ASIA CLEAN BLUE SKIES PROGRAM | KNOWLEDGE SHARING EVENT

SYNERGIES AND CO-BENEFITS OF AIR QUALITY AND CLIMATE CHANGE ACTION

The Costs of Inaction of Air Pollution and Climate Change

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Air Pollution in ASEAN: the Problem

- **Over 85 % of the population of ASEAN were exposed to ambient $PM_{2.5}$ concentrations above the 2021 WHO guidelines of 5 μg/m³ in 2015**
- **This number is expected to increase without further legislation being introduced**

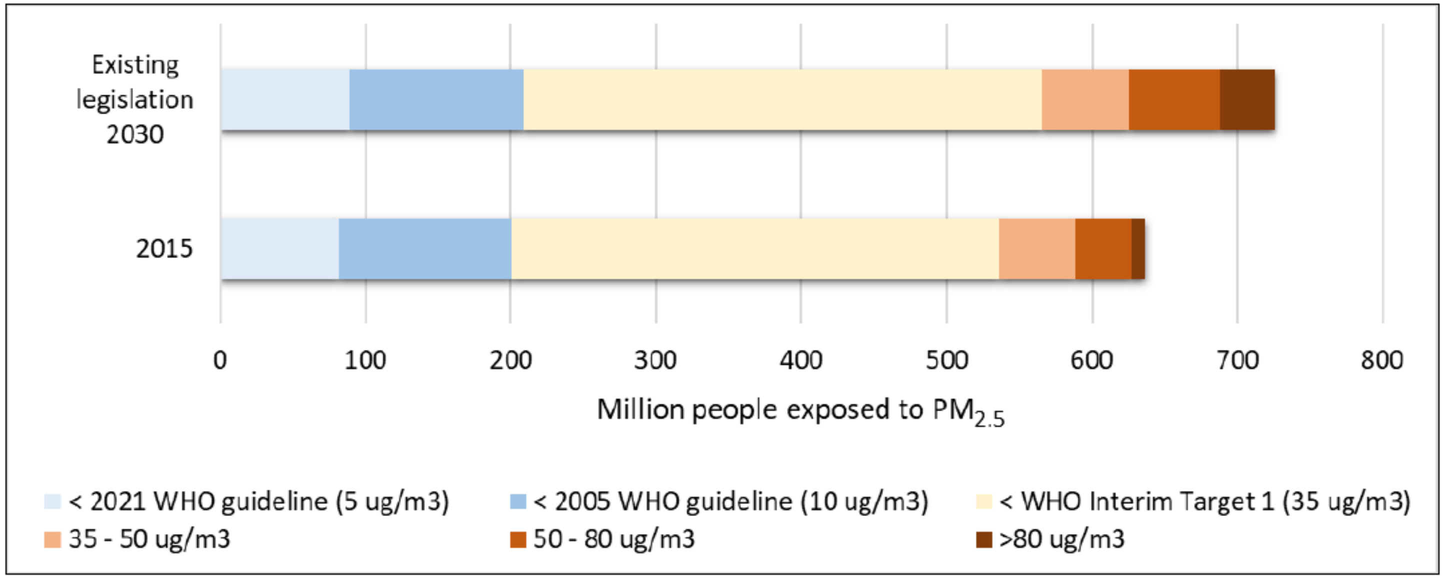
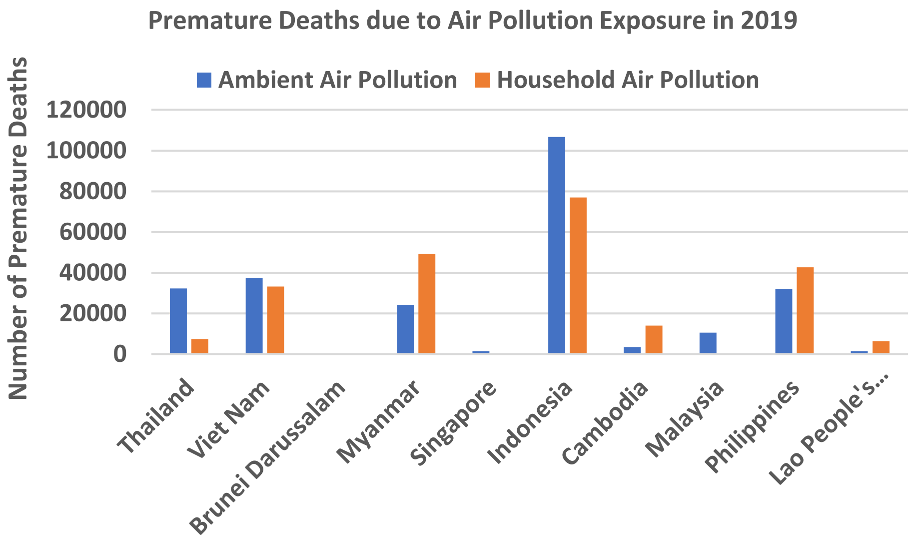
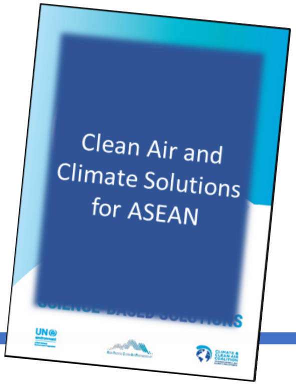


Figure 3. Population exposure to ambient $PM_{2.5}$ (household pollution excluded) in the ASEAN region in 2015 and 2030 assuming successful implementation of current policies



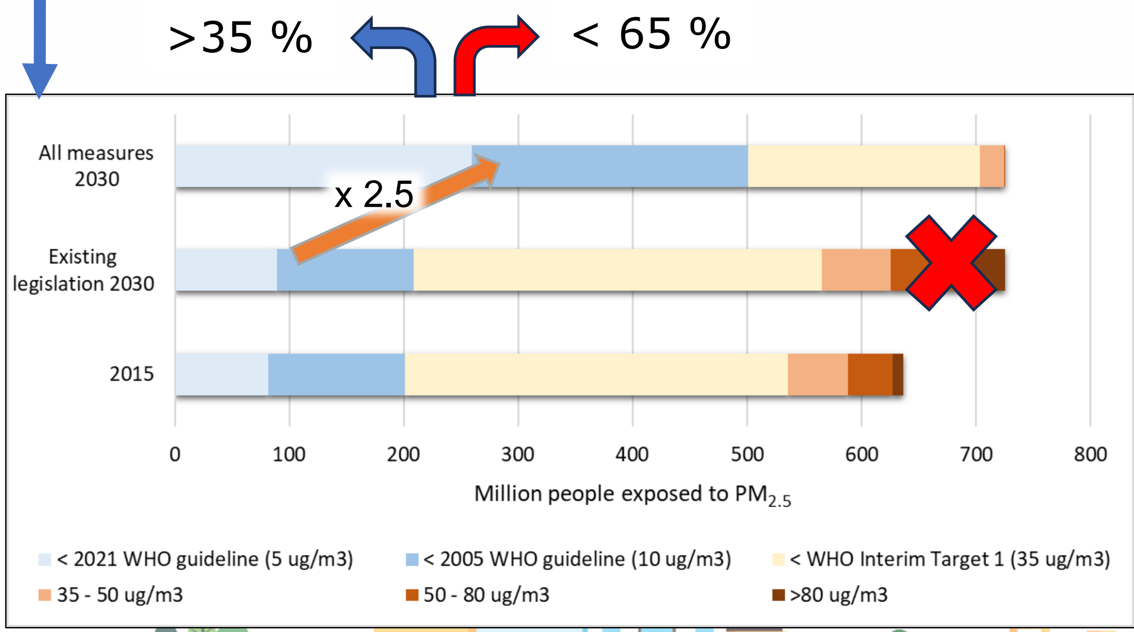
* Source: GBD2019

Mitigation assessments show what can be achieved



12 Solutions

- Expand Access to Clean Cooking
- Dietary Changes
- Improved Waste Management
- Livestock and N Fertilizer Application
- Ban Agriculture Residue Burning
- Prevention of Forest and Peatland Fires
- Stricter Vehicle Emissions Standards *
- Vehicle Inspection and Maintenance
- Tighter Standards for International Shipping
- Improved Industrial Process Standards
- Renewable Energy and Post Combustion Controls
- Fossil Fuels **



* Includes also potential for Evs, ** Reducing fugutive emissions from coal, oil, gas production and distribution

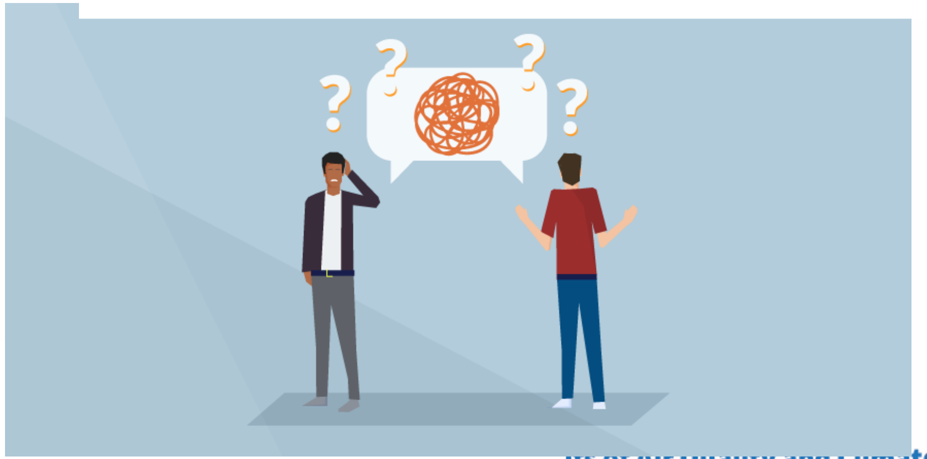
its of Air Quality and Climate Change Action

But there are often barriers to implementation

Cost of Inaction Assessments can help to:

- Overcome some of the barriers which may stand in the way of action
- Provide motivation and increase the evidence base for policy action

Fina



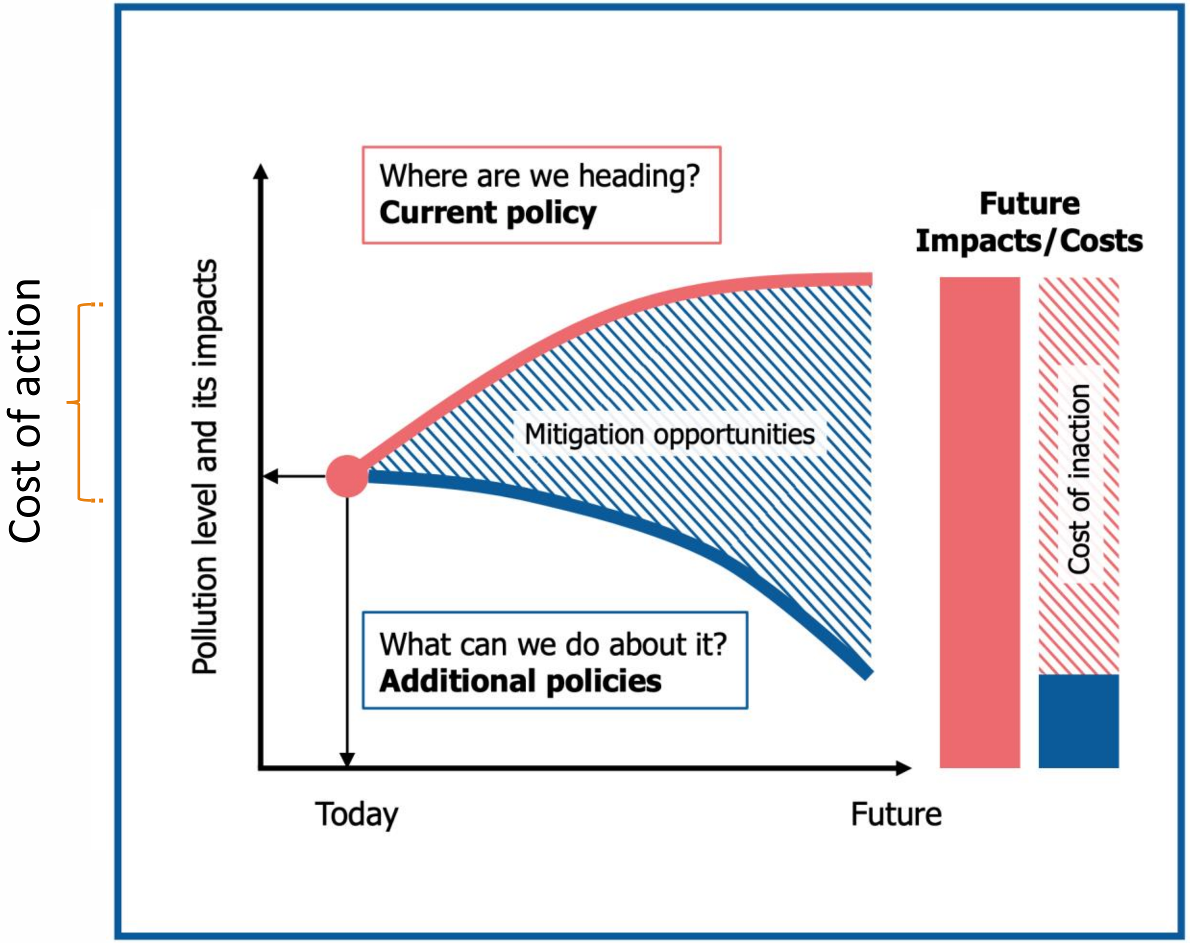
Lack of Cross-Governmental communication

Lack of Regional Cooperation

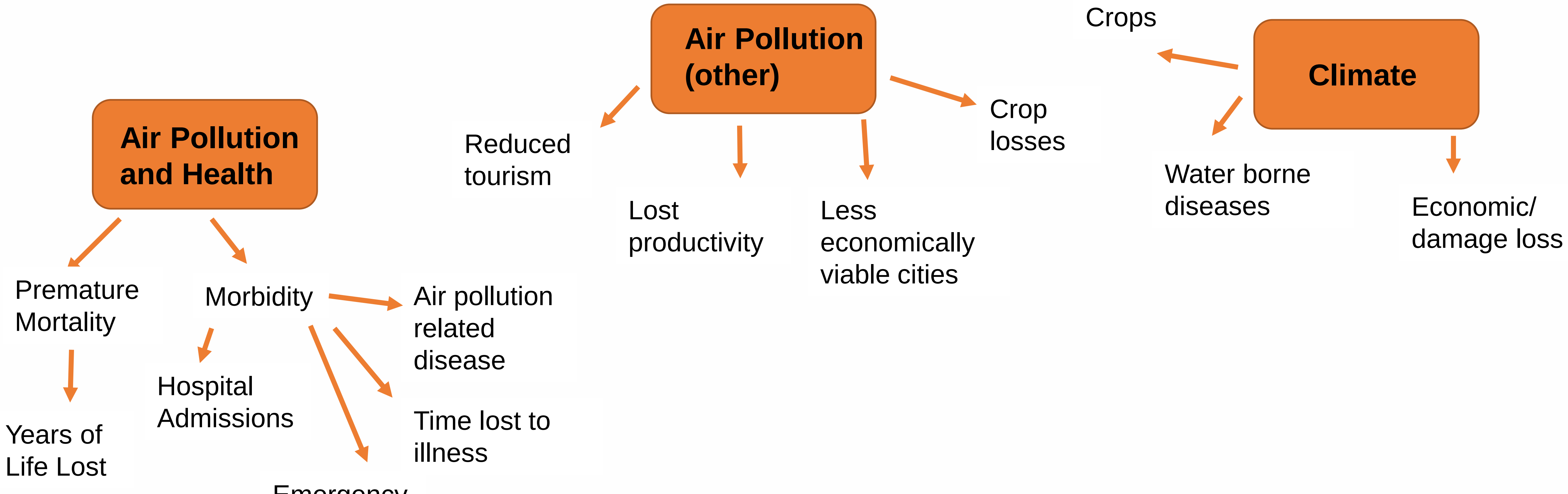
Cost of inaction: Concept

Simply put the cost of inaction is the economic cost related to not taking action (or implementing an ambitious action scenario)

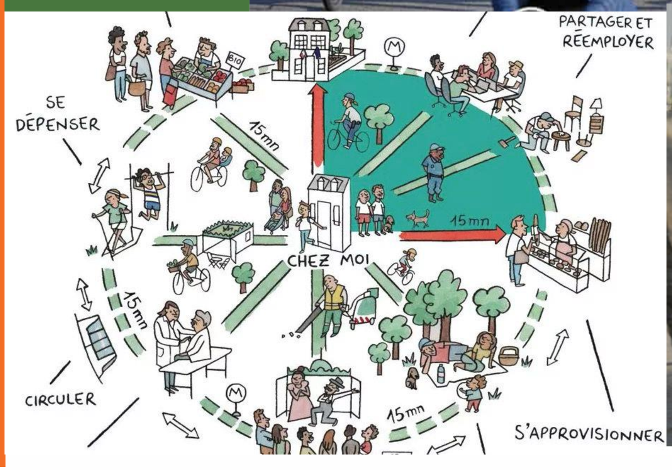
- For *Baseline* and *Alternative Policy* scenarios, develop and evaluate:
    - Emissions and ambient $PM_{2.5}$ levels
    - Control costs
    - Health impacts and the related impact costs
- Difference of policy costs for Baseline vs Additional policy = cost of action
- Difference of impact costs for Baseline vs Additional policy = cost of inaction



There are multiple impacts of air pollution and these have economic costs



Example – costs of promoting walking and cycling



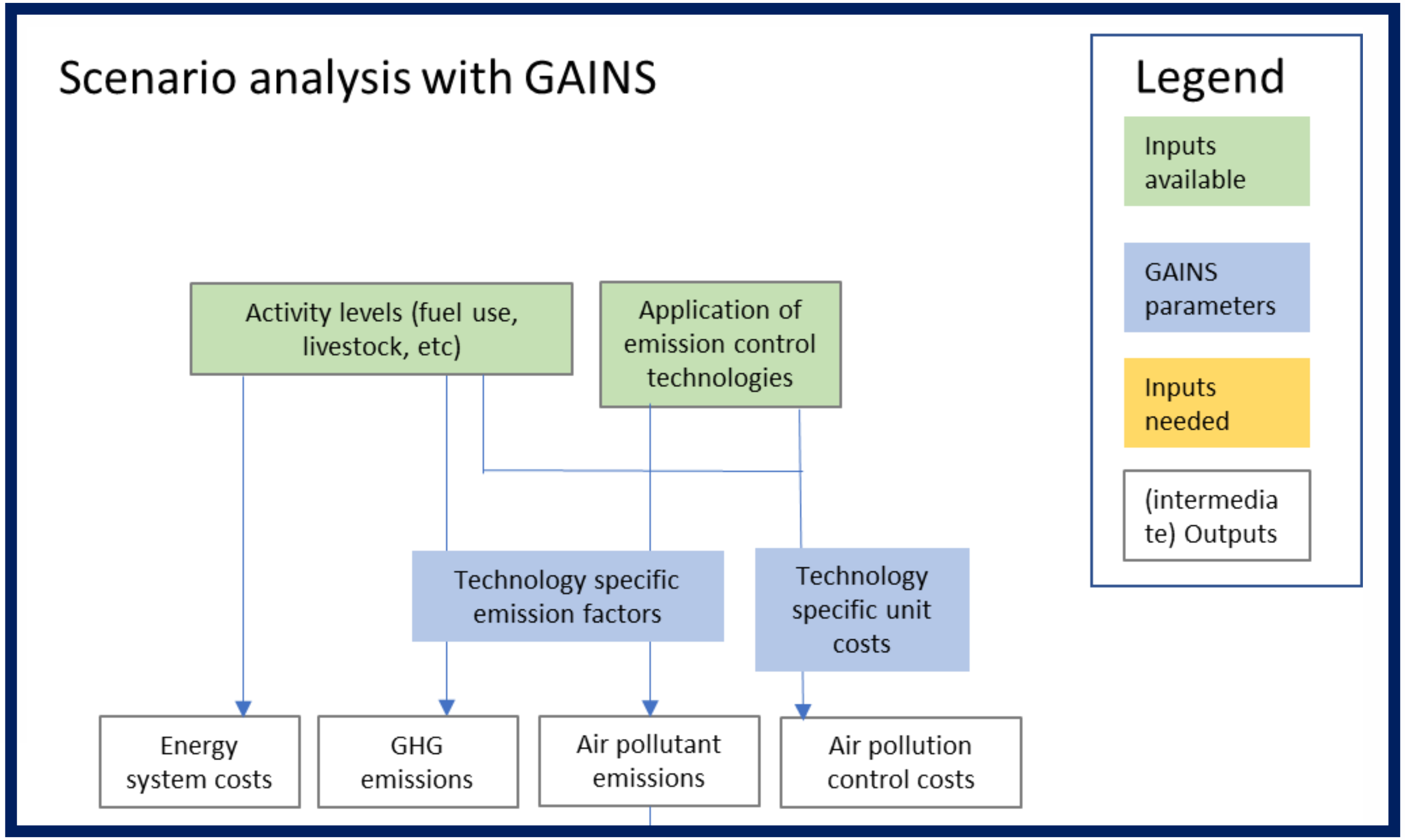
- Health costs from air pollution exposure
- Other costs from air pollution
- Costs associated with climate change
- Costs from having a less active population
- Costs from not reducing congestion
- Costs from road traffic injuries

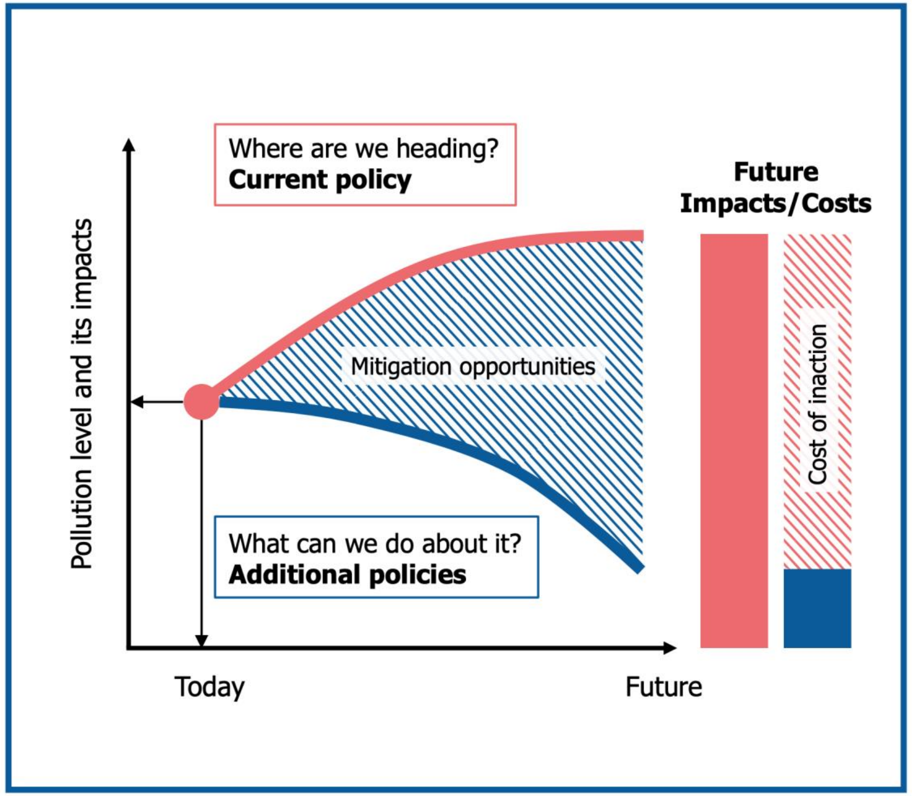
Developing Cost of Inaction Assessments for Thailand, Cambodia and Indonesia

***Focusing on selected health indicators only**

Step 1: Quantify emissions in two alternative policy scenarios

Emissions = Activity Variable x Emission Factor





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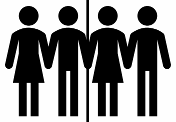
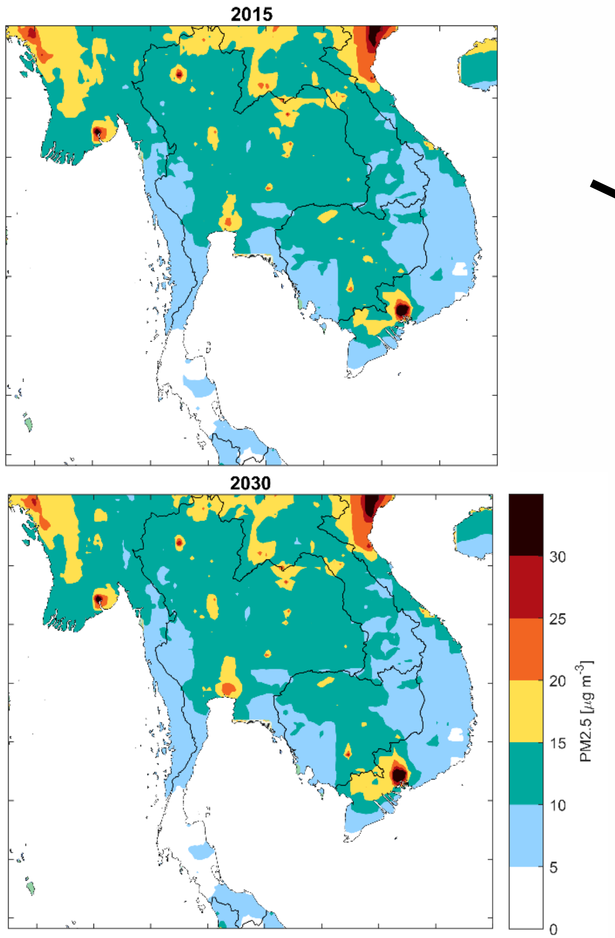
Step 2: Quantify differential air pollution exposure in two alternative scenarios

PM2.5 concentrations = PM2.5 precursor emissions x Transfer Coefficient

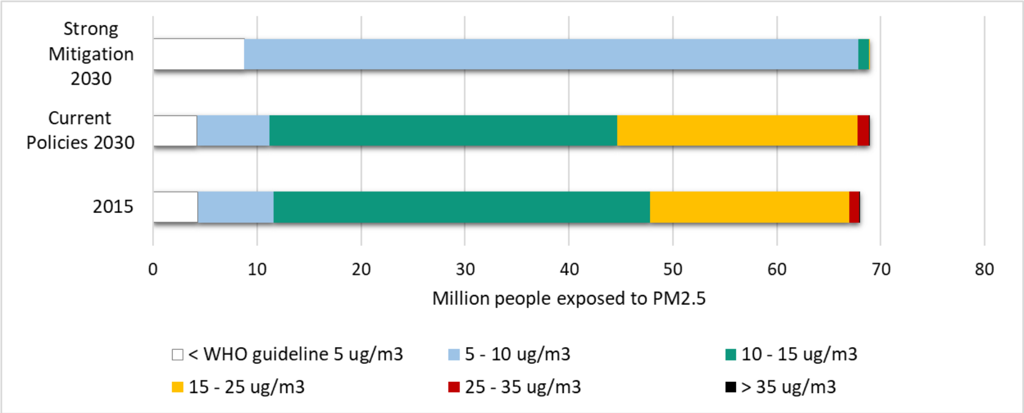


Population weighted exposure to PM2.5



- Taken from Chemical Transfer Model
- Relates emissions to concentrations
- Using meteorology and atmospheric reactions

Fig . 2.3 *Population exposure to $PM_{2.5}$ modelled with the GAINS model for 2015 and for 2030 under different scenarios*



Step 3: Quantify the health impacts of air pollution exposure

$$\Delta Mort = y_0 \left(\frac{RR_{mort} - 1}{RR_{mort}} \right) Pop$$

Exposure to $PM_{2.5}$

Concentration-Response Function

$$\Delta Morb = y_0 \left(\frac{RR_{morb} - 1}{RR_{morb}} \right) Pop$$

IHME

All people living long lives in full health, fully themselves.


New concentration-response functions for seven morbidity endpoints associated with short-term $PM_{2.5}$ exposure and their implications for health impact assessment

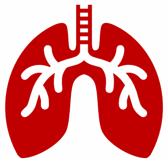
Muye Ru, Drew Shindell, Joseph V. Spadaro, Jean-François Lamarque, Ariyani Challapalli, Fabian Wagner, Gregor Kiesewetter

Baseline mortality levels

Baseline morbidity levels

Mortality Indicators

- Chronic obstructive pulmonary disease (COPD)
- Ischemic Heart Disease
- Stroke
- Lung Cancer
- Acute Lower Respiratory Infection
- Type 2 Diabetes



Morbidity Indicators

- Asthma – related emergency room visits
- Cardiovascular Hospital Admissions (</+ 65 years)
- Respiratory hospital admissions
- Respiratory restricted activity days (working age)

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Step 4: Quantify the costs of the health impacts in each scenario

Mortality Indicator	Unit Cost (USD)
Premature Deaths	**1,094,019**
Year of Life Lost	**41,370**

Mortality costs

- Economic Value of a Statistical Life year x Number of Life Years Lost

Morbidity Indicator	Unit Cost (USD)
Asthma (emergency room visits)	**15**
Cardiovascular hospital admissions < 65 years	**920**
Cardiovascular hospital admissions > 65 years	**920**
Respiratory hospital admissions	**920**
Respiratory restricted activity days	**33**

Morbidity costs

- Cost per hospital visit x number of hospital admissions
- Cost per emergency room visit x number of emergency room visits
- Cost of a lost work-day x number of restricted activity days

$$\ln(Unit\ cost_{ij}) = \beta_{0i}\ln(\text{GDP per capita}_j + \beta_{1i})$$

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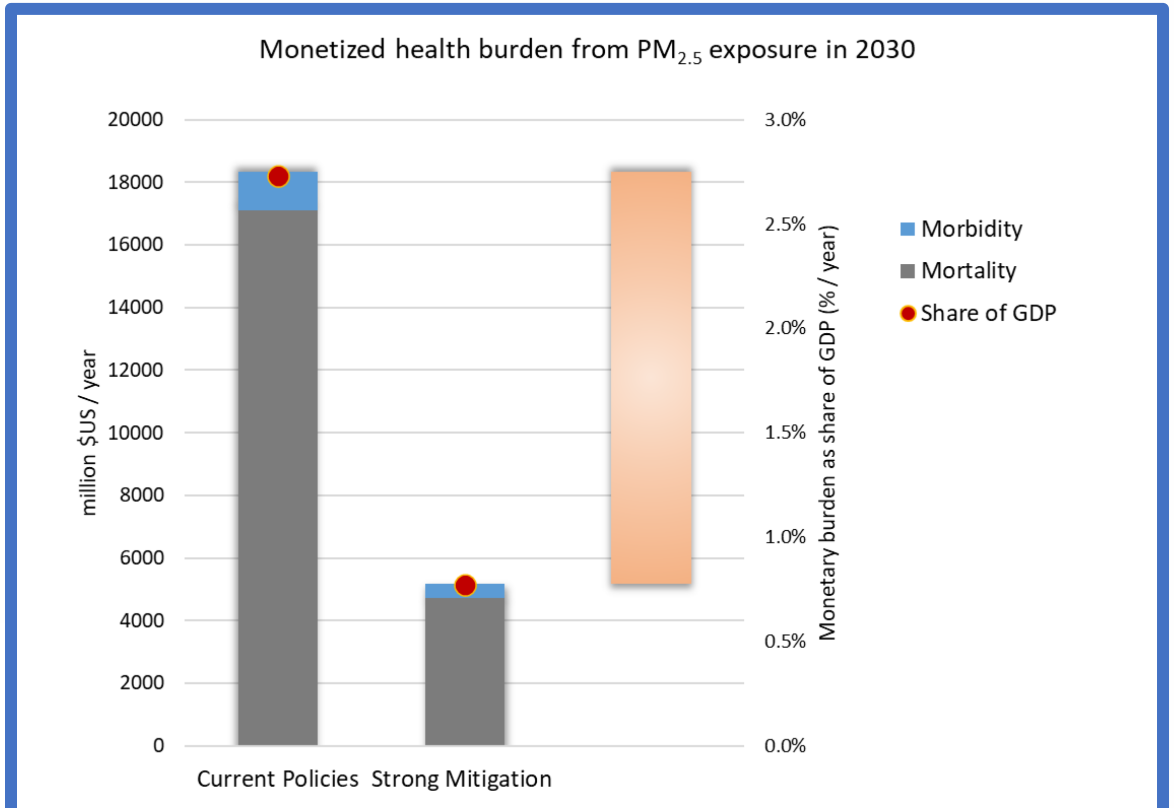
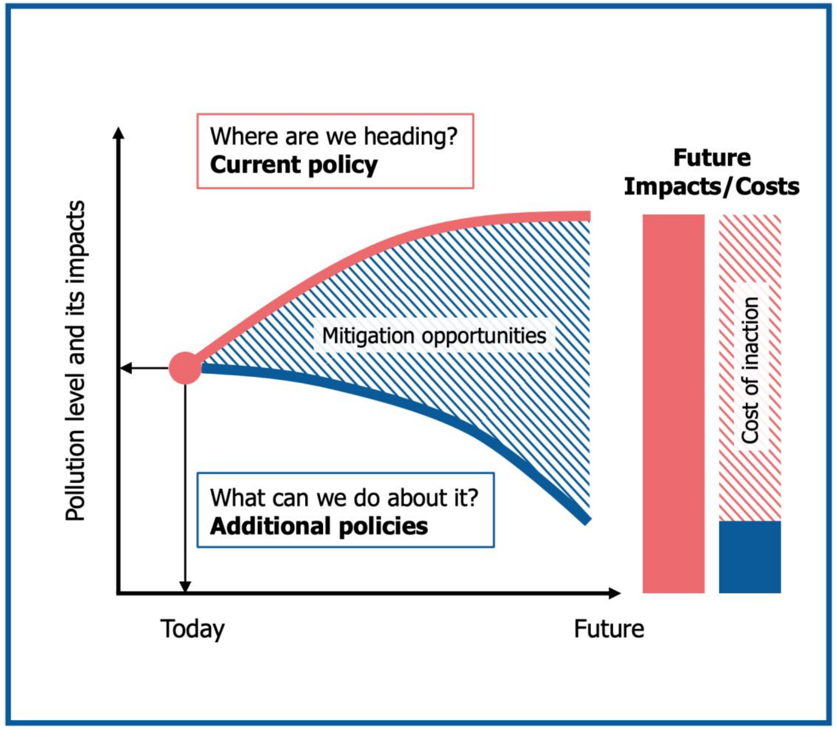
Step 5: Calculate the cost of inaction as the difference

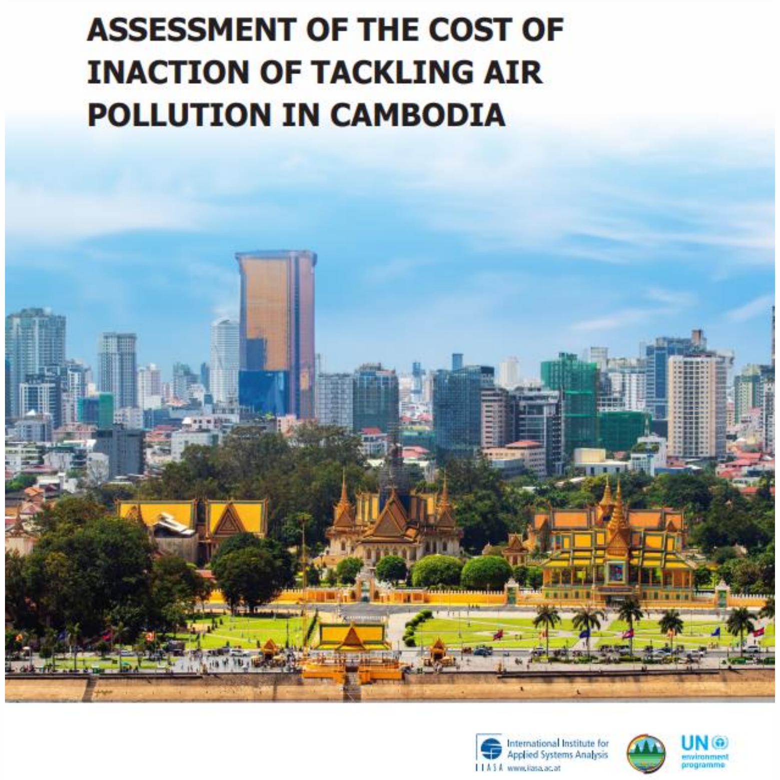
- **The cost of inaction is the difference between the total impact costs in the baseline scenario and the total impact costs in the policy scenario**
- **It represents the costs of not implementing the ambitious actions**





Key Results


NATIONAL ASSESSMENT OF THE COSTS OF INACTION OF TACKLING AIR POLLUTION IN INDONESIA


ASSESSMENT OF THE COST OF INACTION OF TACKLING AIR POLLUTION IN CAMBODIA


NATIONAL ASSESSMENT OF THE COST OF INACTION OF TACKLING AIR POLLUTION IN THAILAND

Without future ambitious action the health impacts of air pollution are expected to increase

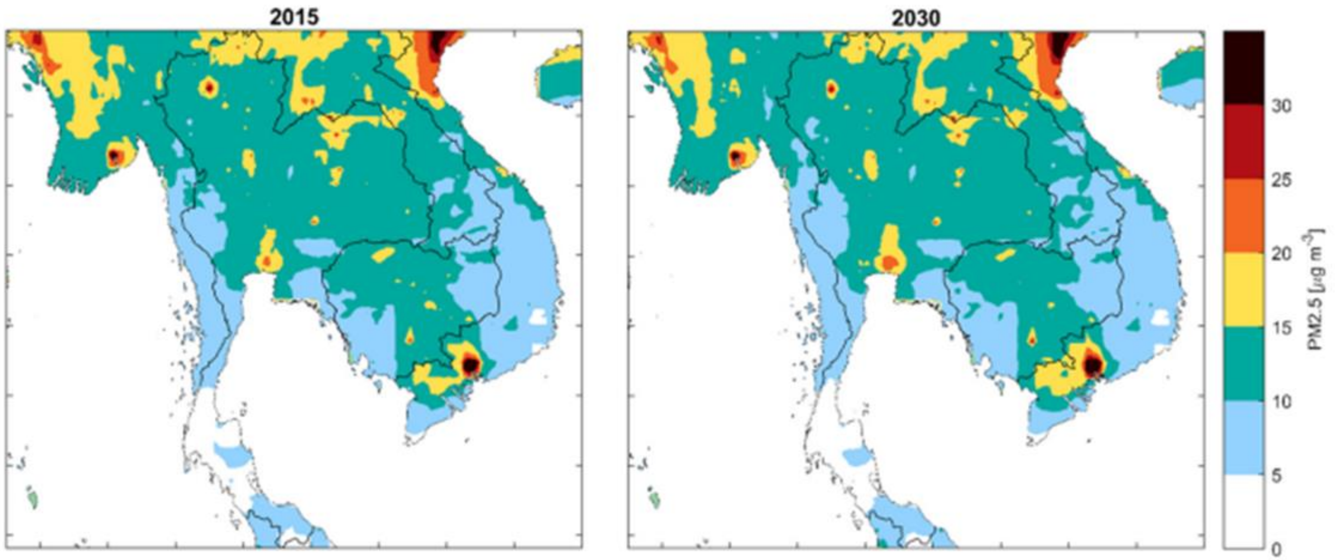
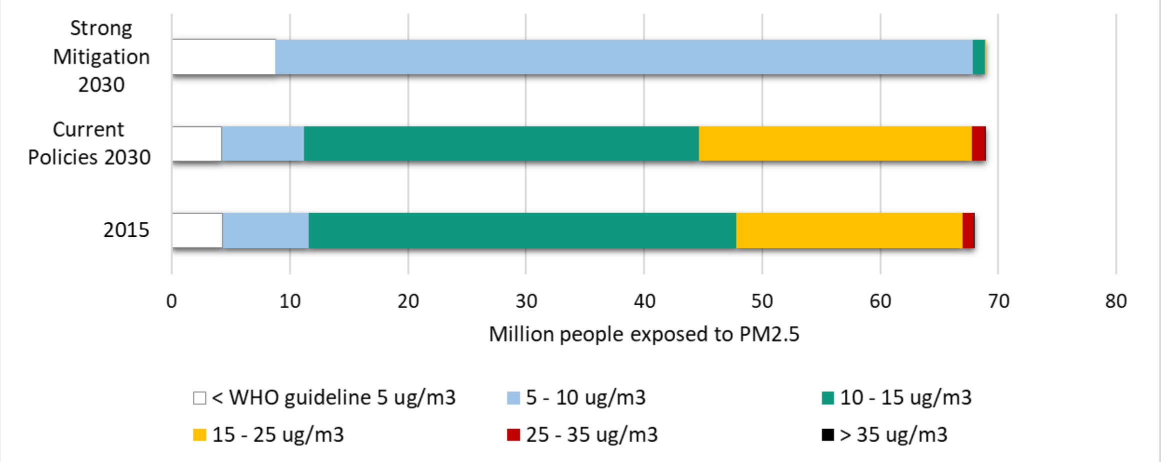


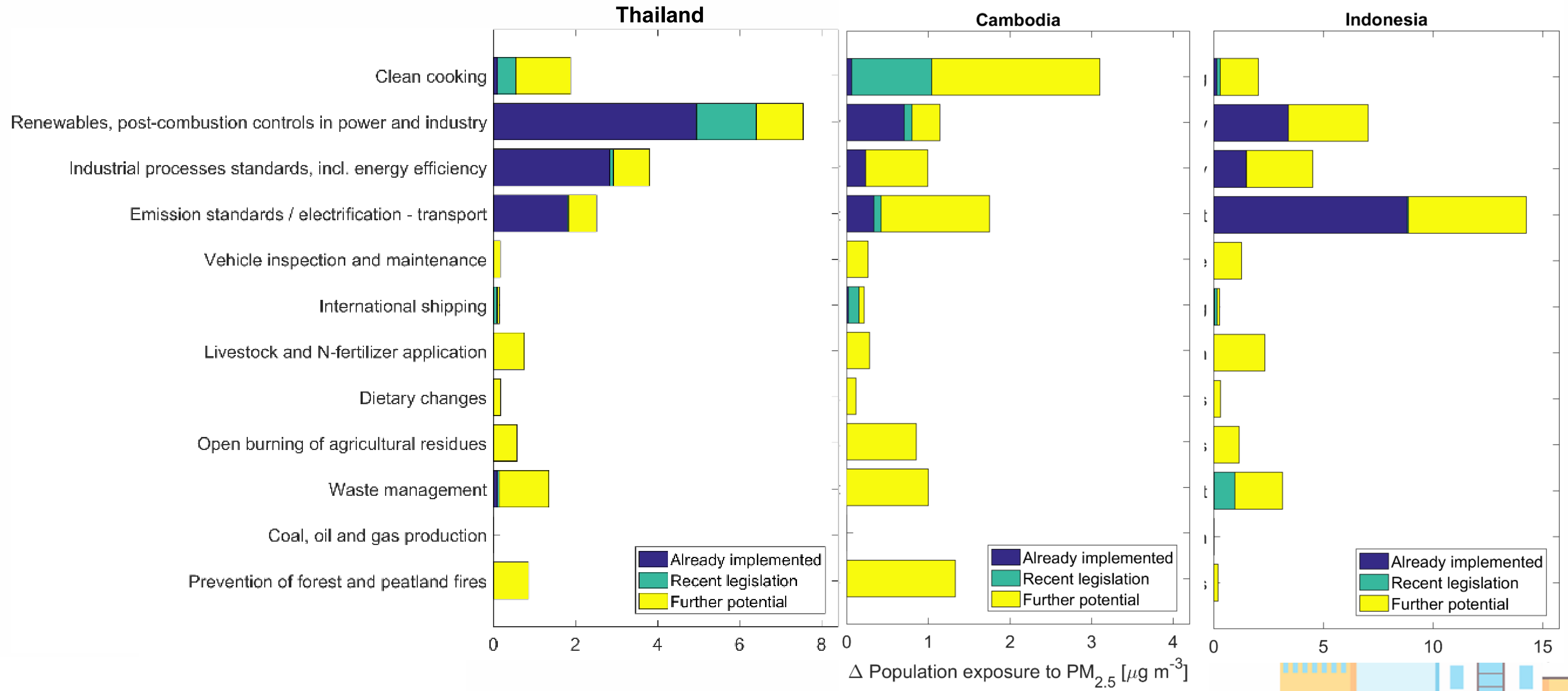
Fig. 2.2 *$PM_{2.5}$ concentrations for Thailand modelled with the GAINS model for 2015 (left) and for 2030 under Current Policies (right)*

Even including current policies, the health impacts of air pollution exposure are likely to increase in all 3 countries (example from Thailand)

This is due to population growth and aging as well as increases in PM in certain areas



Solutions exist and the impact of each solution varies by country



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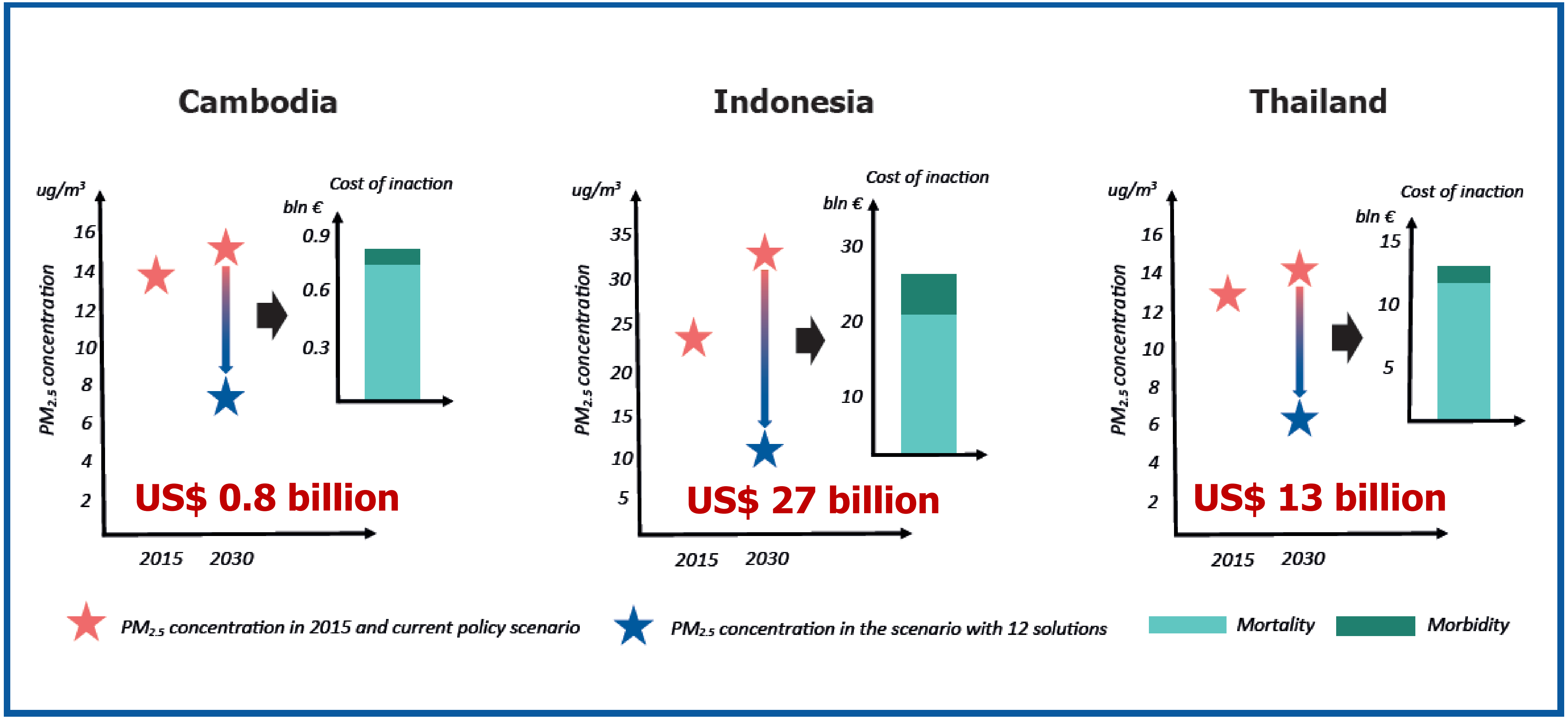
Inaction on air pollution is costly



There are also climate co-benefits (not yet costed)

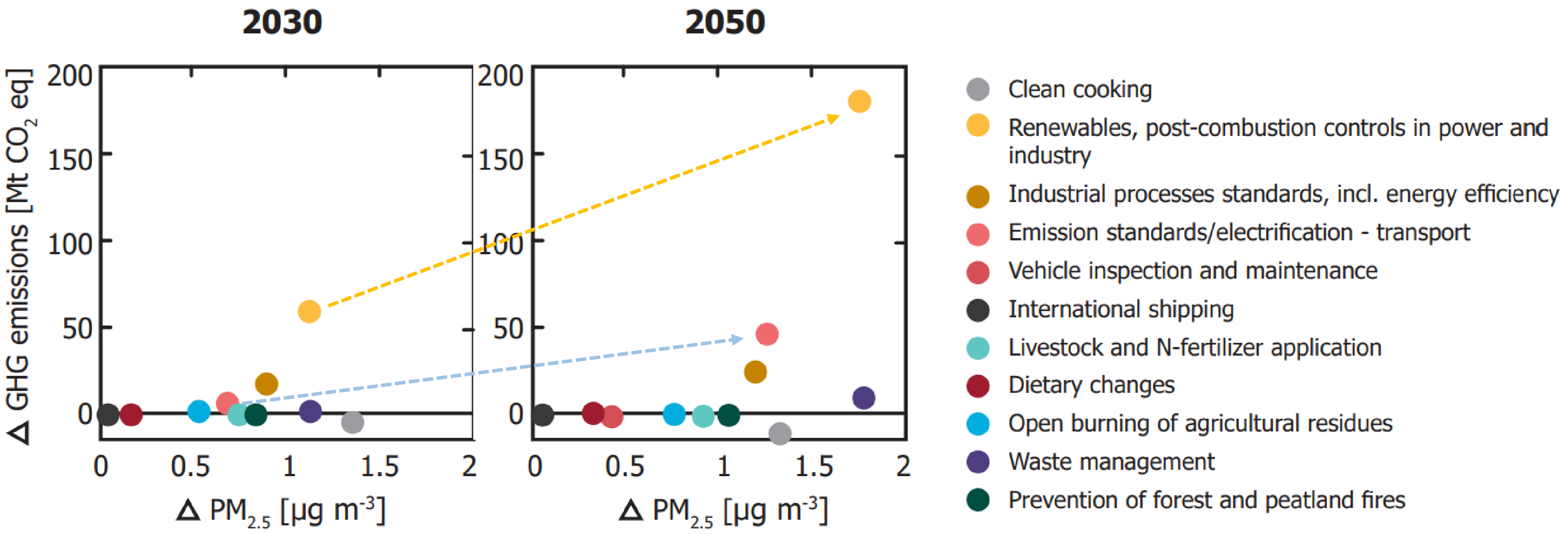


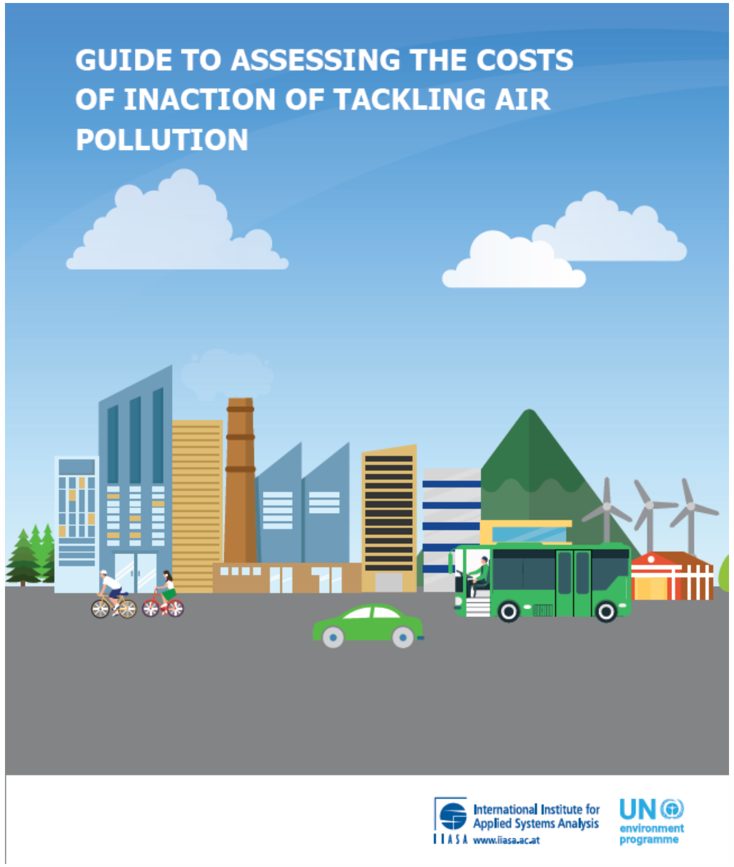
Fig. 2.9 *Co-benefits of individual measures for GHG emissions (CO_2 + CH_4) when fully implemented in 2030 (left) and 2050 (right)*

Guidance Document and Resources

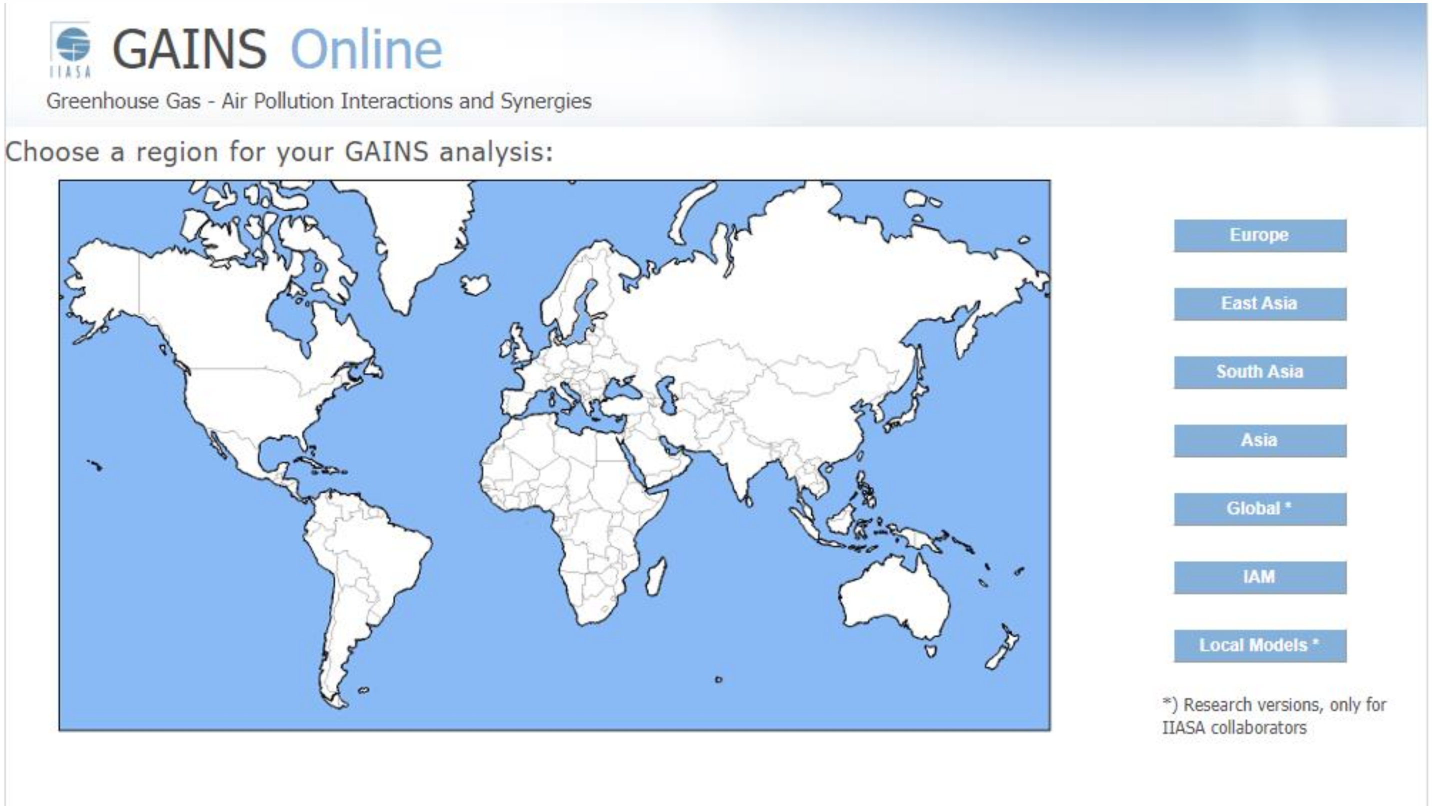
A Guide to Assessing the Costs of Inaction of tackling Air Pollution is available

Provides practical guidelines for developing cost of inaction assessments, including:

- **Detailed steps to follow**
- **Links to useful resources**
- **Good Practices to follow**
- **Key Opportunities and Recommendations**



GAINS Tool



[Access GAINS]