

# Experience with application of IAMs in Europe

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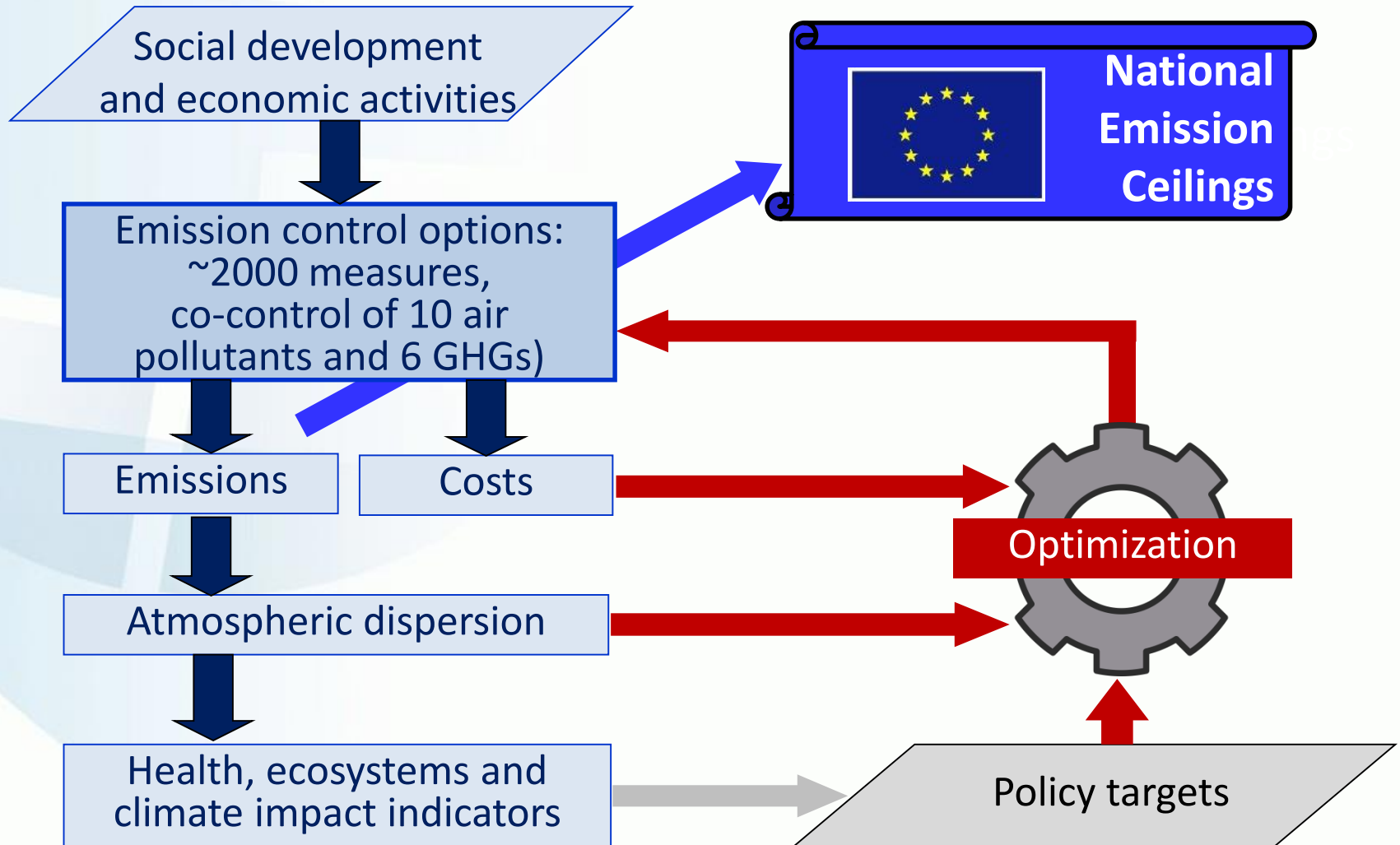
Roundtable on the Future of North-East Asia Clean Air Partnership  
Seoul, Republic of Korea, July 4, 2019

# Purpose of IAMs in UNECE LRTAP and revision of the EU air quality policy

- Assess future situations based on current trends and policy interventions
- Identify cost-effective and win-win packages of policy interventions
- Reveal multiple benefits of policy interventions for diverse stakeholders

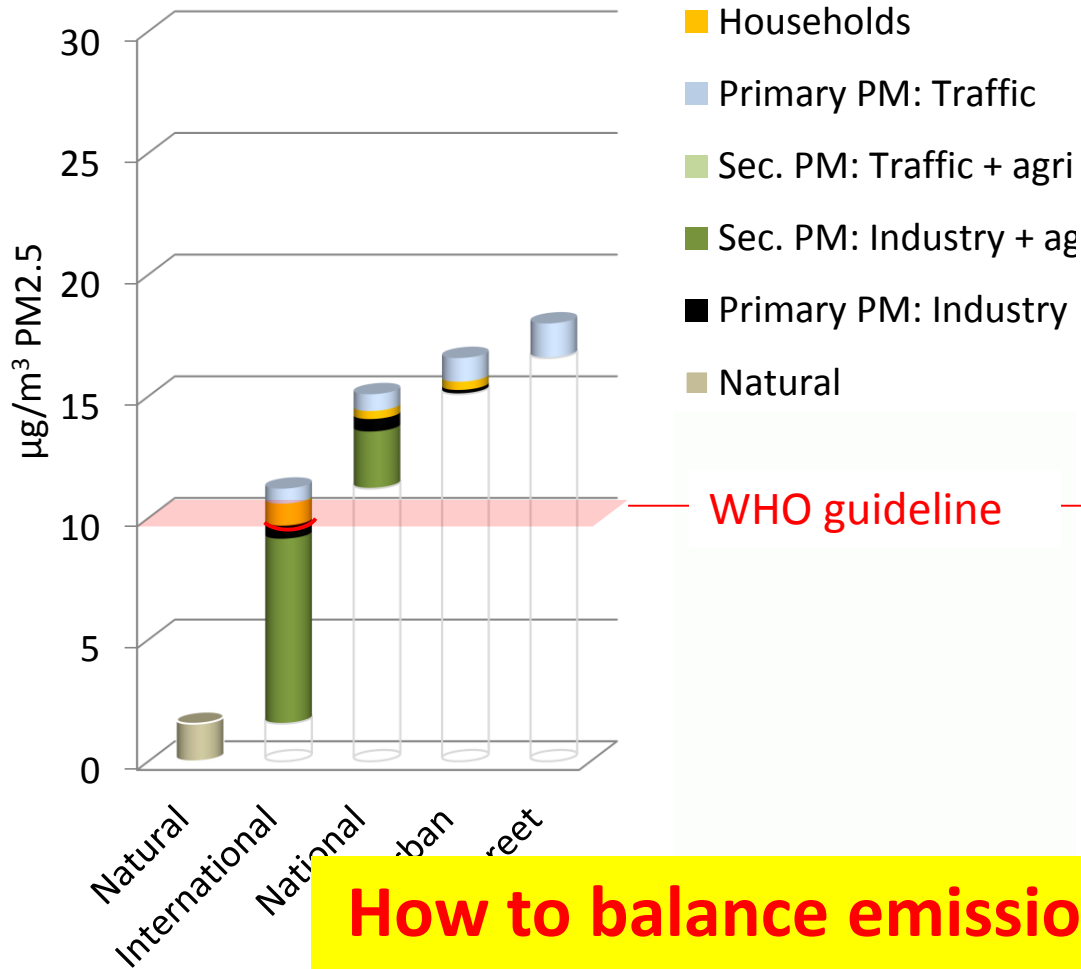
# GAINS - Greenhouse gas–Air pollution Interactions and Synergies:

A tool for a systematic assessment of the cost-effectiveness of emission control strategies

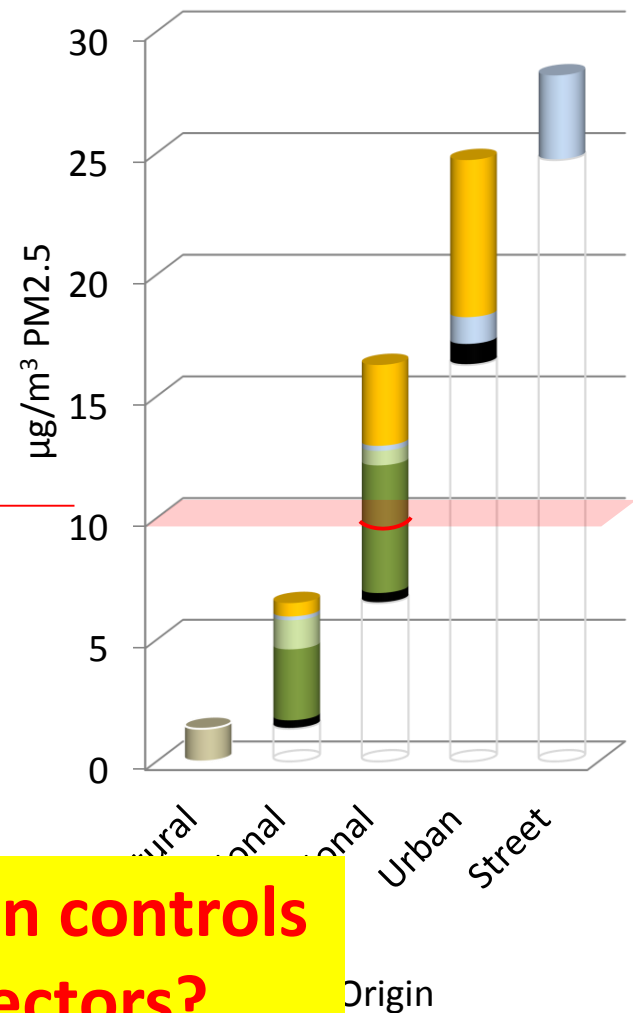


# There are large differences in the contributions of different sources to ambient PM2.5

Netherlands

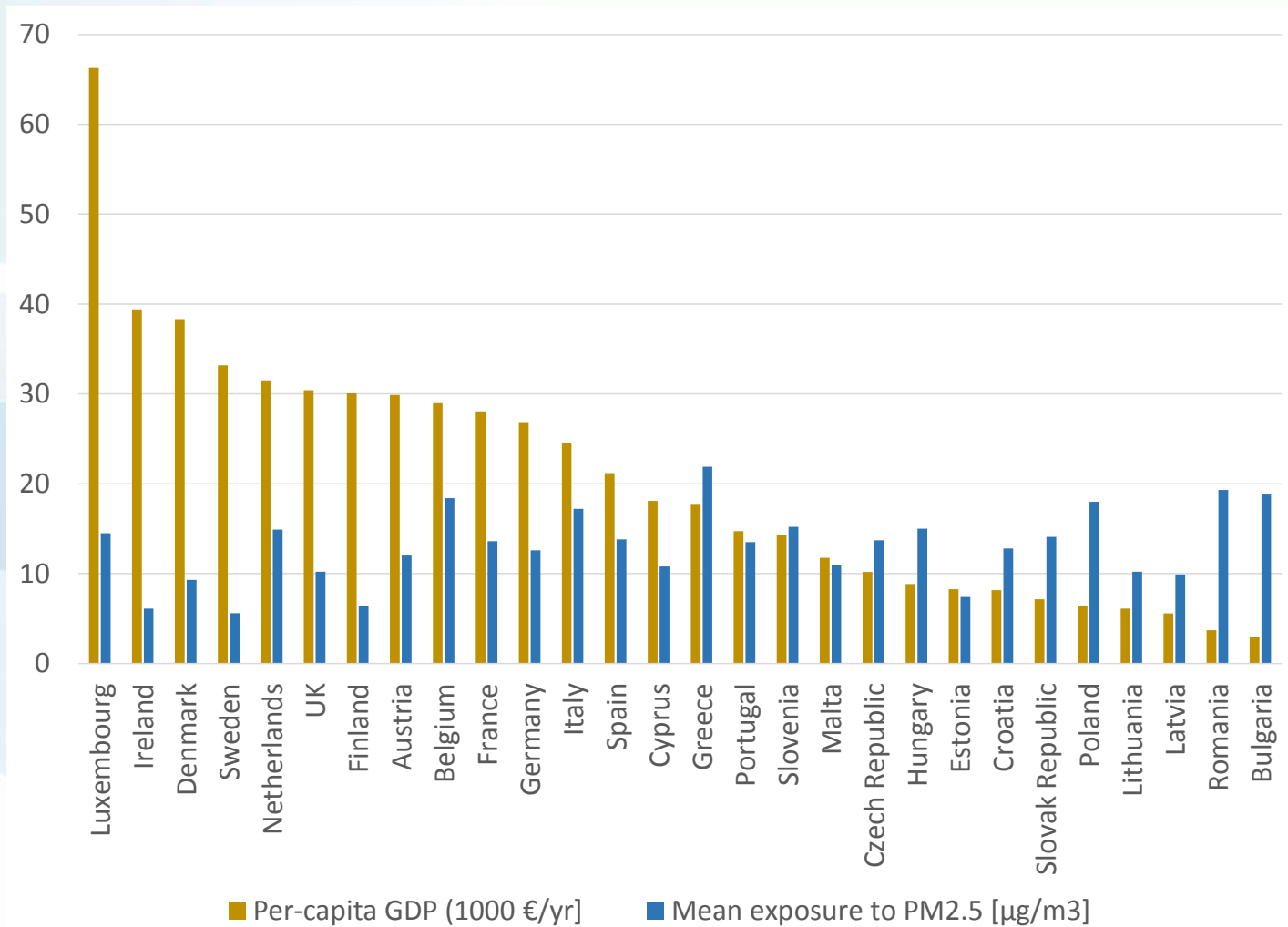


Poland

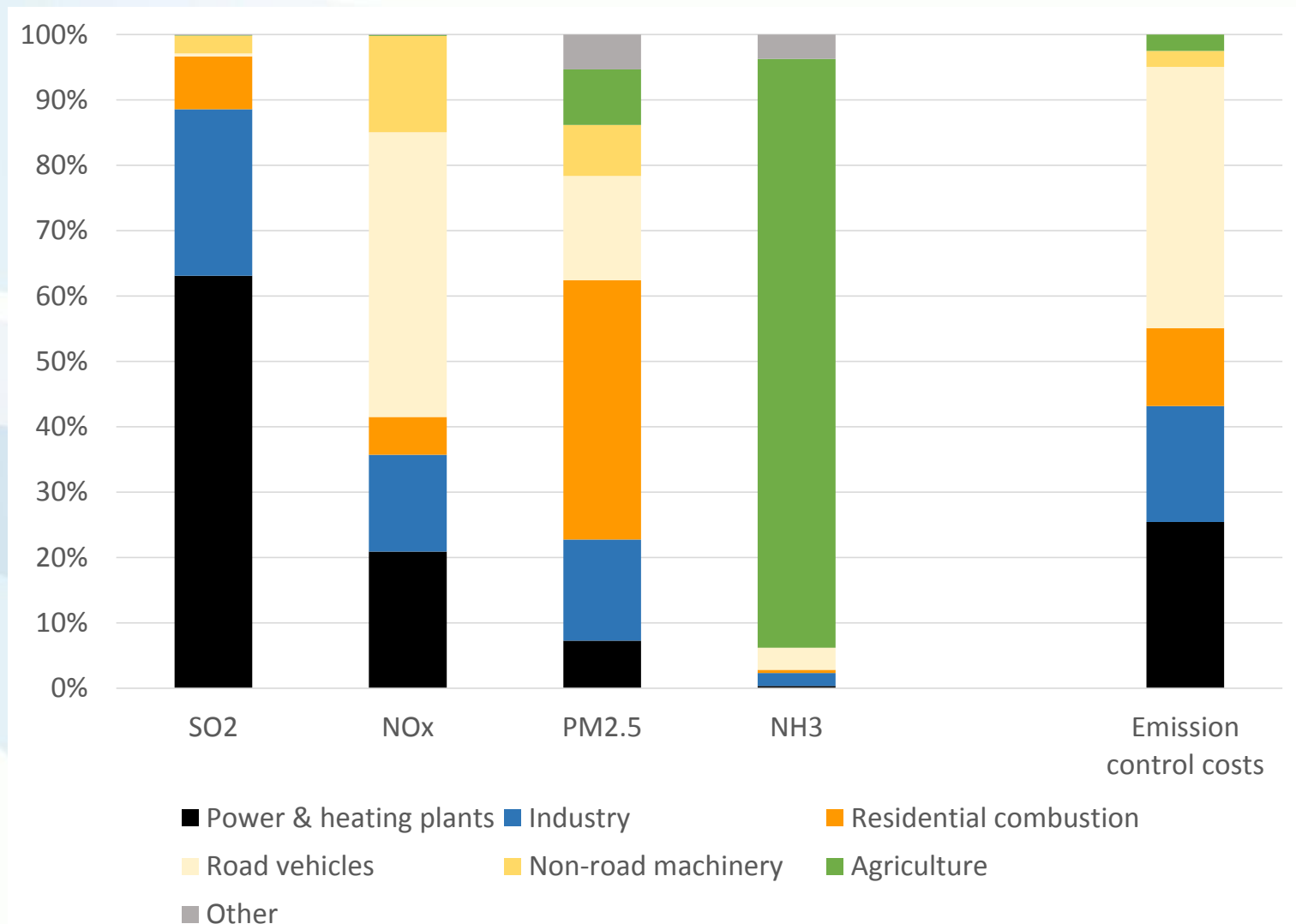


**How to balance emission controls across regions and sectors?**

# There are large differences among countries in economic wealth and pollution



# There are large differences in sectoral emissions, already applied emission controls, and costs



# GAINS:

## A multi-pollutant/multi-effect systems perspective

	PM (BC, OC)	SO <sub>2</sub>	NO <sub>x</sub>	VOC	NH <sub>3</sub>	CO	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs PFCs SF <sub>6</sub>
<b>Health impacts:</b>										
PM (Loss in life expectancy)	√	√	√	√	√					
O <sub>3</sub> (Premature mortality)			√	√		√		√		
<b>Vegetation damage:</b>										
O <sub>3</sub> (AOT40/fluxes)			√	√		√		√		
Acidification (Excess of critical loads)		√	√		√					
Eutrophication (Excess of critical loads)			√		√					
<b>Climate impacts:</b>										
Long-term (GWP100)	(√)	(√)	(√)	(√)	(√)	(√)	√	√	√	√
Near-term forcing	√	√	√	√	√	√	(√)	√	(√)	(√)
Carbon deposition to the Arctic and glaciers	√									

# Cost-benefits vs cost-effectiveness analysis

## Cost-benefits analysis

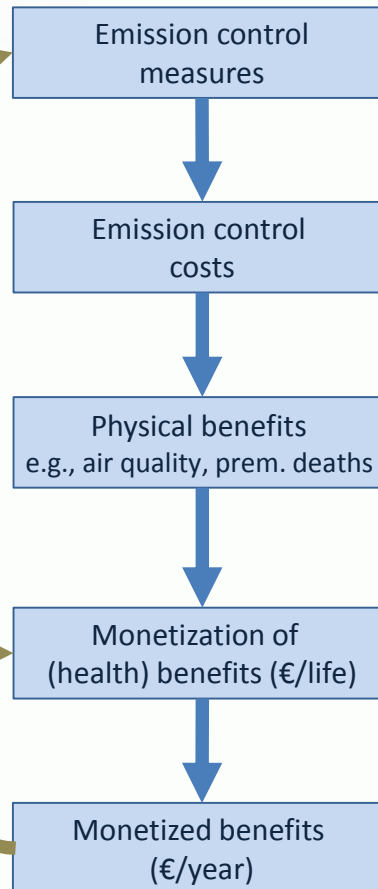
## Cost-effectiveness analysis

For which measures are the (marginal) monetized benefits larger than their costs?

Which set of measures delivers the policy target at least cost?

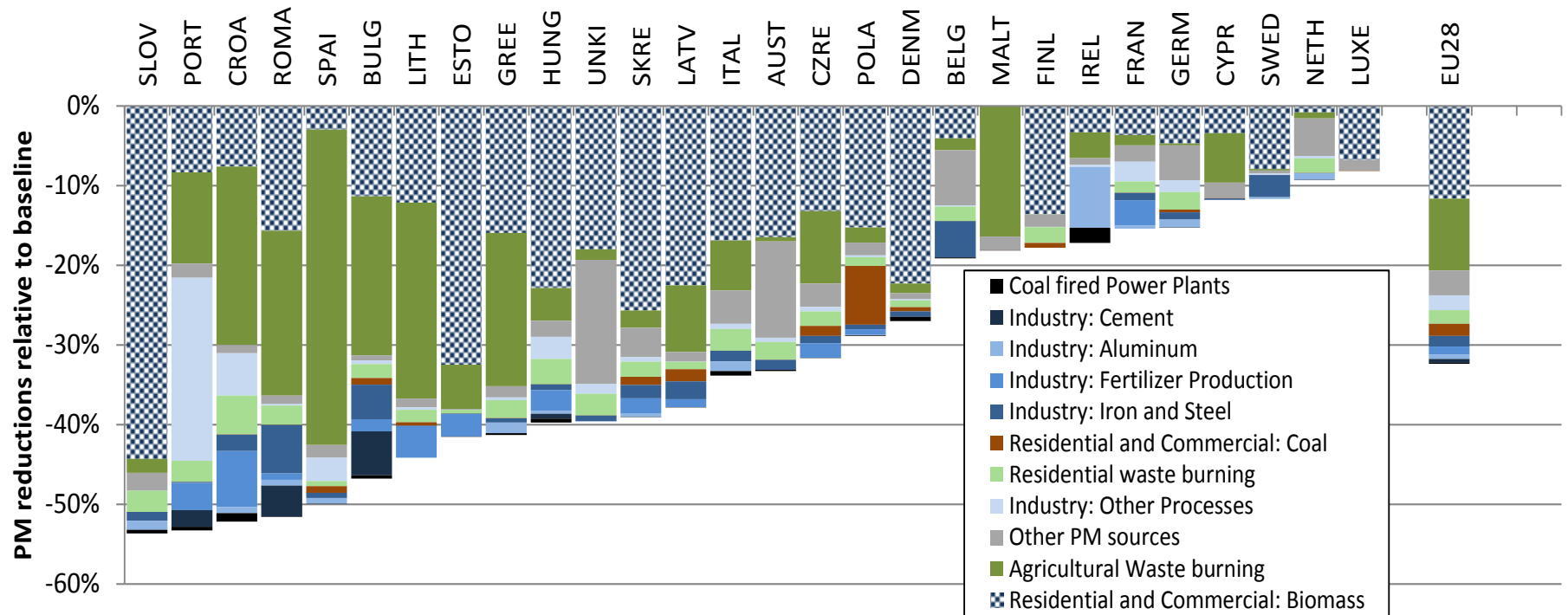
**Policy choice:**  
Monetary value (€) of human life, ecosystems, etc.

**Policy choice: Targets**  
(e.g., achieve AQ limit values, or reduce health impacts by 50%)





# Cost-effective PM2.5 emission reductions for a 50% reduction of health impacts, by sector and country

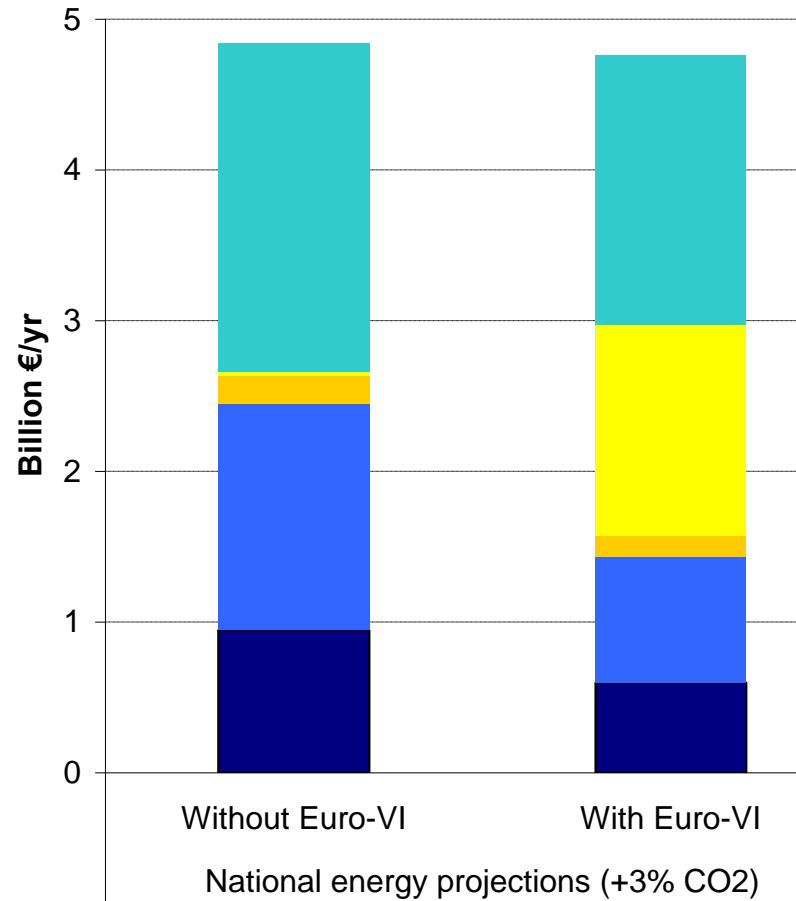


## Key measures:

- Modern biomass stoves with lower emissions and higher energy efficiency
- Enforcement of ban on agricultural residue burning
- Stricter PM controls on some industrial processes

# Emission control costs

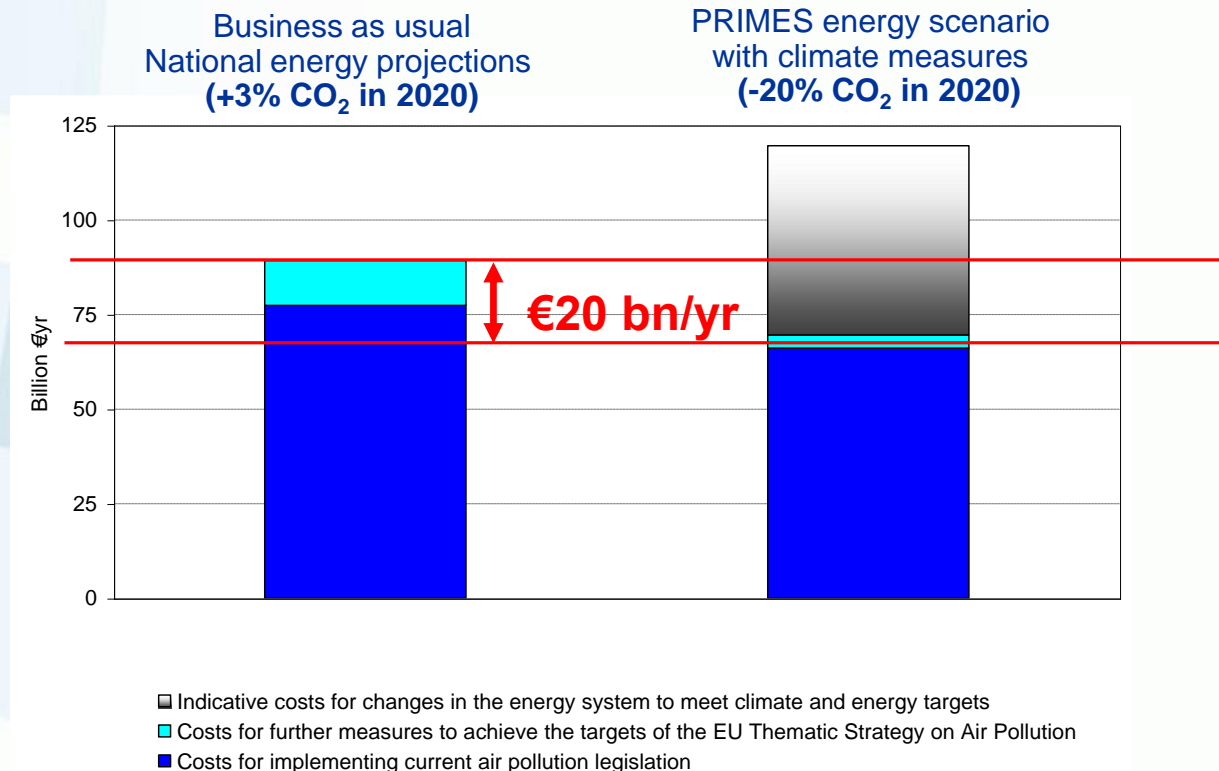
## for achieving the EU air quality targets



■ Power sector ■ Industry ■ Domestic ■ Transport ■ Agriculture

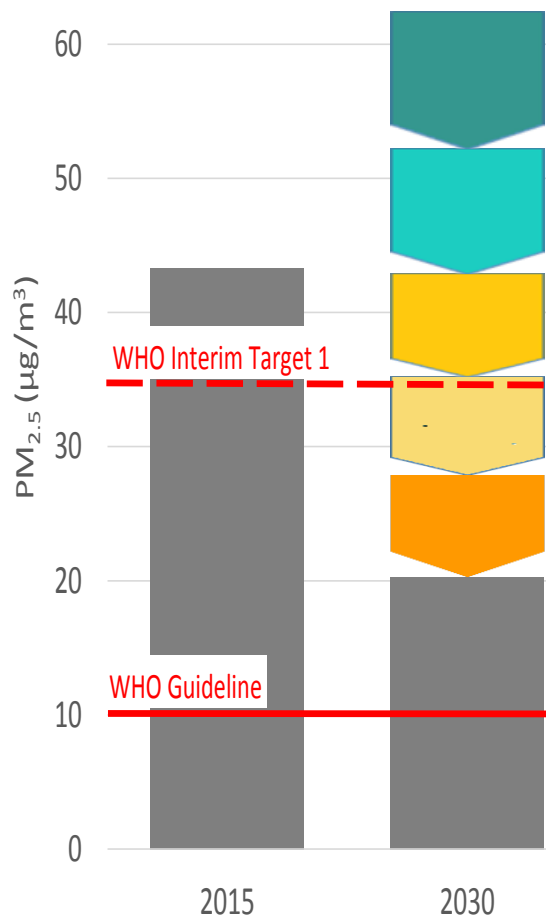
# Climate policies do not only save lives, but also money for air pollution controls

## Air pollution control costs for achieving the EU air quality targets



# Asia: Further air quality improvements require a re-orientation of current policies

Mean population exposure to PM<sub>2.5</sub>



## Already implemented measures

- Vehicle emission standards
- TSP(+SO<sub>2</sub>+NO<sub>x</sub>) controls at large plants

## Compliance with post-2015 legislation

- SO<sub>2</sub>+NO<sub>x</sub> controls at stationary sources

## Conventional PM controls - Asia-wide

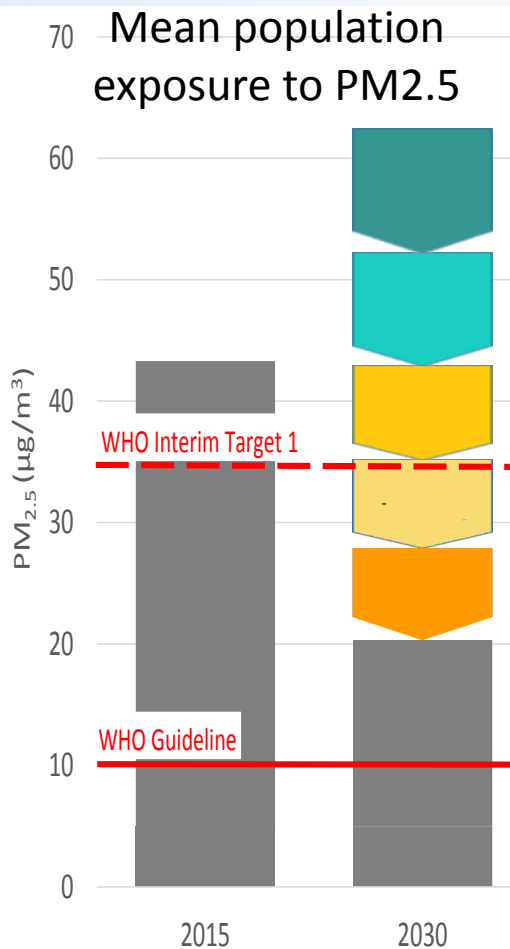
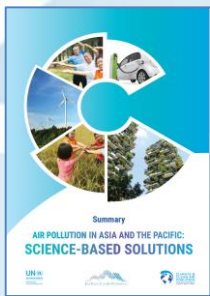
## 'Next-stage' air quality measures

- Fertilizer use, manure management
- Open burning of waste and biomass
- Forest fires, I&M of vehicles

## Development priority measures

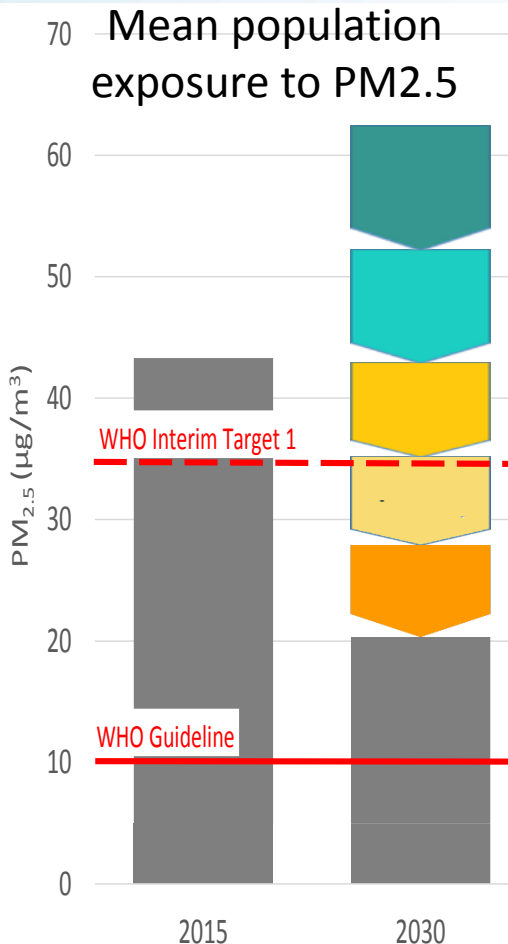
- Clean cooking fuels, renewable energy
- Energy efficiency, waste management
- Public transport and electric vehicles

# Asia: The top 25 clean air measures have important co-benefits on climate



	Climate forcers		
	CO <sub>2</sub>	CH <sub>4</sub>	BC
Current legislation baseline	<i>Relative to 2015</i>		
	+16%	+17%	-24%
Conventional controls	<i>Relative to baseline 2030</i>		
	0%	0%	-8%
'Next stage' measures	0%	-29%	-56%
Development priority measures	-19%	-44%	-72%

# Asia: The top 25 clean air measures have important co-benefits on the SDG sustainable development goals



	Climate forcers			SDG benefits
	CO <sub>2</sub>	CH <sub>4</sub>	BC	
<b>Current legislation baseline</b>	<i>Relative to 2015</i>			
	+16%	+17%	-24%	
<b>Conventional controls</b>	Relative to baseline 2030			
	0%	0%	-8%	
<b>'Next stage' measures</b>	0%	-29%	-56%	
<b>Development priority measures</b>	-19%	-44%	-72%	

# Utilizing IAM results to support science-based, policy-oriented cooperation

## ***CIAM (Center for Integrated Assessment Modelling): ingredients for success***

- *Open access to model and data*
- *Regular scientific peer review*
- *Data input: Structured data input from WGs/centers – approved by consensus*
- *Regular reviews of key outcomes by TFIAM*
- *Regular participation of CIAM in other working groups/scientific networks*
- *Regular consultations with national experts and other stakeholders*

## ***Center or Ensemble approach?***

- *Originally three IAMs in Europe - Now links to national analyses/models*

# Policy analysis: Institutional arrangements in Europe

