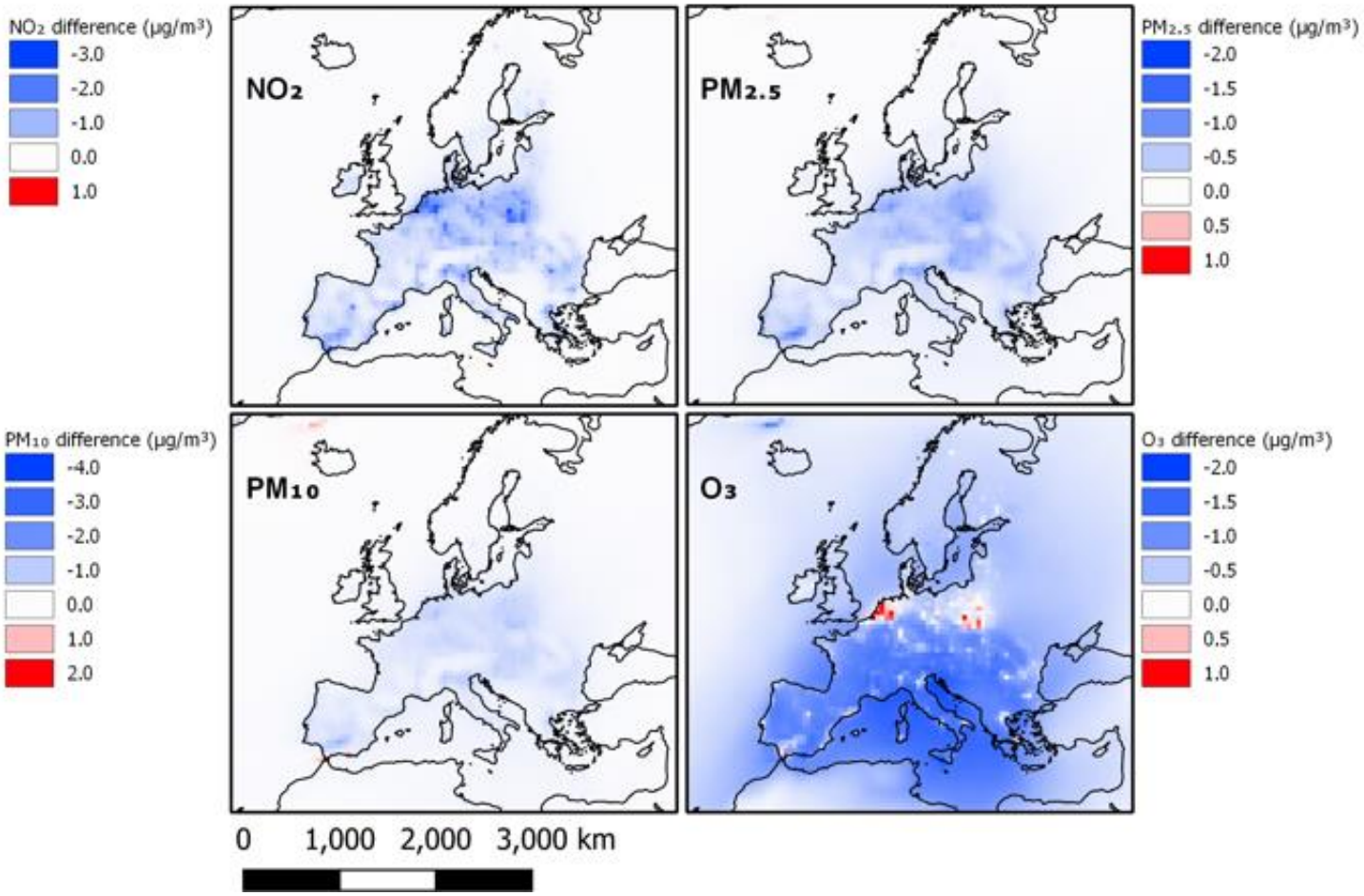
(Difference in annual mean pollutant concentration between 2030 baseline and all measure scenarios (µg/m³))



Air quality within modelled domain	NO_2	O_3	PM_{10}	$PM_{2.5}$
AAQD air quality standards (from 2030) (µg/m³)	20	120*	20	10
Area meeting AAQD air quality standards in 2030 (Baseline scenario) (%)	100%	100%	100%	100%
WHO guideline values (µg/m³)	10	100*	15	5
Area meeting WHO guideline values in 2030 (Baseline scenario) (%)	99.7%	100%	99.6%	95.3%
Area meeting WHO guideline values in 2030 (extra measures) (%)	99.9%	100%	99.9%	98.4%
Difference (%)	**+0.2%**	**-**	**+0.3%**	**+3.1%**

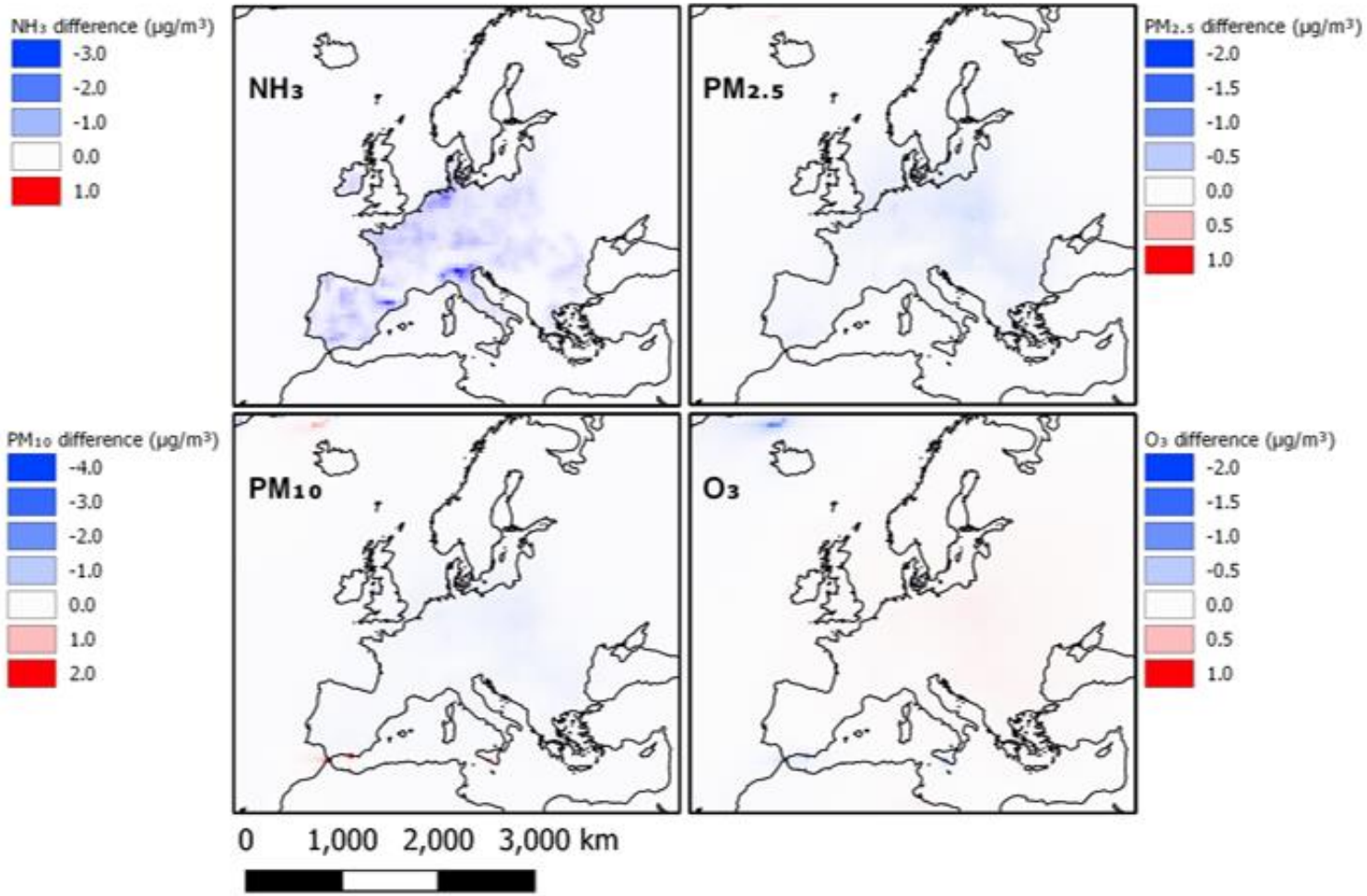
Air quality Impacts - energy

Difference in annual mean pollutant concentration between 2030 baseline and energy measure scenarios (µg/m³)



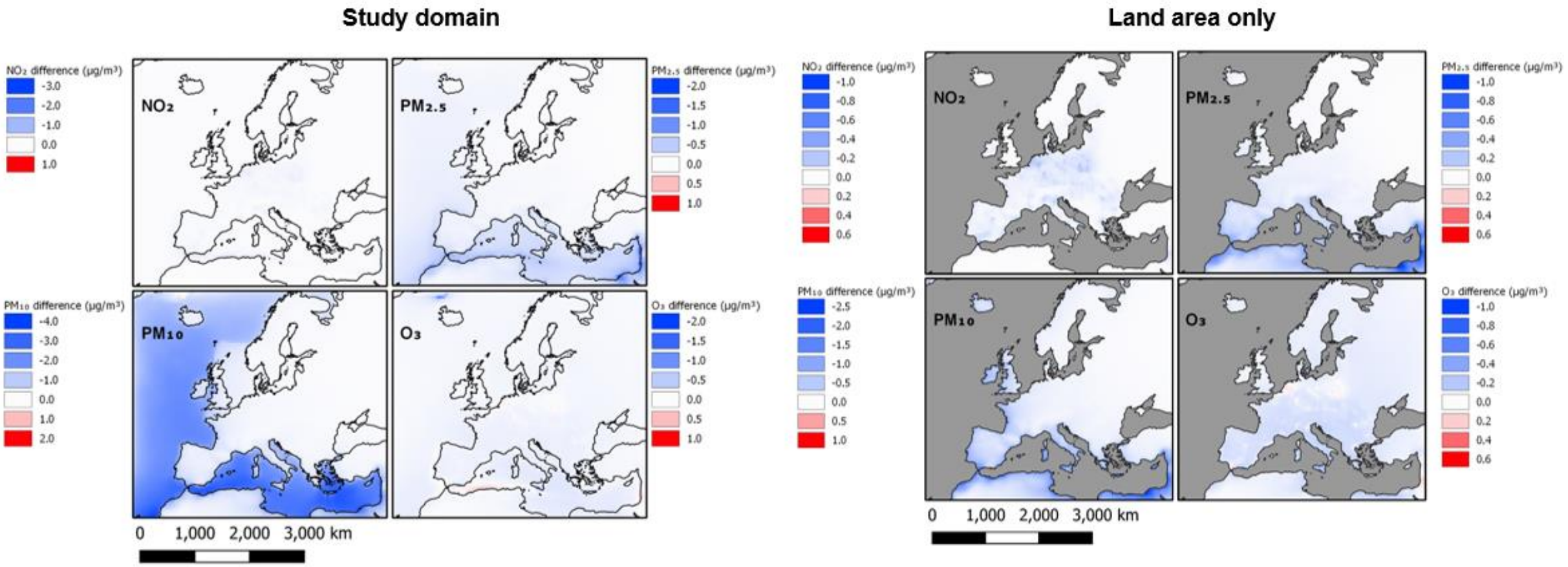
Air quality Impacts - agriculture

Difference in annual mean pollutant concentration between 2030 baseline and agriculture measure scenarios (µg/m³)



Air quality Impacts - transport

Difference in annual mean pollutant concentration between 2030 baseline and transport measure scenarios (µg/m³)



Economic assessment

Cost assessment:

- Provided an indication of the range of potential costs which could be incurred, where these costs could be most significant, and which stakeholders could be impacted. The quantitative costs have focused on capital expenditure to implement each measure and associated ongoing operational costs.
- Direct comparisons between measures are challenging due to the variance in scope, but initial estimates indicate the highest costs result from implementing measures within the energy sector.

Economic assessment

Benefit assessment:

- A qualitative economic assessment has identified a **broad range of potential benefits**. **These impacts could be explored further with an ambition to monetise the expected impact** (e.g. creation of employment opportunities, economic development and regeneration of local areas, and reduction in noise pollution).
- The **health impact assessment has estimated positive health benefits** resulting from a reduction in exposure to pollutant concentrations of PM2.5, NO2, and O3. This included a reduction in mortality impacts and for each of the six morbidity pathways assessed (using concentration response functions based on World Health Organization Guidelines for mortality and different academic studies for morbidity).
- **Environmental benefits, focused on crop production and forest biomass, were observed in all Member States,** with the exception of Sweden (where no significant impact was observed).

Health Impact Assessment

One key overall consideration is that we expect the health impacts to be **widely underestimated – model resolution is high and the population-weighted factor was not taken into account.**

Environmental Impact Assessment

The environmental impact assessment (only looked at O_3) aimed to demonstrate the benefits of reduced pollutant concentrations on the environment:

- quantitative estimate of potential crop yield increase;
- quantitative estimate of potential tree biomass increase;
- qualitative assessment of changes to acidification and eutrophication on ecosystems.

Positive impacts resulted from the measures implementation.

Most notably within Italy, we can see the greatest increases in crop production as well as tree biomass.

Environmental Impact Assessment

Methodology: Applying relevant concentration-response functions, the changes in crop yields and tree biomass as a result of changes in O_3 concentration were predicted.

Results:

Increase in crop yield (%) per country in 2030

	Poland	Sweden	Spain	Italy	Bulgaria	France
% Increase in crop yield	0.027	0.000	0.164	0.289	0.0034	0.020

Increase in tree biomass (%) per country in 2030

	Poland	Sweden	Spain	Italy	Bulgaria	France
% Increase in tree biomass	0.0003	0.0000	0.0430	0.0624	0.0019	0.0042

A reduction of emissions as a result of the 10 measures may also reduce exceedances of critical loads for eutrophication and acidification in **ecosystems**.

Key conclusions

Air quality:

- The study demonstrated the capacity to fully deliver on AAQD by 2030 under the baseline scenario with no need for extending the deadline;
- The implementation of the set of 10 measures will bring the EU very close to comply with WHO 2021 Guidelines;
- Measures will also bring clear reduction of transboundary air pollution.

Key conclusions

Air quality:

Table 4-1 – area within modelled domain meeting WHO air quality guideline values in 2030 (%) for baseline scenario and scenario where EU-27 implements all 10 extra measures

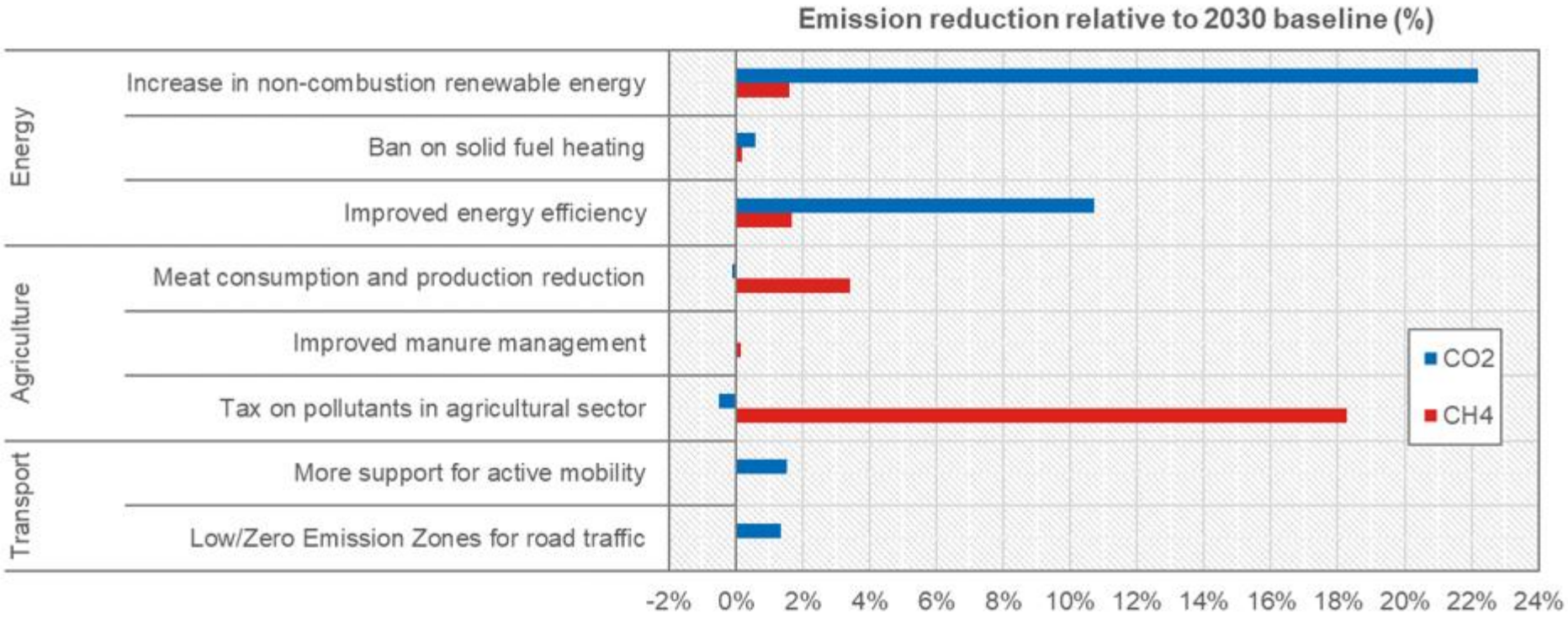
Air quality within modelled domain	NO_2	O_3	PM_{10}	$PM_{2.5}$
AAQD air quality standards (from 2030) (µg/m3)	*20*	*120**	*20*	*10*
Area meeting AAQD air quality standards in 2030 (Baseline scenario) (%)	100%	100%	100%	100%
WHO guideline values (µg/m^3)	10	100*	15	5
Area meeting WHO guideline values in 2030 (Baseline scenario) (%)	99.7%	100%	99.6%	95.3%
Area meeting WHO guideline values in 2030 (extra measures) (%)	99.9%	100%	99.9%	98.4%
Difference (%)	**+0.2%**	**-**	**+0.3%**	**+3.1%**

*Average of daily maximum 8-hour mean O_3 concentration in the six consecutive months with the highest six-month running-average O_3 concentration

Key conclusions

Climate:

The implementation of the 10 measures by 2030 results in an overall reduction in GHG pollutant emissions (CO2 and CH4) relative to a 2030 baseline.



Key recommendations for future studies

Air Quality	• Developing a **more disaggregated dataset** on the Member State's projected emissions by source and fuel. • Develop a **fuller understanding of the policies** (firm and funded) that are assumed in Member States' emission projections and also obtain fuel consumption data/assumptions that underpin those projections. • **Engage with Member States** to understand the feasibility (technically and economically) of implementing further measures. while promoting the necessary consideration to be given to the 10 covered measures, giving their potential, and in general to non-technical measures. • **Model each measure individually** at **lower resolution** (10 x 10 km or below)
Economic Assessment	A more detailed, in-depth, cost assessment could: • Cover a **broader scope of impacts** • **Enhance the data gathering process** (for example through stakeholder engagement) • **Monetise the potential benefits** to provide a more complete assessment and enable greater comparability Recommendations for further work on the health assessment include: • Use of **population weighted concentration modelling** • More refined **sensitivity analysis** A future environmental assessment would focus on: • Widening the **scope of crops and tree types assessed**

Methodology of the study

Why sharing the study overview and conclusions in this meeting?

The 50x50 km resolution of this analysis is not capable to grasp the impacts that the 10 identified measures have at city/local level. Where changes are also happening and can be appreciated even at street level.

Invitation to elaborate such analysis using city/street level resolution. How much cutting overall national emissions will benefit local air quality? A big indication about what cities could advocate for during the NAPCPs definition. And demand during the Gothenburg Protocol revision process.

EEB European Environmental Bureau

eeb.org

Thanks for listening!
Margherita.Tolotto@eeb.org

Keep in touch

eeb@eeb.org

@Green_Europe

@EuropeanEnvironmentalBureau

The EEB gratefully acknowledges the financial support from the LIFE Programme of the European Union. This communication reflects the organizers' views and does not commit the donors.