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Air Quality Intelligence

13th Concawe Symposium:

Understanding the Air Quality Limit Value setting process and associated compliance challenge

Outline

- The AQLV setting process
- Understanding the Compliance Challenge
- Informing the Risk Management process and Compliance challenges
- Some concluding remarks

Establishing AQLVs: A Two Step Process: 'Risk Assessment' followed by 'Risk Management'

- The WHO, in publishing its guidance, recognises that risk assessment is, by its very nature, 'single issue' focused while we live in a 'multi-issue' world; therefore in the process of setting binding AQLVs, a subsequent and separate 'risk management' process should be undertaken to account for the other important factors

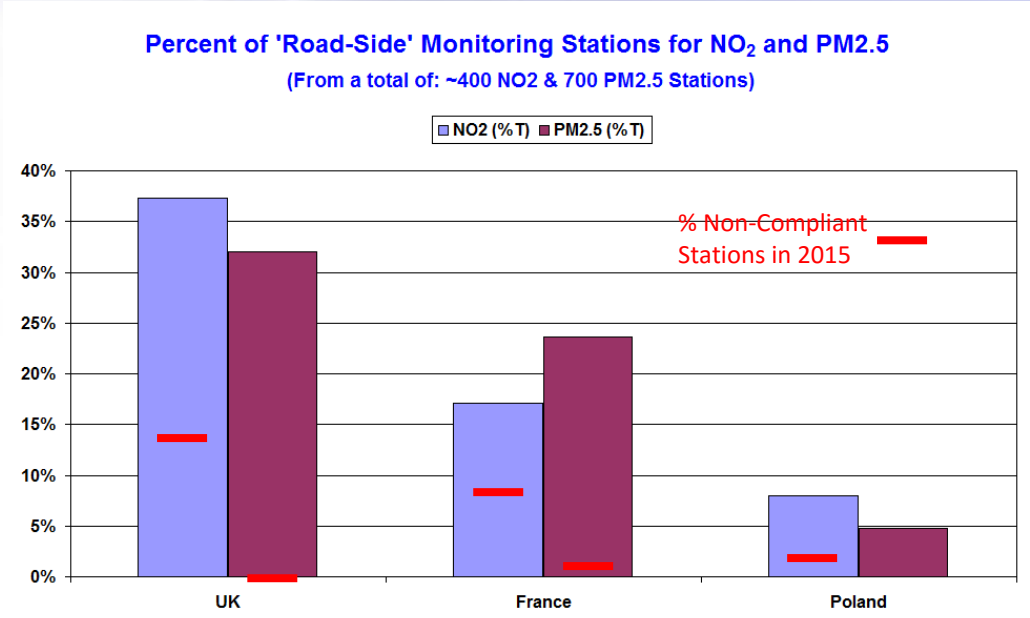
- Here is a quote from the preface to their most recent published guidelines:

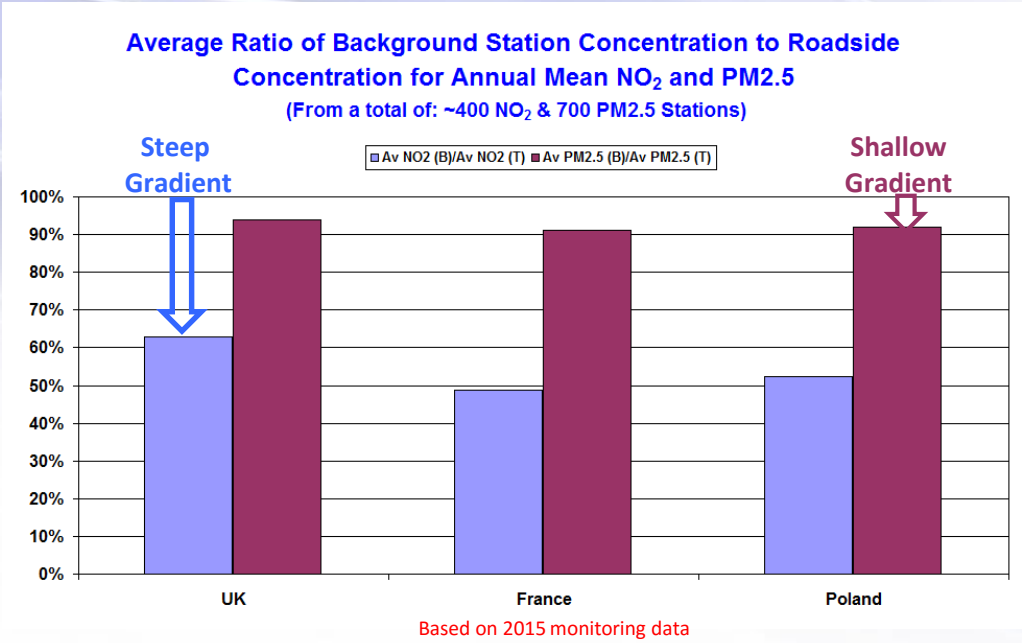
> 'It should be emphasised….that the guidelines are health-based or based on environmental effects, and are not standards per se. In setting legally binding standards, considerations such as **prevailing exposure levels, technical feasibility, source control measures, abatement strategies, and social, economic and cultural conditions** should be taken into account.'[1]

(1) Preface to Air Quality Guidelines for Europe, Second Edition, WHO Regional Publications, European Series, No. 91

Understanding the AQLV Compliance Challenge

- The key purpose of the AAQD is to ensure that citizens are protected from **exposure** to levels of pollutant concentrations **above the AQLVs**
- Annex III of the Directive requires that measuring points should be sited to ensure they represent the *maximum concentration that the population is likely to be exposed to for a period which is significant* ***compared to the averaging time of the limit value(s)***
- For compliance with annual mean AQLV this would generally mean that siting should be in the urban 'background' and not the 'roadside' (traffic station), However the reality is very different:





Informing the Risk Management Process and the Compliance Challenge: Some Illustrative Analysis

Road Transport Scenarios: Total Replacement **of all**: Diesel PC, Gasoline PC, LDV, Road Transport with Electric Vehicles; 'Euro 7' (for NO_x only);

Non-Transport Scenarios: Substitution of **all** Solid Fuel Burning (Wood or Coal) in the Domestic Sector with either Gas or Gasoil; Elimination of Ammonia in the Agricultural sector (PM2.5 only)

PM2.5

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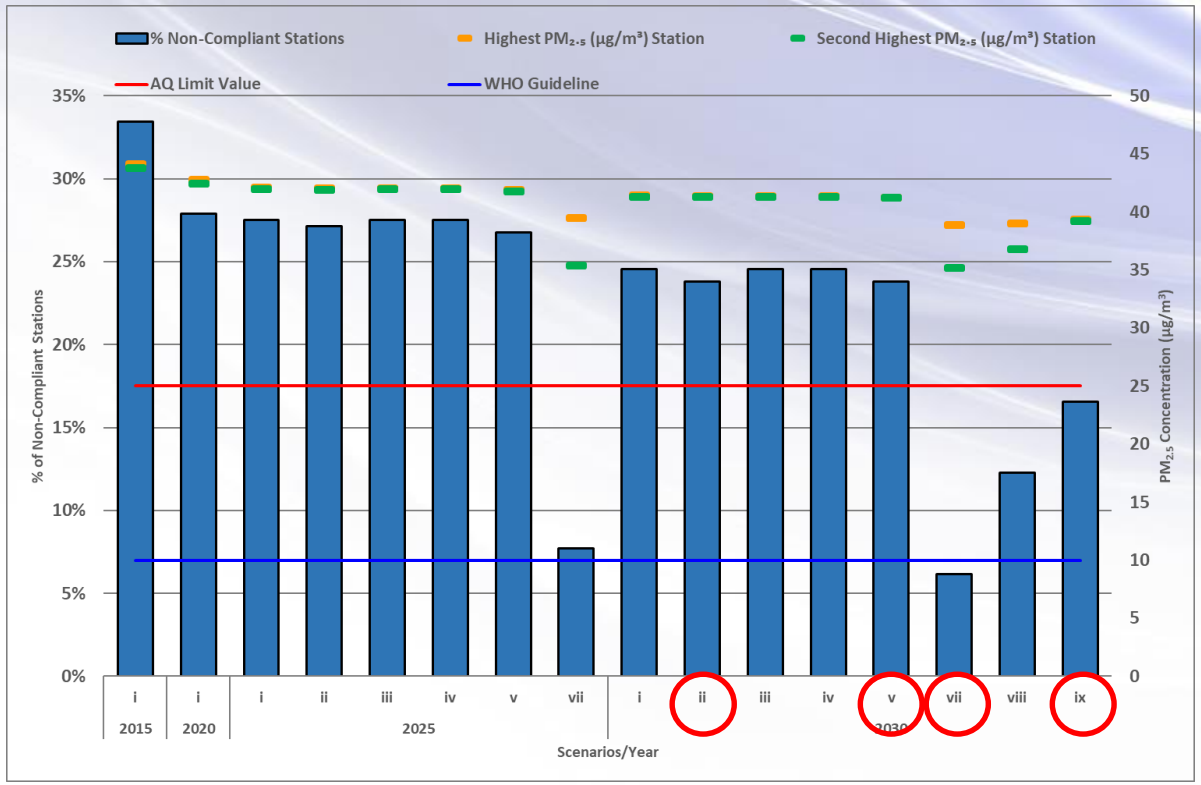
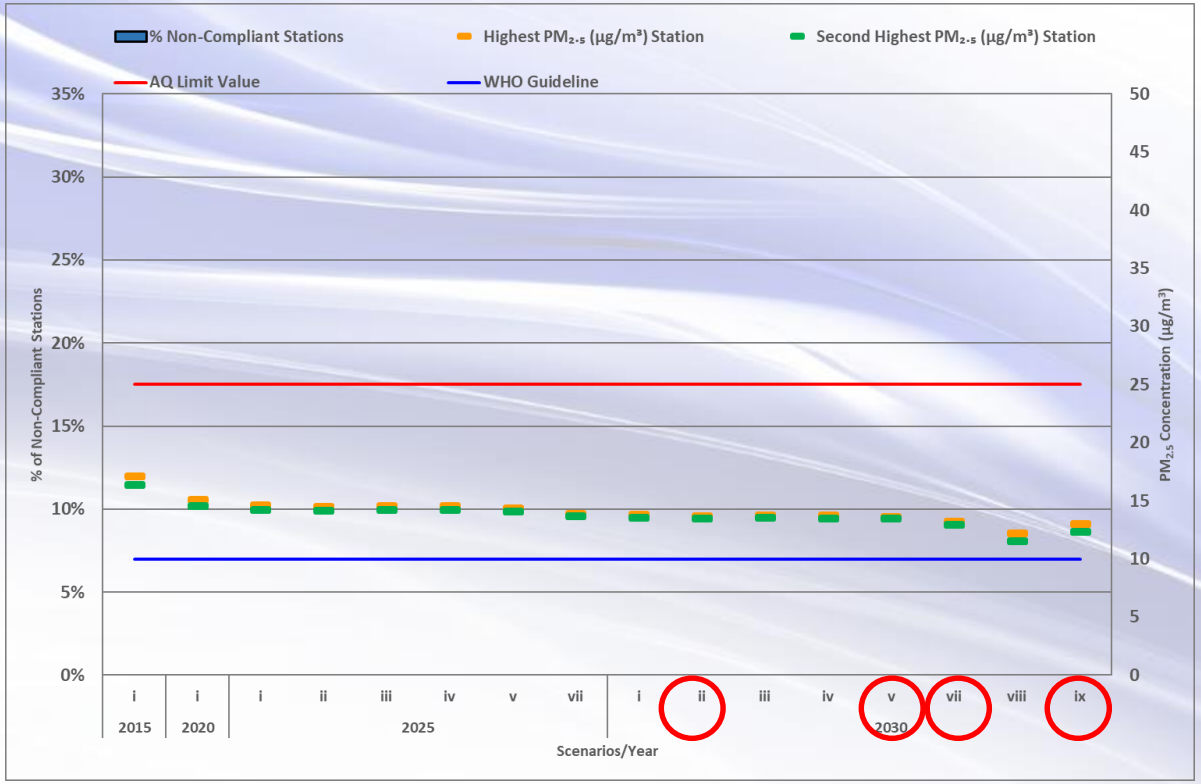
PM2.5 compliance outlook for the **Two Highest Concentration Stations** for 'Current Legislation' (CLE) and a Range of Future Scenarios
Percentage of Non-Compliant Urban/Suburban Stations

i. TSAP16 CLE
ii. PCD to Electric
iii. PCG to Electric
iv. LDV to Electric
v. All Road Transport to Electric
vii. Domestic Solid Fuel to Heating Oil
viii. TSAP16 2030 MTFR
ix. Agricultural NH3 Emissions Removed

Poland (269 Stations)

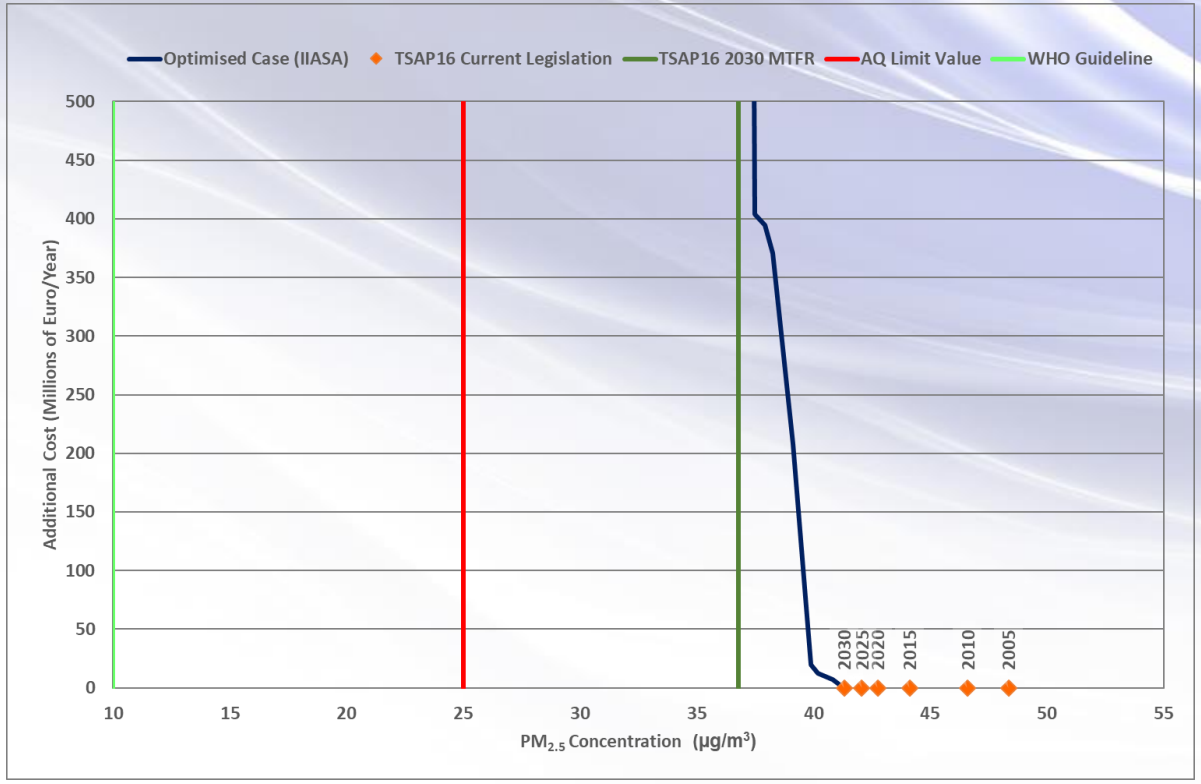


UK (78 Stations)

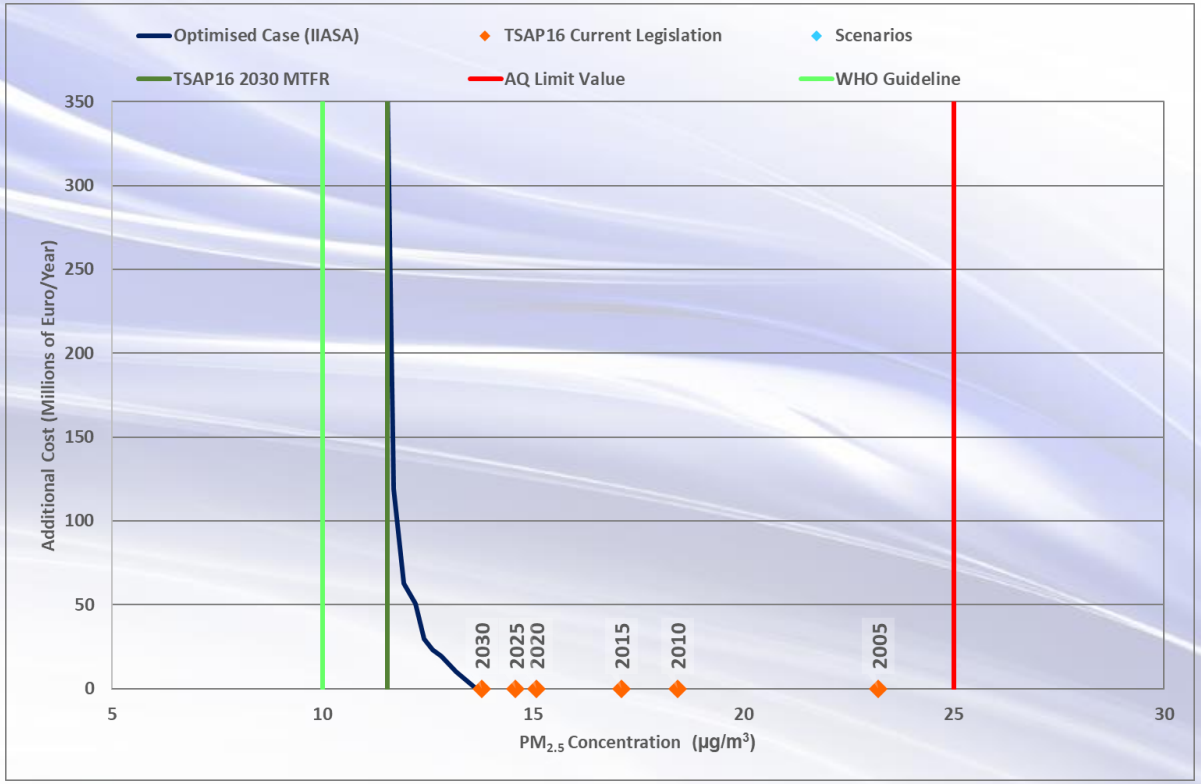


Additional Cost of Reduction Measures (**Stationary Sources**) for IIASA Optimised Case against Concentration at the **Highest PM2.5 Concentration Measuring Station (in 2010)**

Poland



UK



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Concentration Response to Additional Scenarios in 2030

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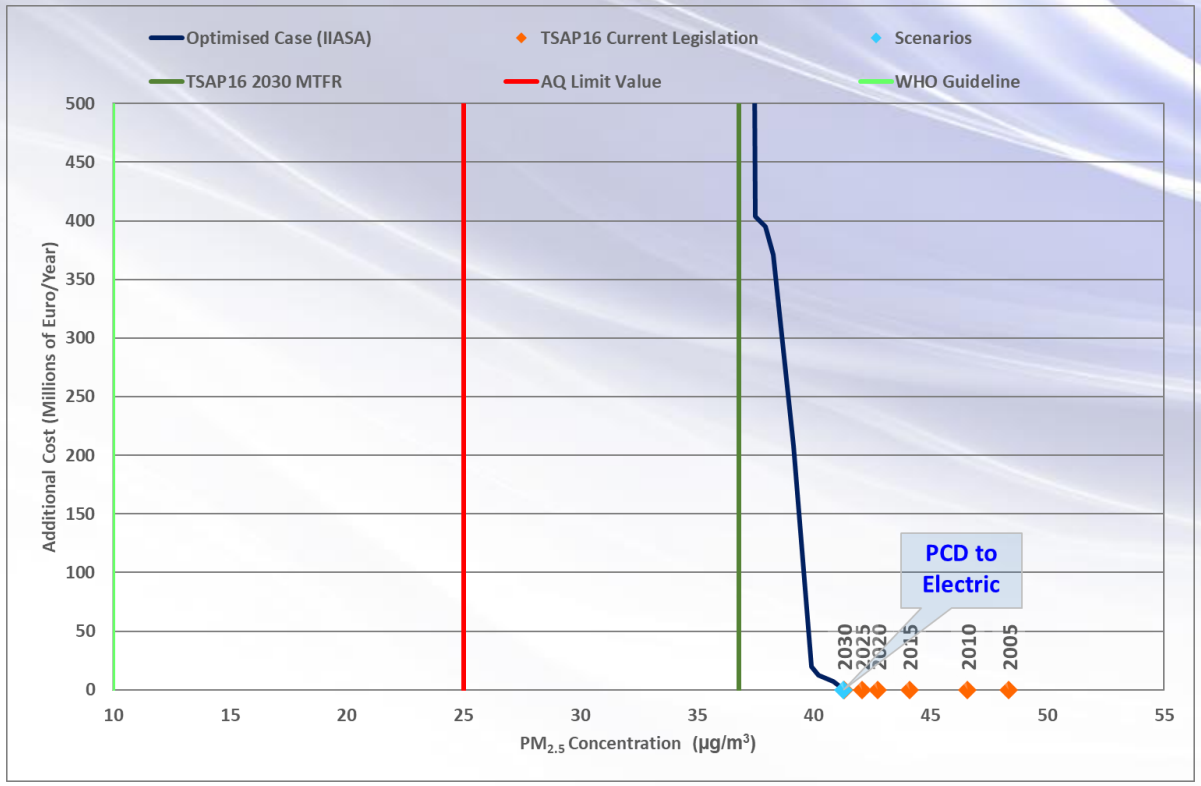
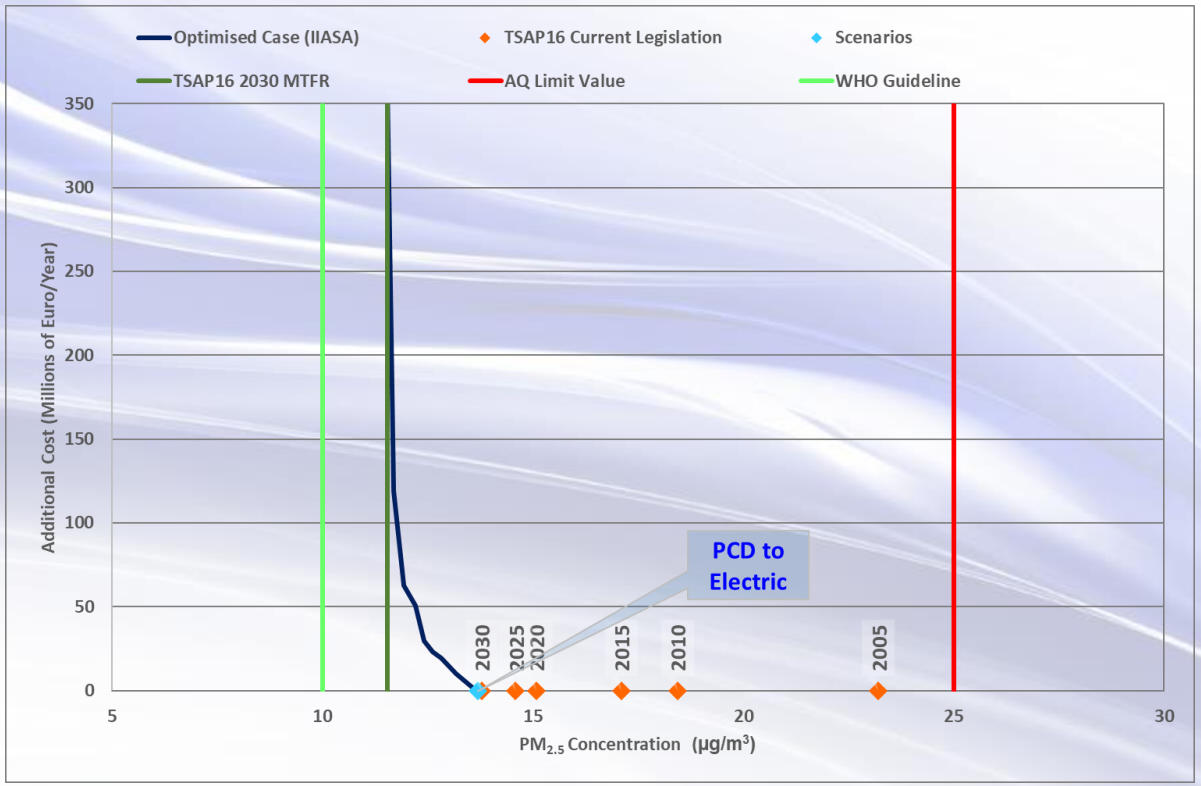


UK



Note: Cost of 'Substitution' and 'NH3 Elimination in Agriculture' scenarios not shown

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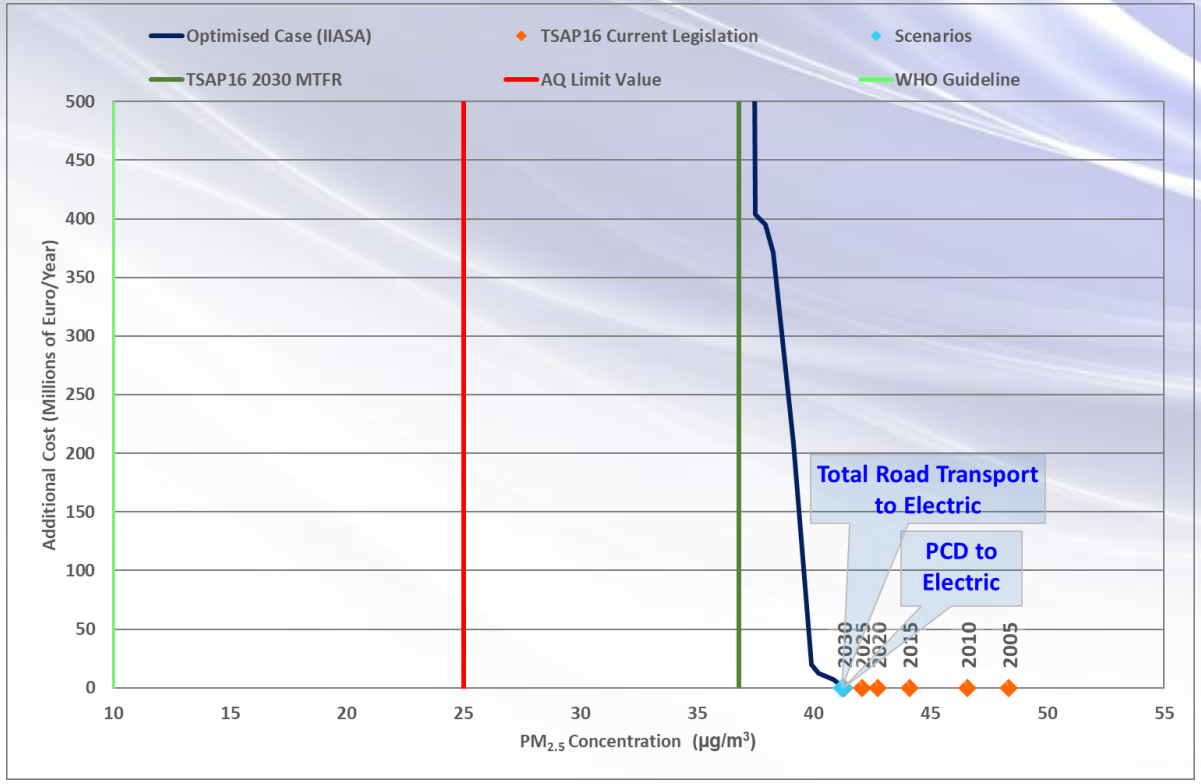

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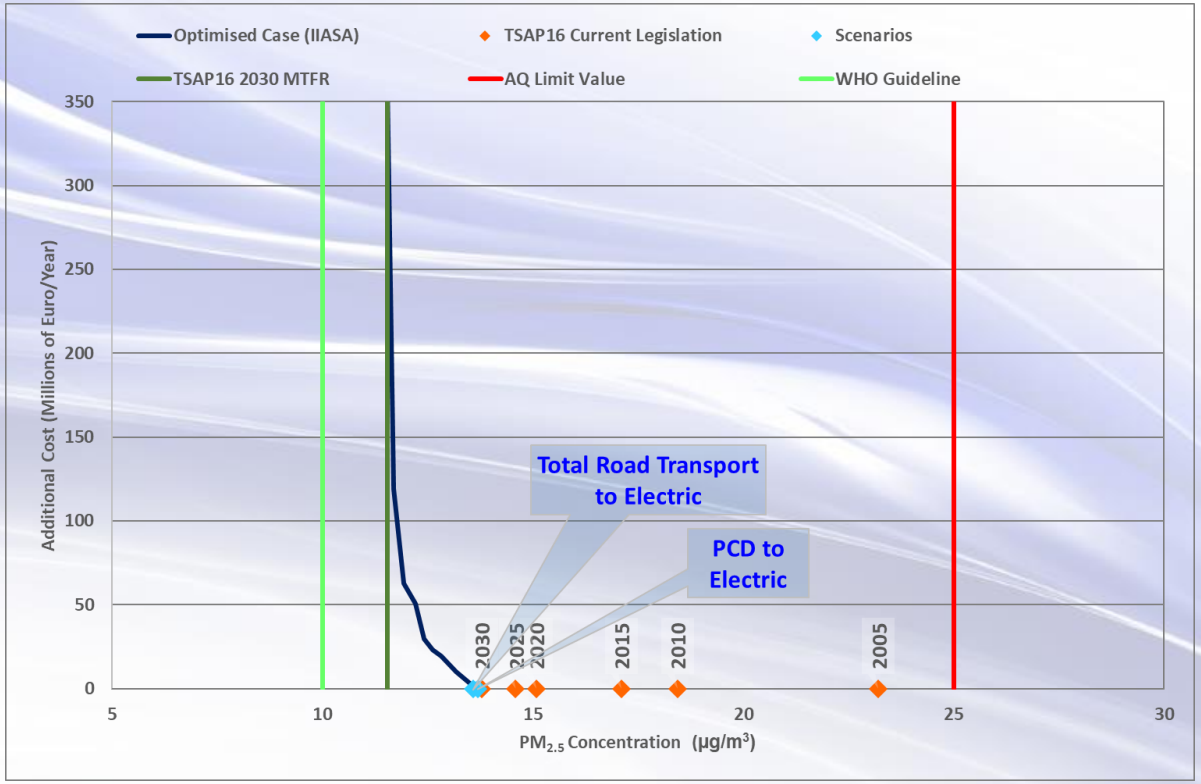

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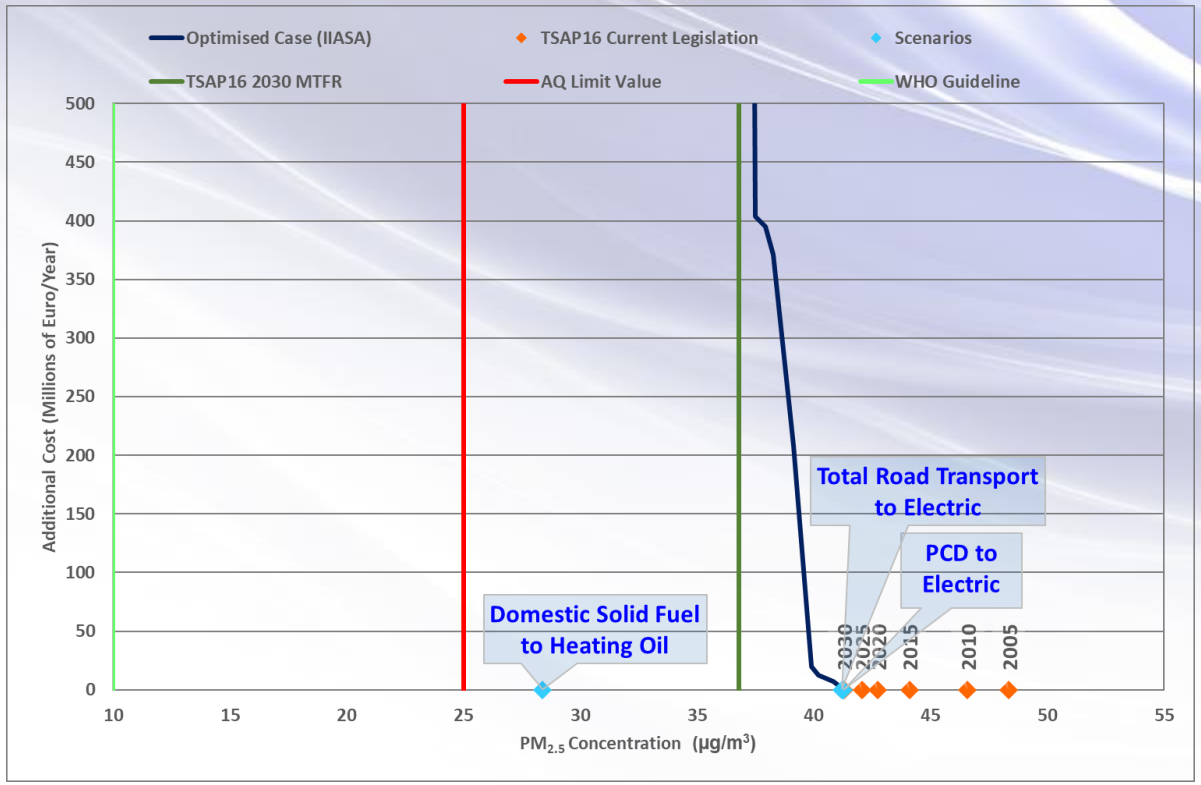

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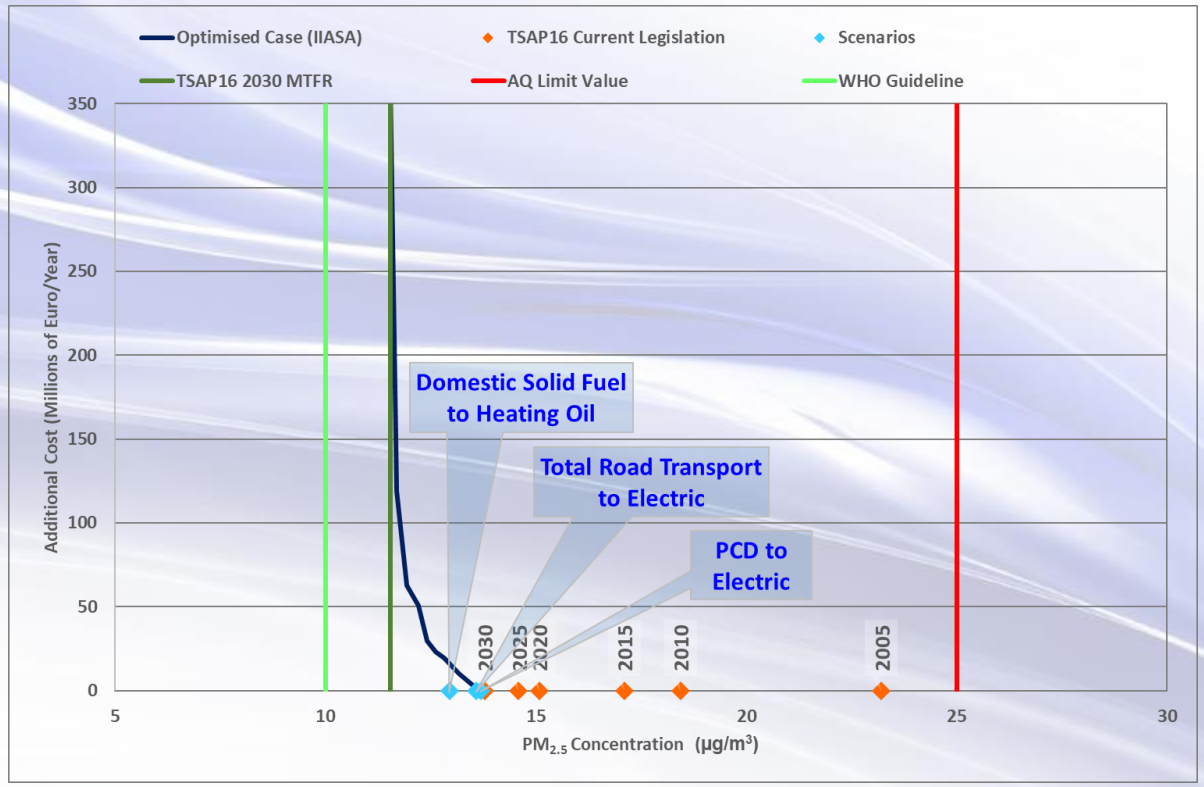

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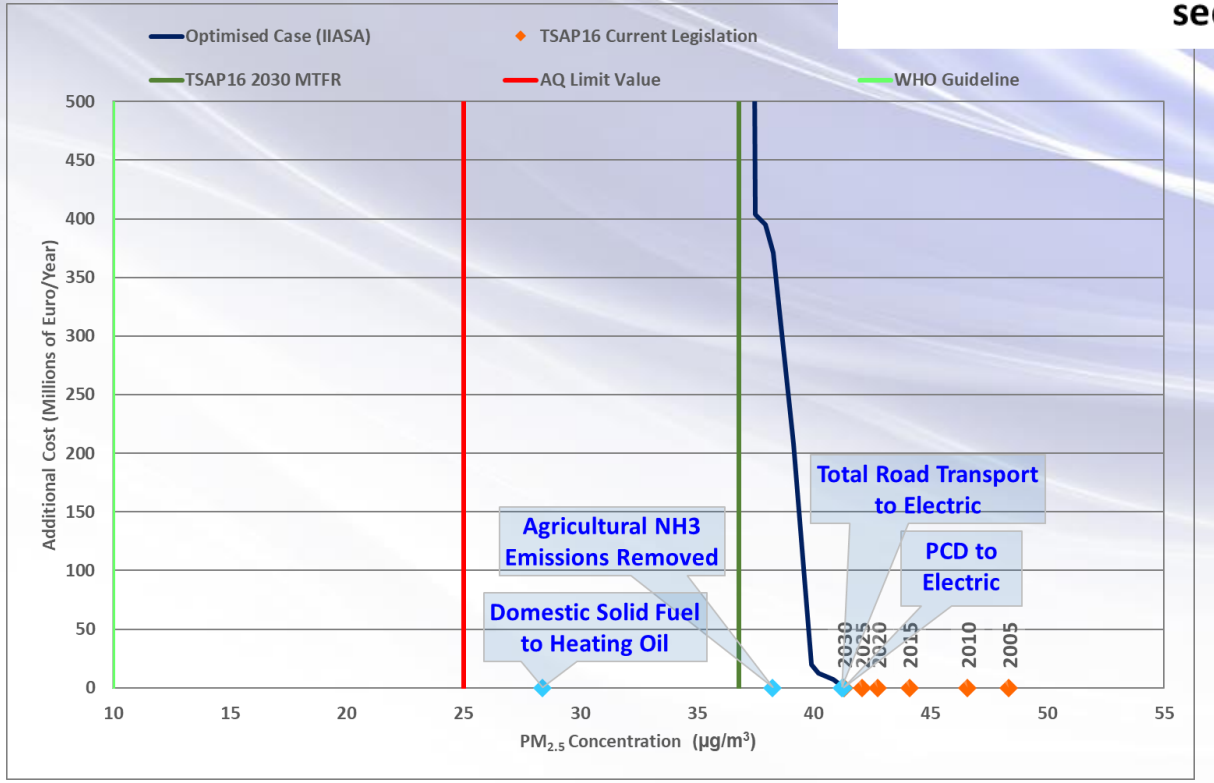
Why essentially zero response to substituting all conventional road transport with electric vehicles BUT large response to move from solid to either gas or heating oil in domestic sector?

Poland



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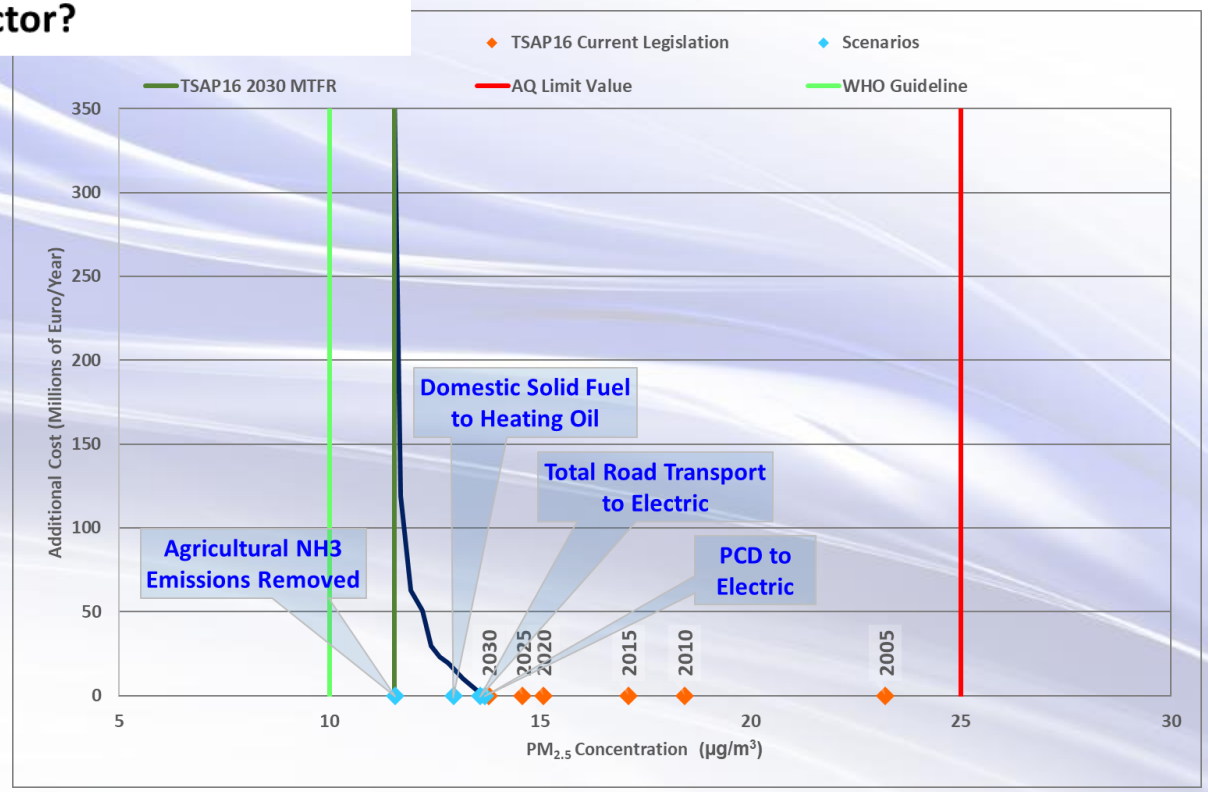

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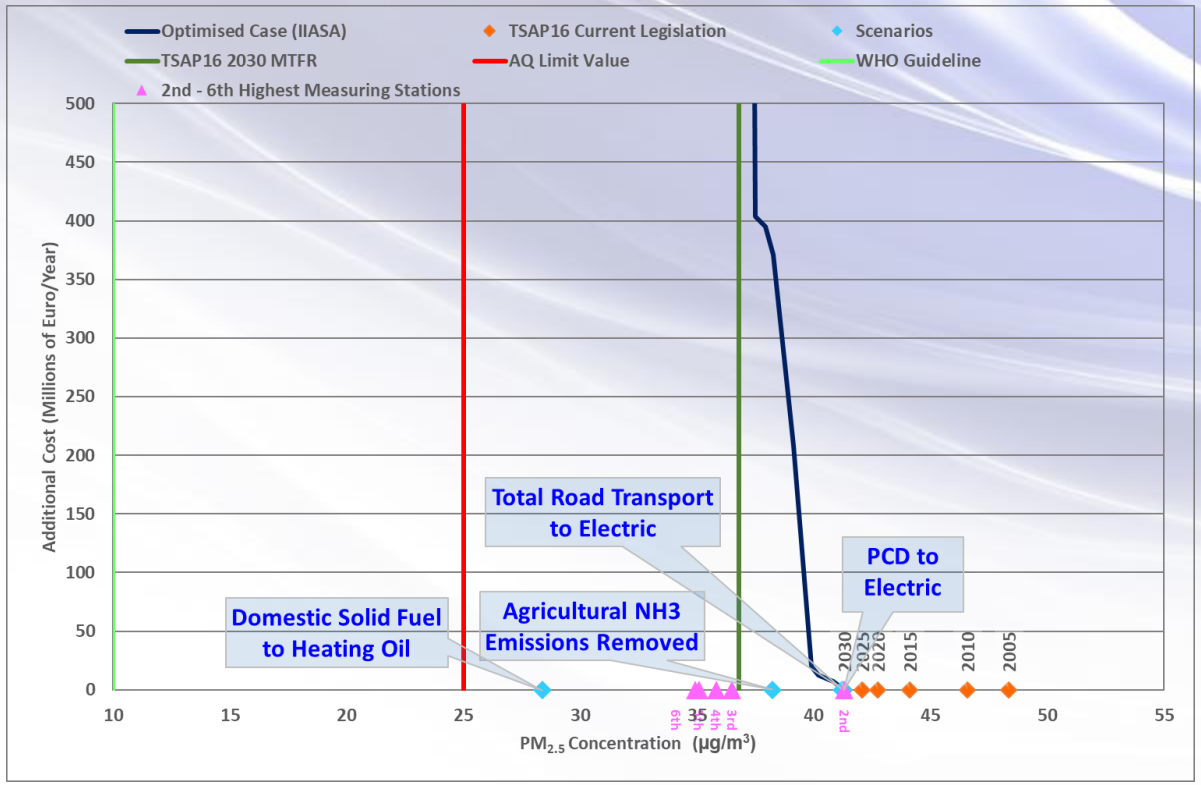
Poland (269 Stations)



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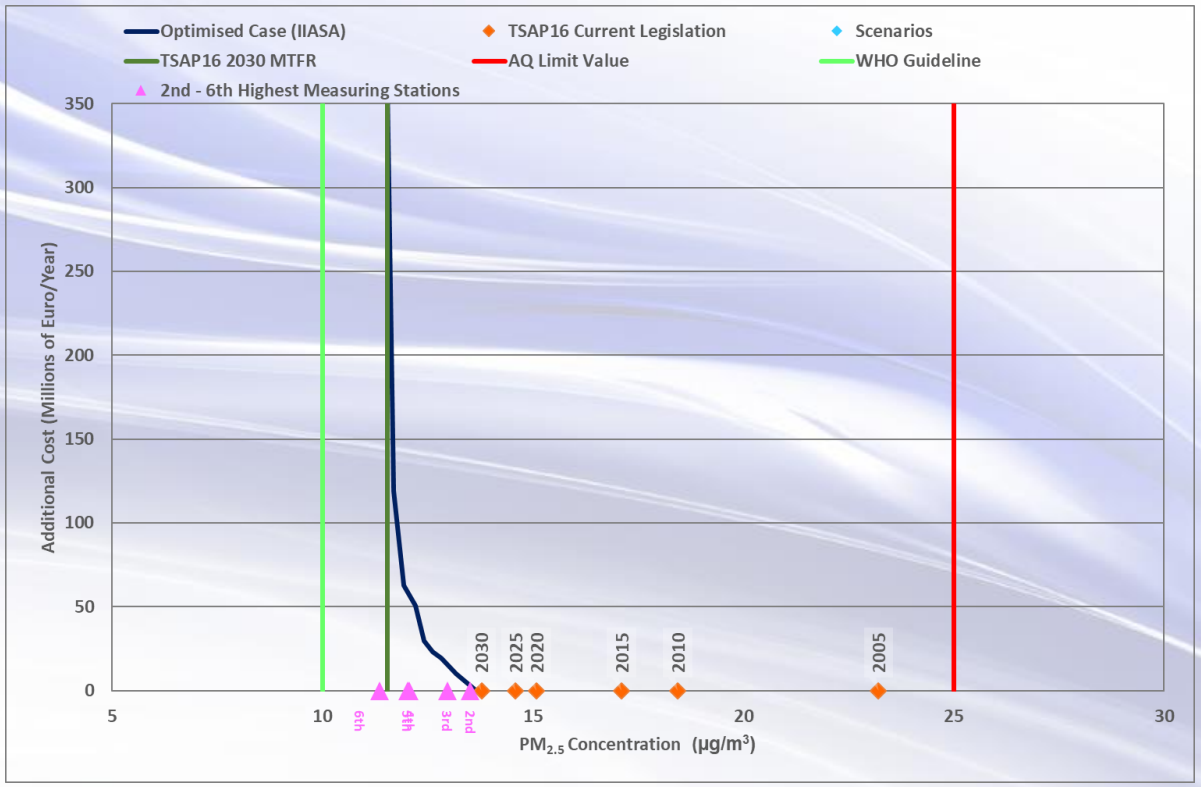

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NO_2

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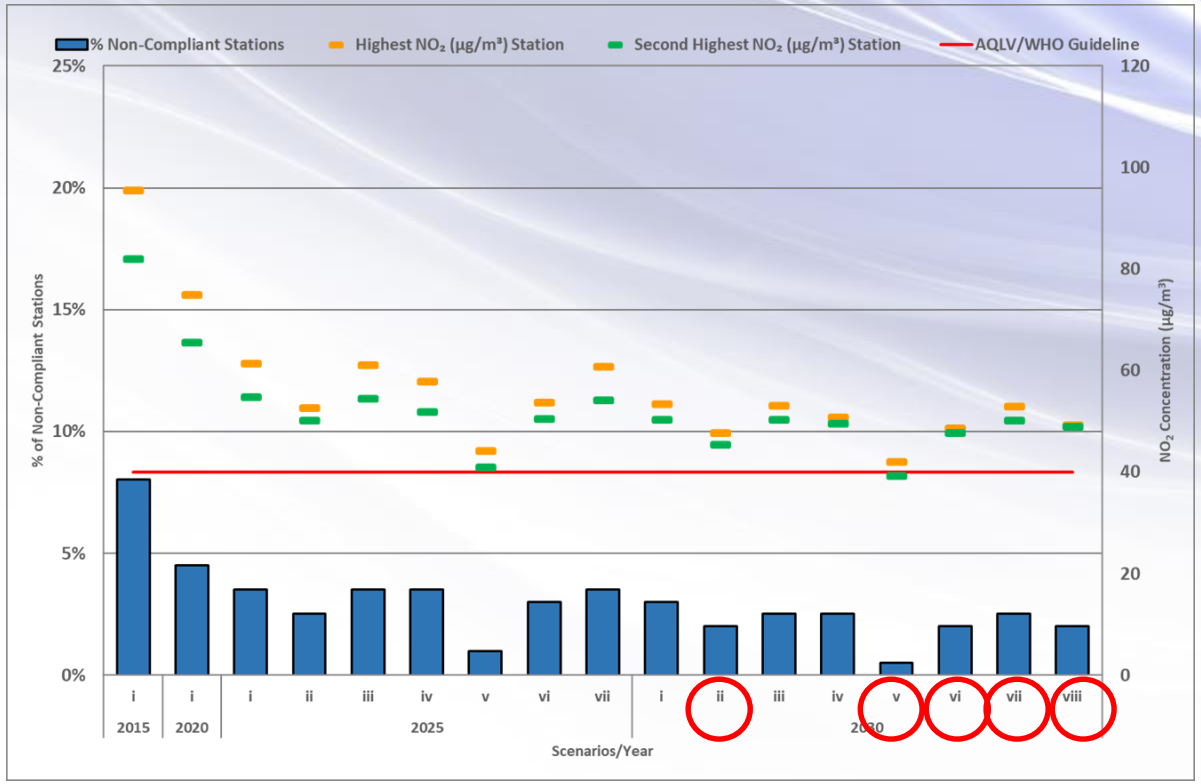
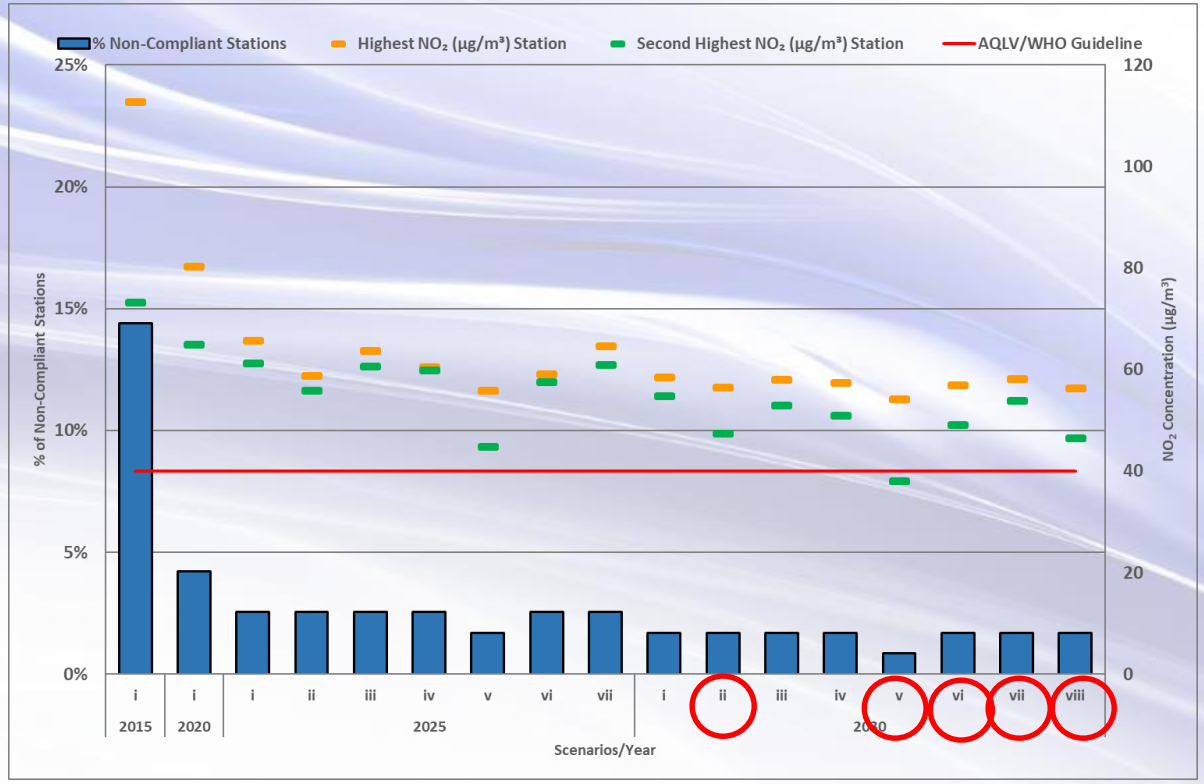
NO_2 compliance outlook for the **Two Highest Concentration Stations** for 'Current Legislation' (CLE) and a Range of Future Scenarios
Percentage of Non-Compliant Urban/Suburban Stations

- i. TSAP16 CLE
- ii. PCD to Electric
- iii. PCG to Electric
- iv. LDV to Electric
- v. All Road Transport to Electric
- vi. PCD to EURO7
- vii. Domestic Solid Fuel to Heating Oil
- viii. TSAP16 2030 MTFR

France (199 Stations)

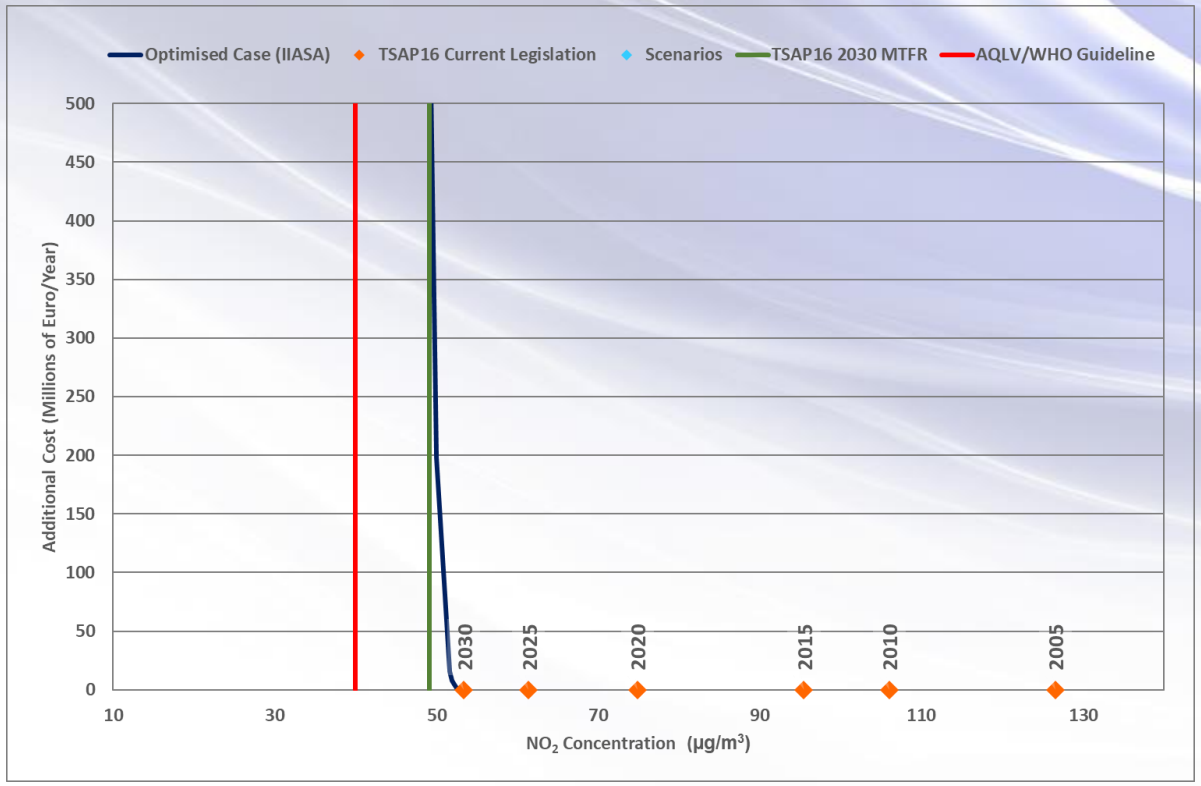


UK (118 Stations)



Additional Cost of Reduction Measures (**Stationary Sources**) for IIASA Optimised Case against Concentration at the **Highest NO_2 Concentration Measuring Station (in 2010)**

France



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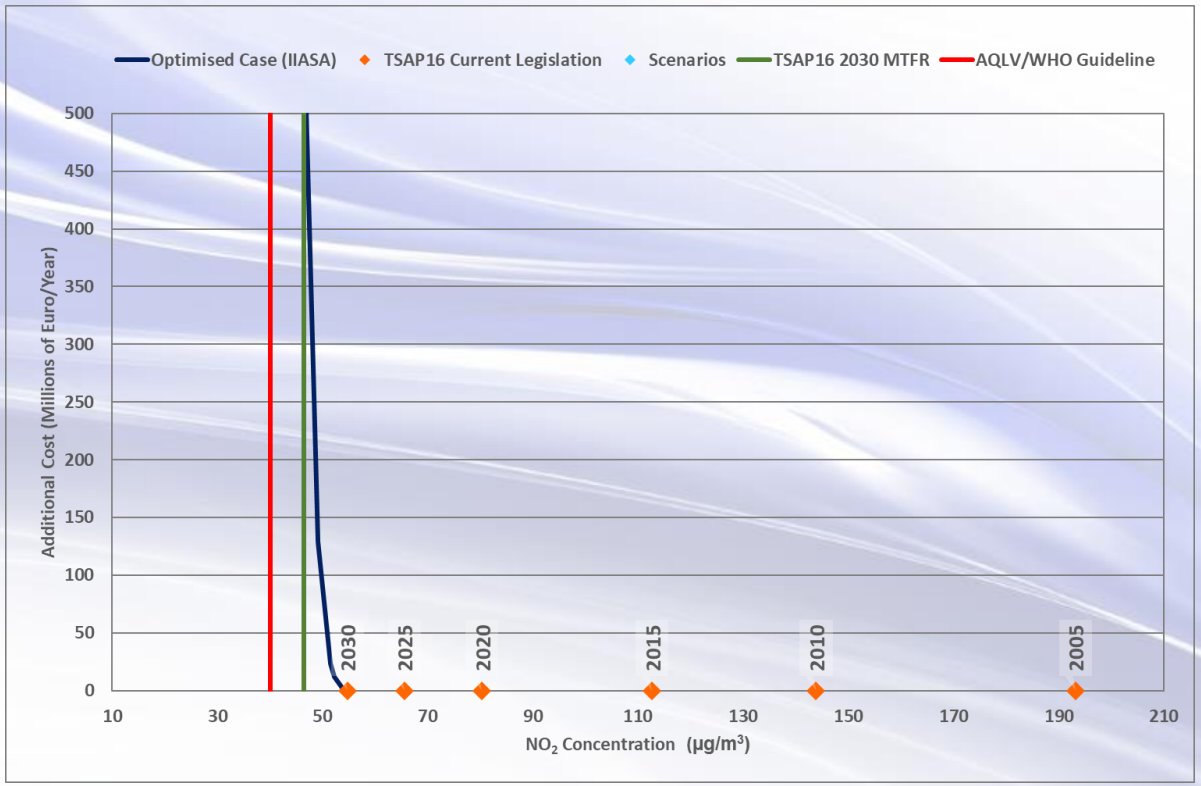

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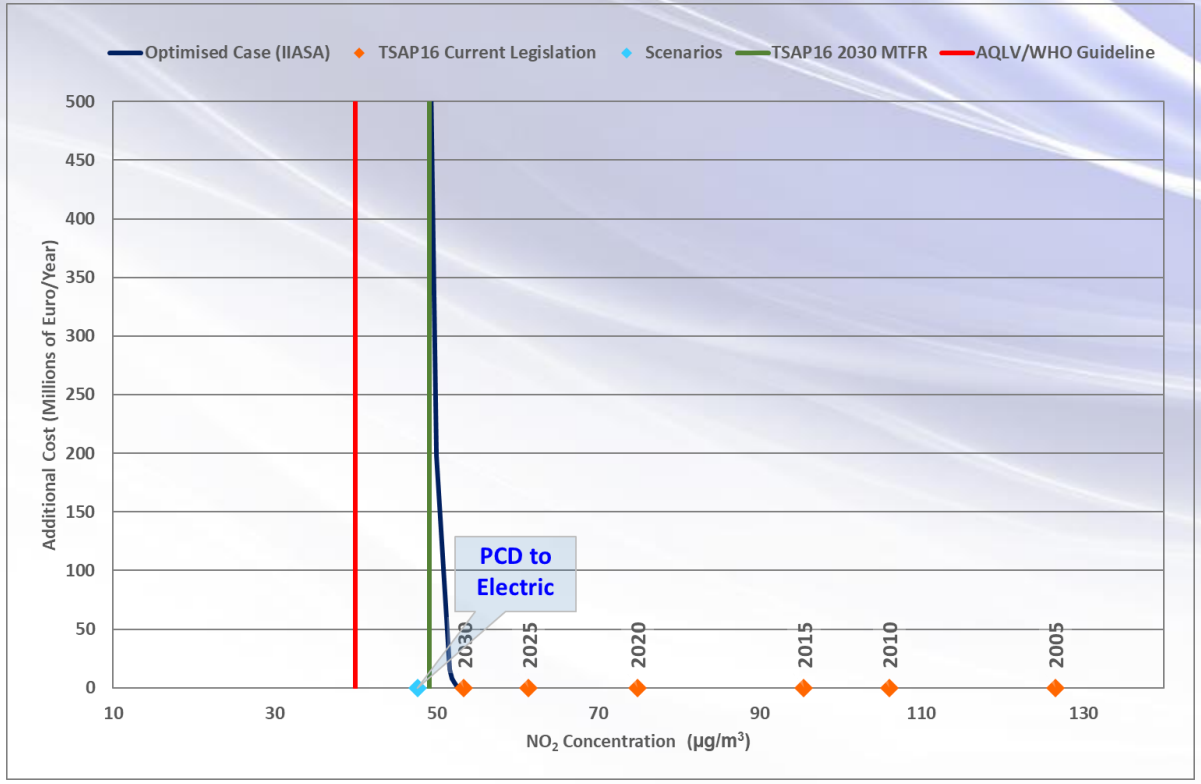
Concentration Response to Additional Scenarios in 2030

France



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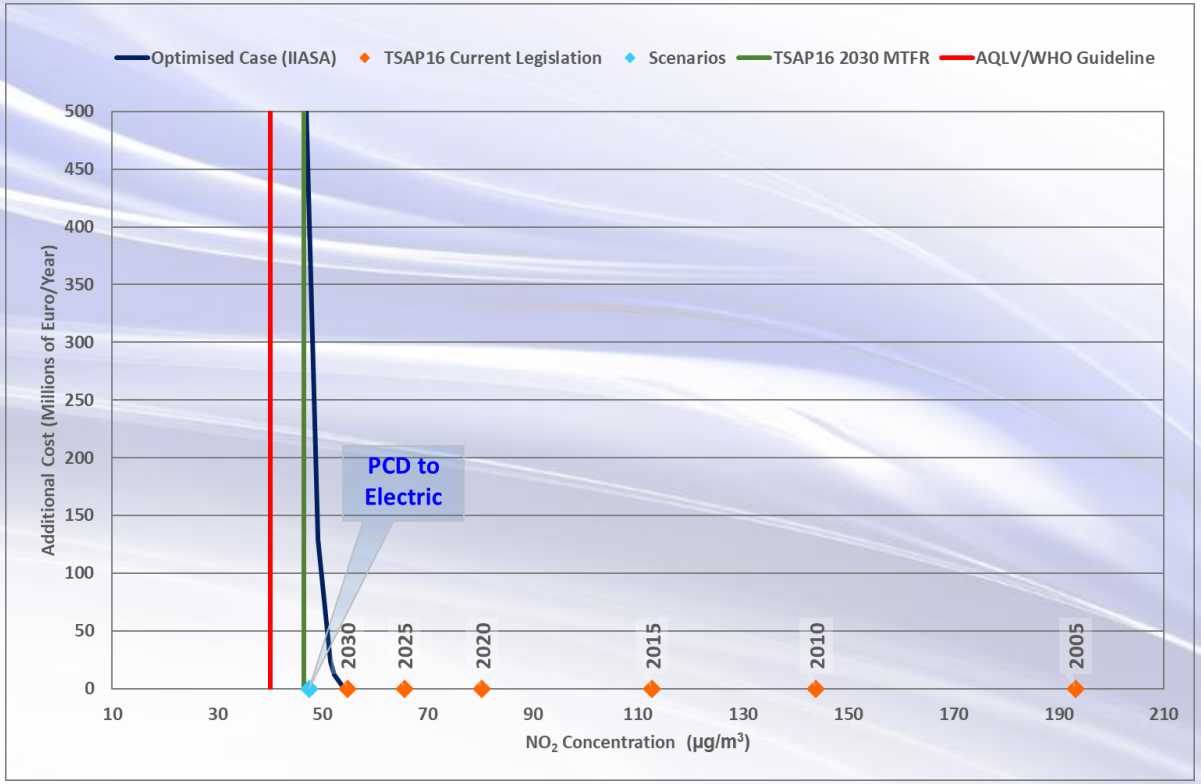

Note: Cost of 'Substitution' scenarios not shown

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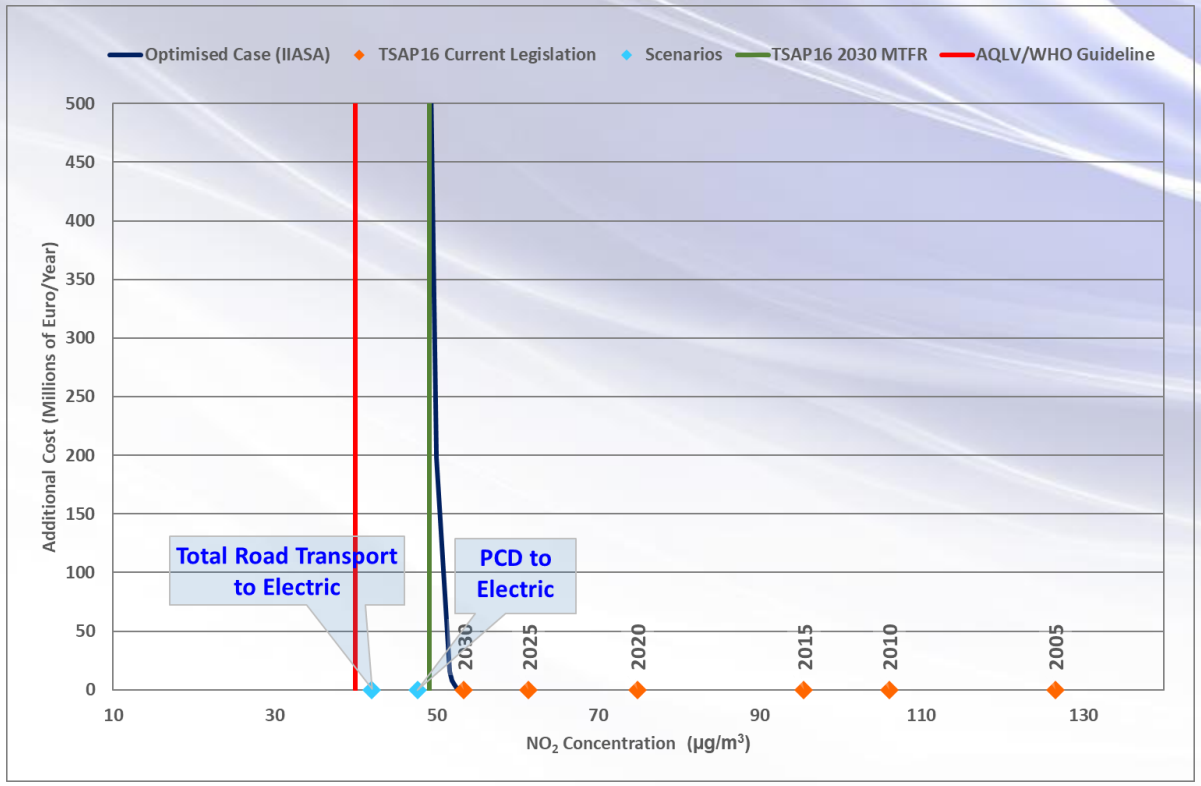

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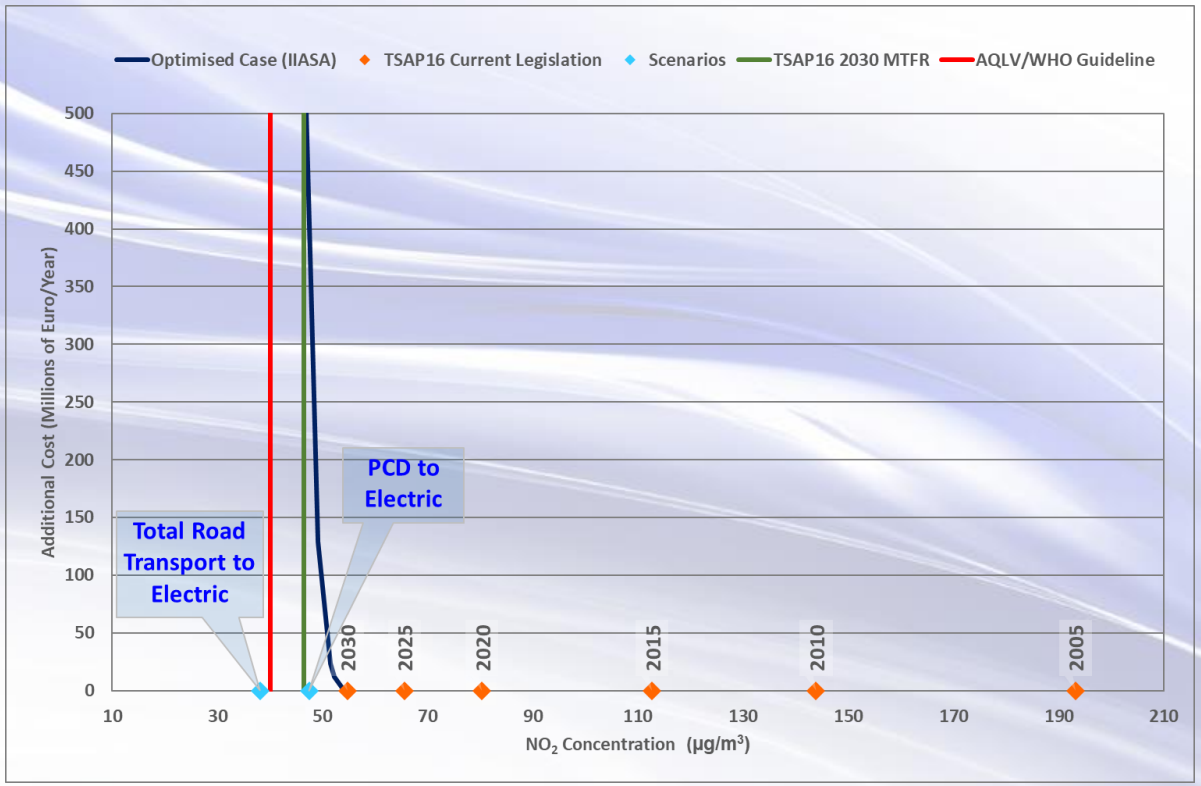

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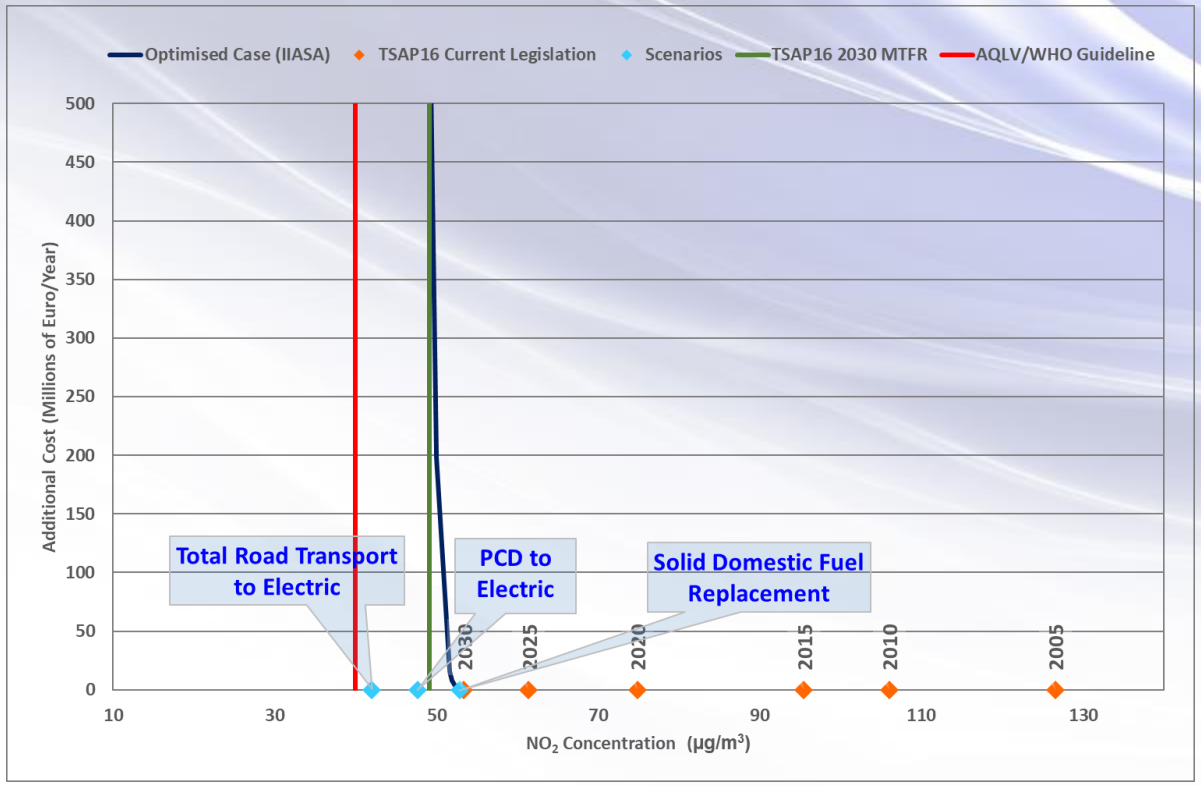

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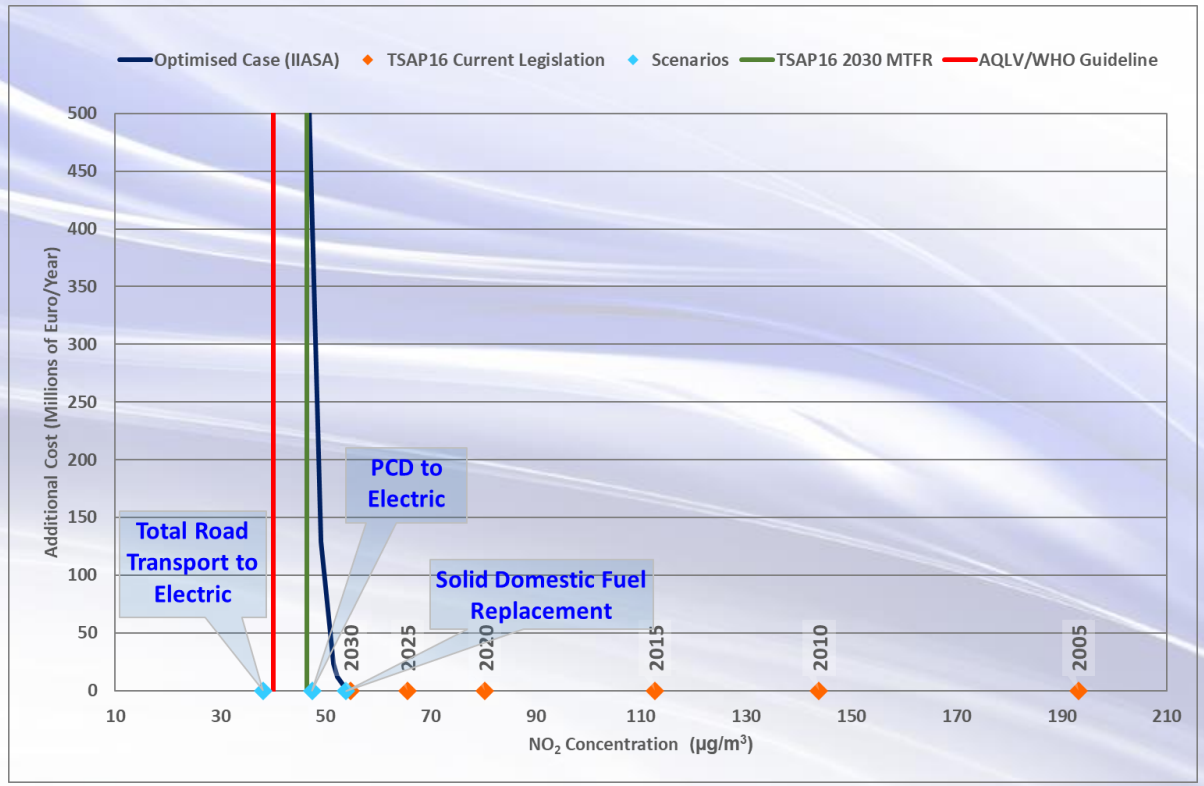

Note: Cost of 'Substitution' scenarios not shown

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Some Concluding Remarks

- A revised PM2.5 limit value set at WHO guide value of 10µg/m3 will not be achievable in many areas of Europe in a 2030 world even at MTFR
  - Elimination of domestic coal would make the most significant contribution to improved compliance
  - Growth in domestic wood burning, especially in open fires, is antagonistic to improved compliance
  - Electrification of road transport does not offer any benefit to improved compliance
  - **This emphasises the need for a separate 'Risk Management' step in the revision process rather than simply adopting the WHO guide values; a process recognised by the WHO**
- Compliance with the existing annual NO_2 limit value (or a lower revised value) would be made more relevant and achievable, if the revised AAQD incorporated a system where compliance was based on measurements/adjustments to measurements which ensure they represent annual population exposure
  - **Importantly This would not compromise the goal of protecting the urban population from exposure to levels above the limit value**
- Moving directly to a population exposure based goal setting would ensure policies are designed to achieve the goal of protecting populations rather than 'raw compliance'

Back-up Slides

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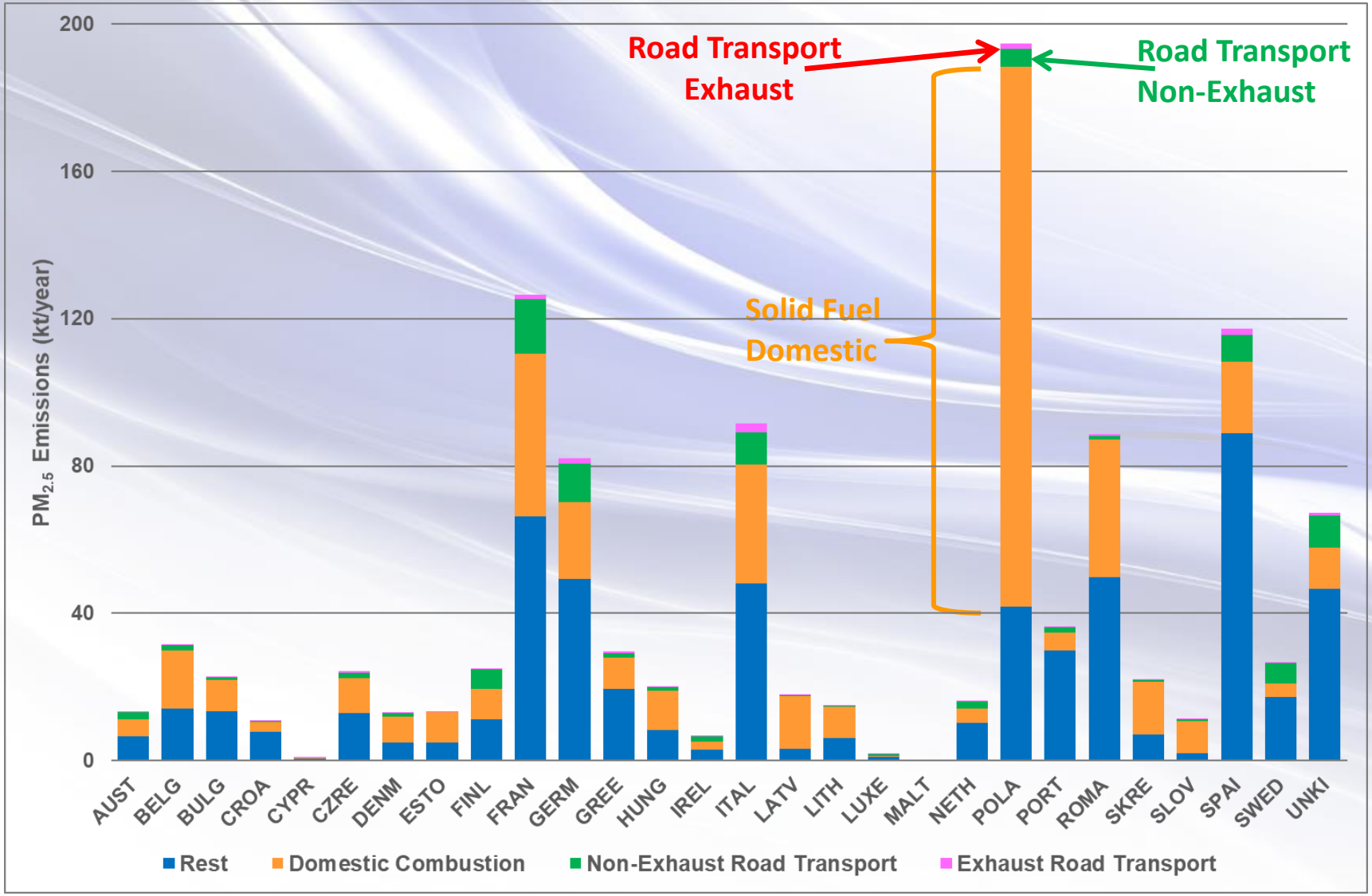
$PM_{2.5}$ Emissions GAINS TSAP16 2030 CLE



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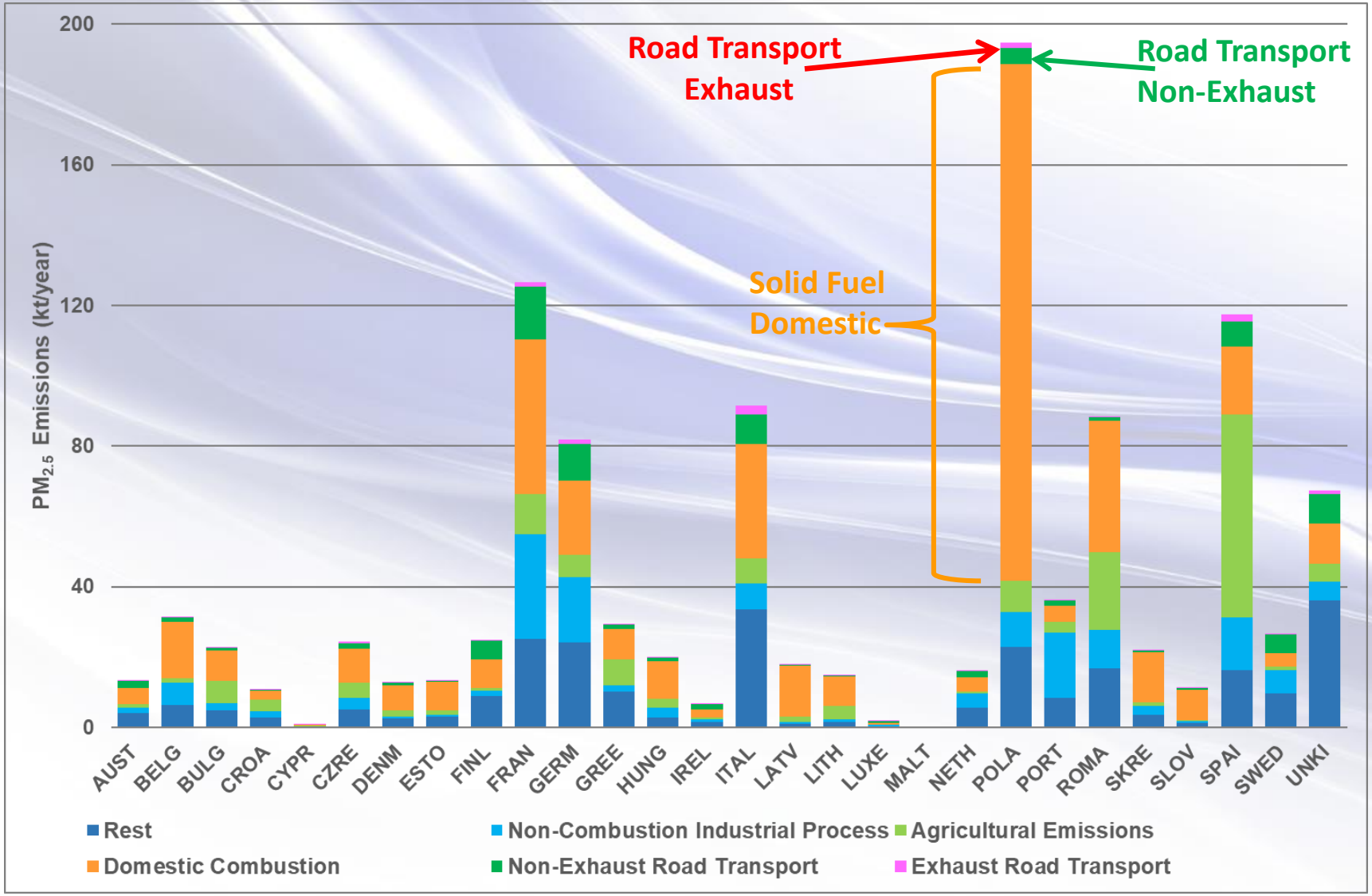
$PM_{2.5}$ Emissions GAINS TSAP16 2030 CLE



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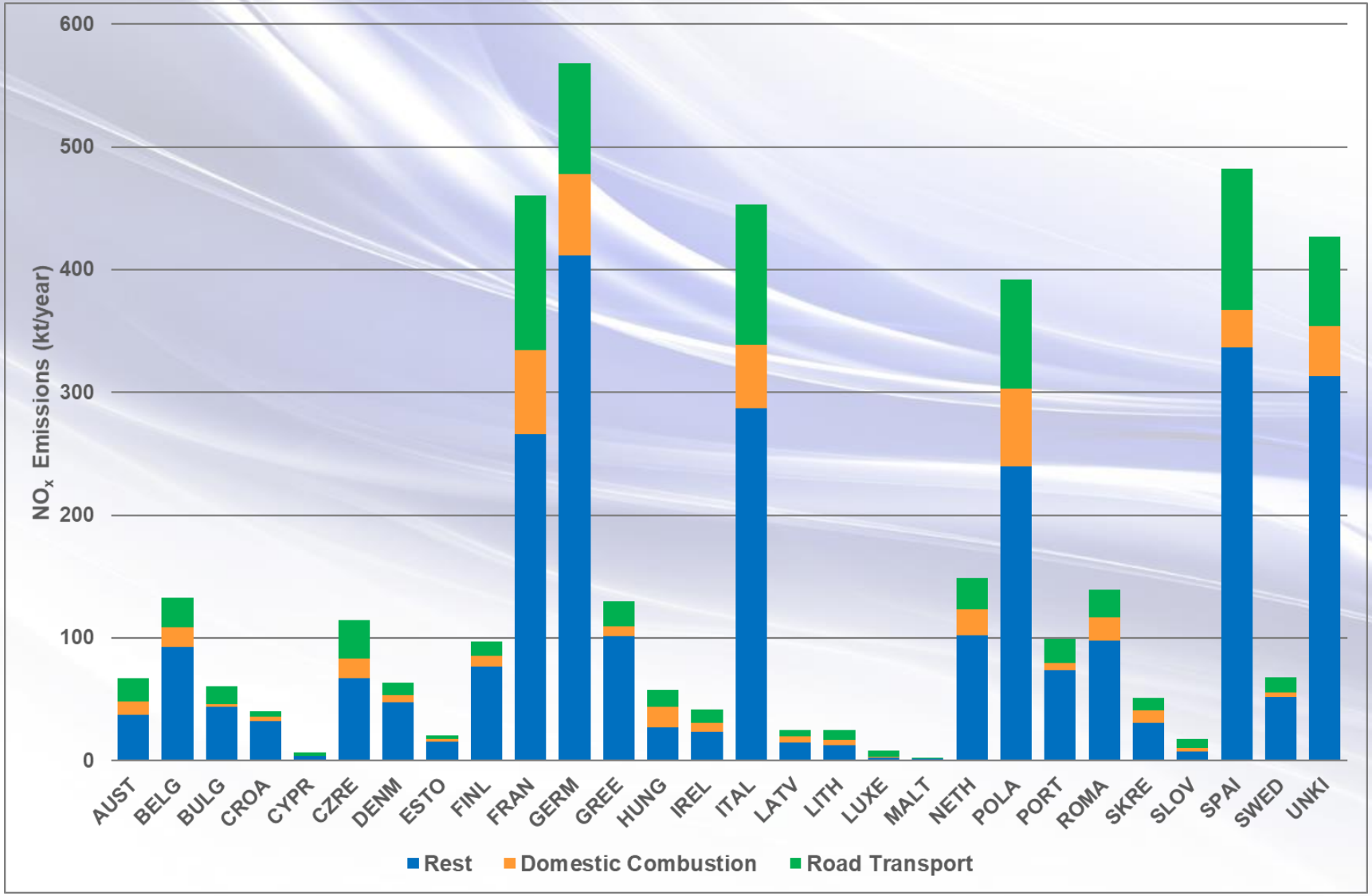
NO_x Emissions GAINS TSAP16 2030 CLE



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NO_x Emissions GAINS TSAP16 2030 CLE