

# WHO Guidelines and ISO standards

ISO TC285 Liaison Organisation



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# Overview

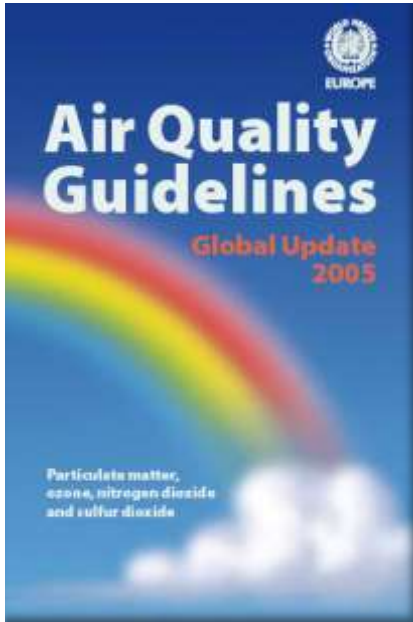
- What WHO does on this topic and why is it an ISO TC285 Liaison Organization?
- WHO Air Quality Guidelines for household fuel combustion:
  - How these have developed
  - Emission rate targets to achieve AQGs (Rec 1)
  - Policy during transition (Rec 2)
- Emission rates as a basis for standards:
  - Use in IWA Tiers and relationship to WHO AQG
  - Linking increments of emission rates to health risks
  - Work in progress

# WHO activities and interest in ISO process

- Global UN-lead organisation for public health:
  - Assesses disease burden: HAP linked to >4 million premature deaths - so a public health priority
  - Also concerned about burns & poisoning
  - Develops and supports the implementation of evidence-based policy (i.e. through AQ Guidelines)
- Standards are one means of implementing cleaner and safer stoves and fuels
- WHO contribution can help ensure standards reflect health evidence

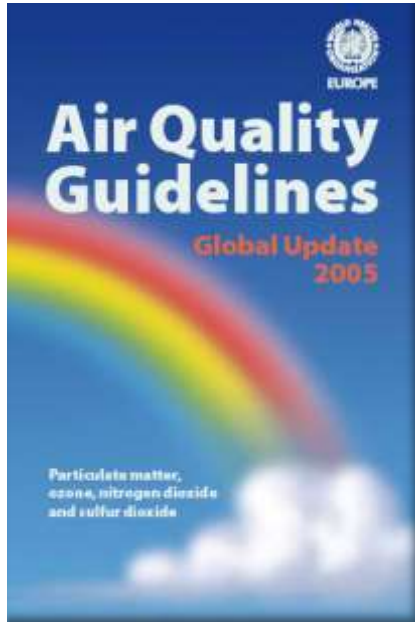


# WHO Air Quality Guidelines

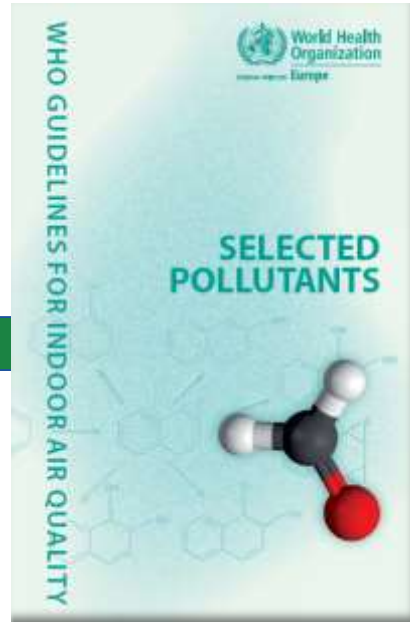


Published 2006  
PM<sub>2.5</sub> & PM<sub>10</sub>

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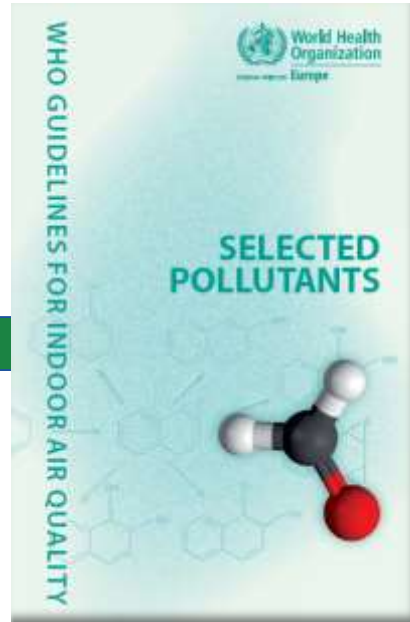
Published 2010  
Carbon monoxide (CO)



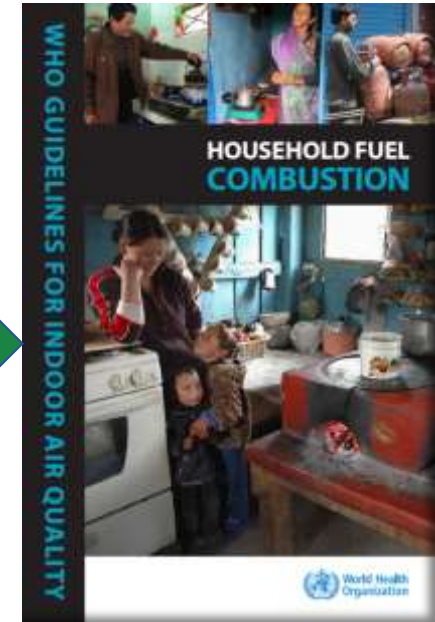
# WHO Air Quality Guidelines



Published 2006  
PM<sub>2.5</sub> & PM<sub>10</sub>



Published 2010  
Carbon monoxide (CO)



Published 2014  
Rec #1:  
Emission rate targets

# WHO AQG for Household Fuel Combustion: Recommendation #1



## Recommendation

Emission rates\* from household fuel combustion should not exceed the following emission rate targets (ERTs) for PM<sub>2.5</sub> and CO.

## Emission

PM<sub>2.5</sub> (μg/m<sup>3</sup>)  
 PM<sub>2.5</sub> (μg/m<sup>3</sup>)  
 CO (μg/m<sup>3</sup>)  
 CO (μg/m<sup>3</sup>)

\*Emission rates refer to the total emissions emanating from the combustion of household fuels.

The purpose of these ERTs is to help ensure device performance results in IAQ that meets WHO guideline levels

# Putting Recommendation #1 into practice

- Testing and standards needed to implement this recommendation
- Important for WHO to set AQG as the goal = no or minimal health risk
- Evidence shows – in practice - need +/- exclusive use of clean fuels
- WHO recognises:
  - this will take time
  - especially for rural &/or poor households
- Therefore - must also consider performance of intermediate steps in transition





# WHO AQG for Household Fuel Combustion: Recommendation #2



## Recommendation

Governments and their implementing partners should develop strategies to accelerate efforts to meet these air quality guidelines ERTs (See Recommendation 1). Where intermediate steps are necessary, transition fuels and technologies that offer substantial health benefits should be prioritized.

## Strength of recommendation

Strong

# ISO IWA Tiers and WHO Guidelines and Emissions Rate Targets

For the new ISO TC 285 standards, it would be useful to show how increments of emission rate relate to (increments of) health risks (WHO Rec #2)

## Indoor Emissions

Tier	PM <sub>2.5</sub> (mg/min)	CO (g/min)
0	>40	>0.97
1	≤40	≤0.97
2	≤17	≤0.62
3	≤8	≤0.49
4	≤2	≤0.42

- Tier 4 aligned to WHO using Box Model of Emissions
- Also includes Total Emissions, Efficiency/Fuel Use, and Safety
- Spans the full range of technologies

## Emissions for Unvented Stoves/Fuels

	PM <sub>2.5</sub> (mg/min)	CO (g/min)
Intermediate ERTs	1.75	0.35
ERTs	0.23	0.16

- Intermediate ERTs aligned using Probabilistic Box Model of Emissions
- Also includes ERTs for vented stoves
- Sets ambitious health-based goals

60% meet IT-1

WHO Air Quality Guidelines

2010

ISO Tiers of Performance

2012

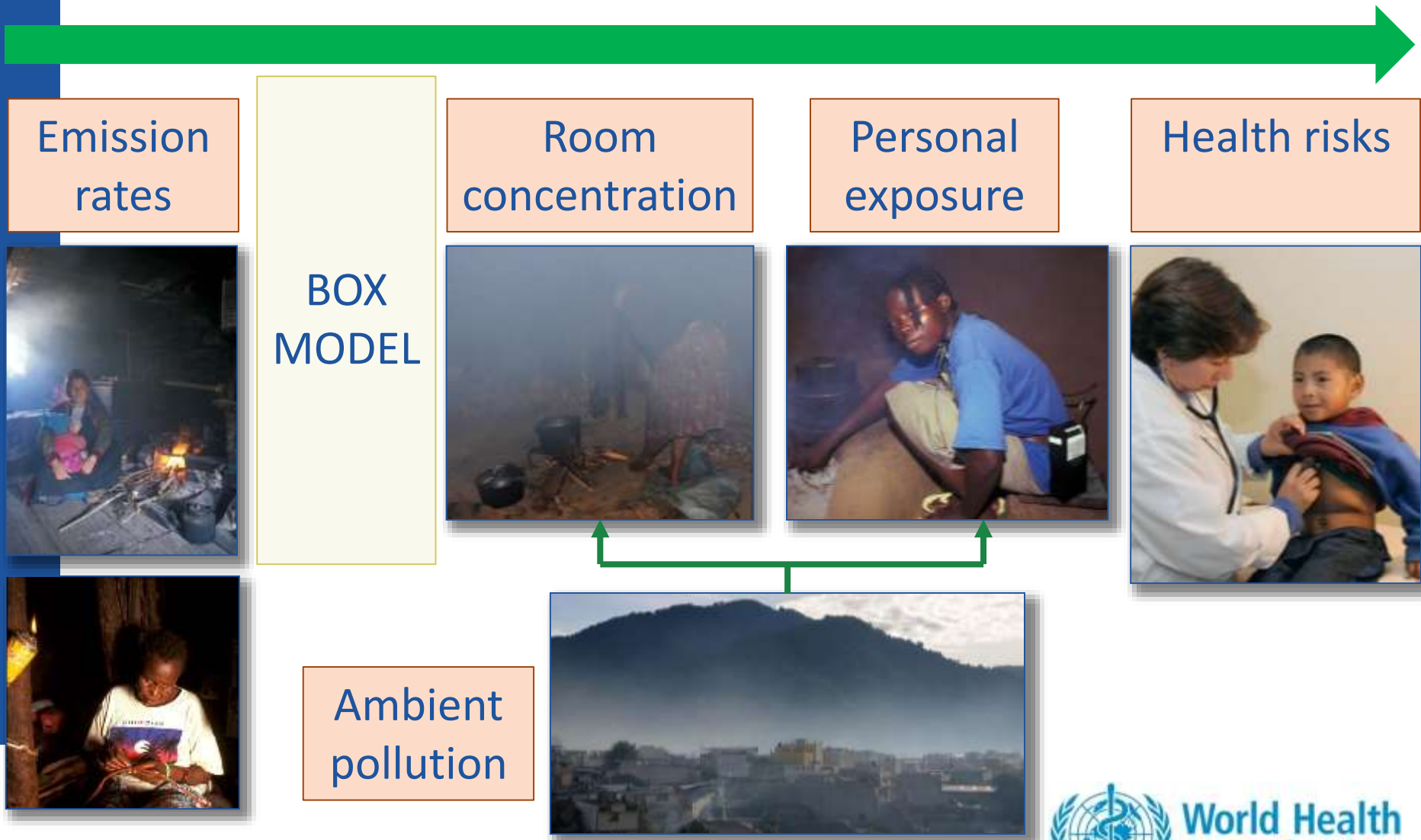
WHO Emissions Rate Targets (ERTs)

2014

90% meet AQG of 10 µg/m<sup>3</sup>

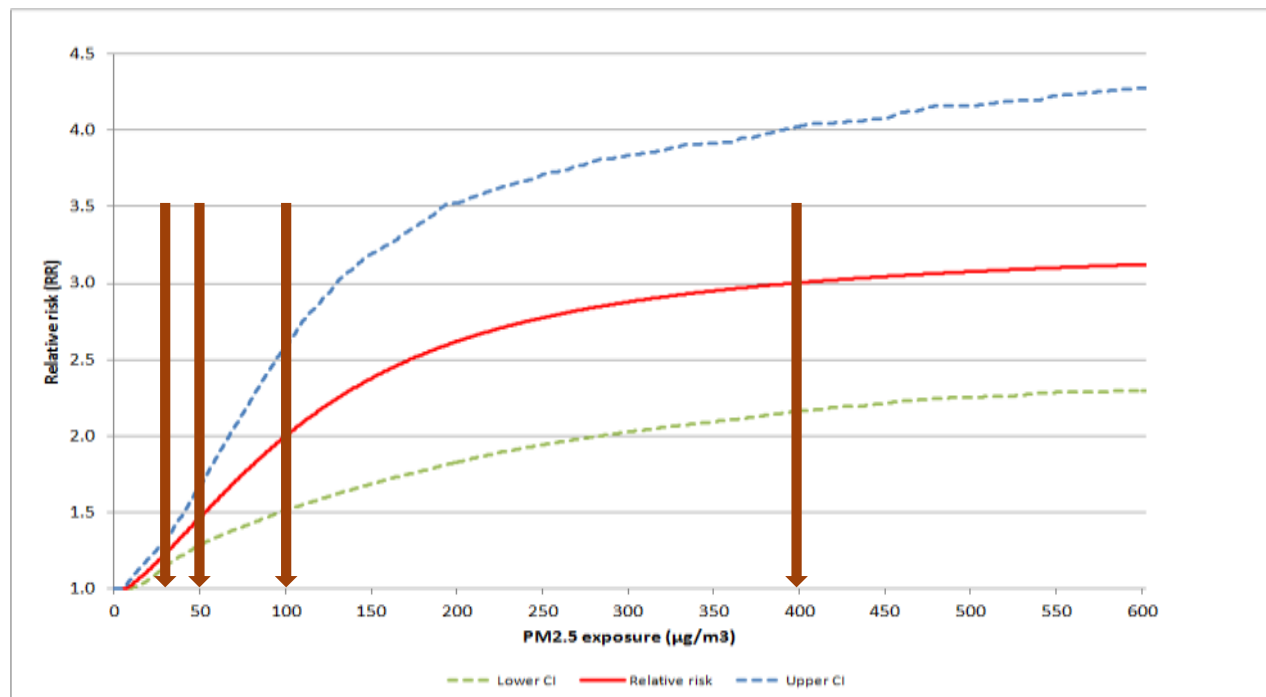


# Extend information on link between emission rates and health risks



# Framing health risks – PM<sub>2.5</sub>

Risk level	RR (ALRI)	PM <sub>2.5</sub> (µg/m <sup>3</sup> )
Air quality guideline	1.0	10
IT-1 (approximately)	1.25	32
	1.5	53
	2.0	101
Open fire	3.0	398



IER for  
child  
ALRI

# Illustrative emission rates for increments of risk to health (child ALRI)

PM2.5 HAP target ( $\mu\text{g}/\text{m}^3$ )	ALRI RR target	Open		90% meeting target	50% meeting target
		90% meeting target	50% meeting target		
		Emission Rate ( $\text{mg}/\text{min}$ )	Emission Rate ( $\text{mg}/\text{min}$ )		
10	1.00	0.2	-		
32	1.25	0.7	1.9		8.2
53	1.50	1.2	3.1		13.2
101	2.00	2.4	6.3		26.2
398	3.00	8.7	23.5	31.0	99.0

**WORK IN PROGRESS!**

For example, an emission rate of 1.2 mg/min PM<sub>2.5</sub> will – based on model input values - lead to:

- 10% of homes experiencing a 50% or more increase in risk of child pneumonia
- 90% homes experiencing risk below that level

PM<sub>2.5</sub> target





# Work plan – with B/Air MG

Phase	Main activities	Timing
I	<ul style="list-style-type: none"><li>• Develop emissions (box) model to include multiple sources, outdoor AQ and allow an exposure factor</li><li>• Link model to IER function (risks)</li></ul>	January-February 2016

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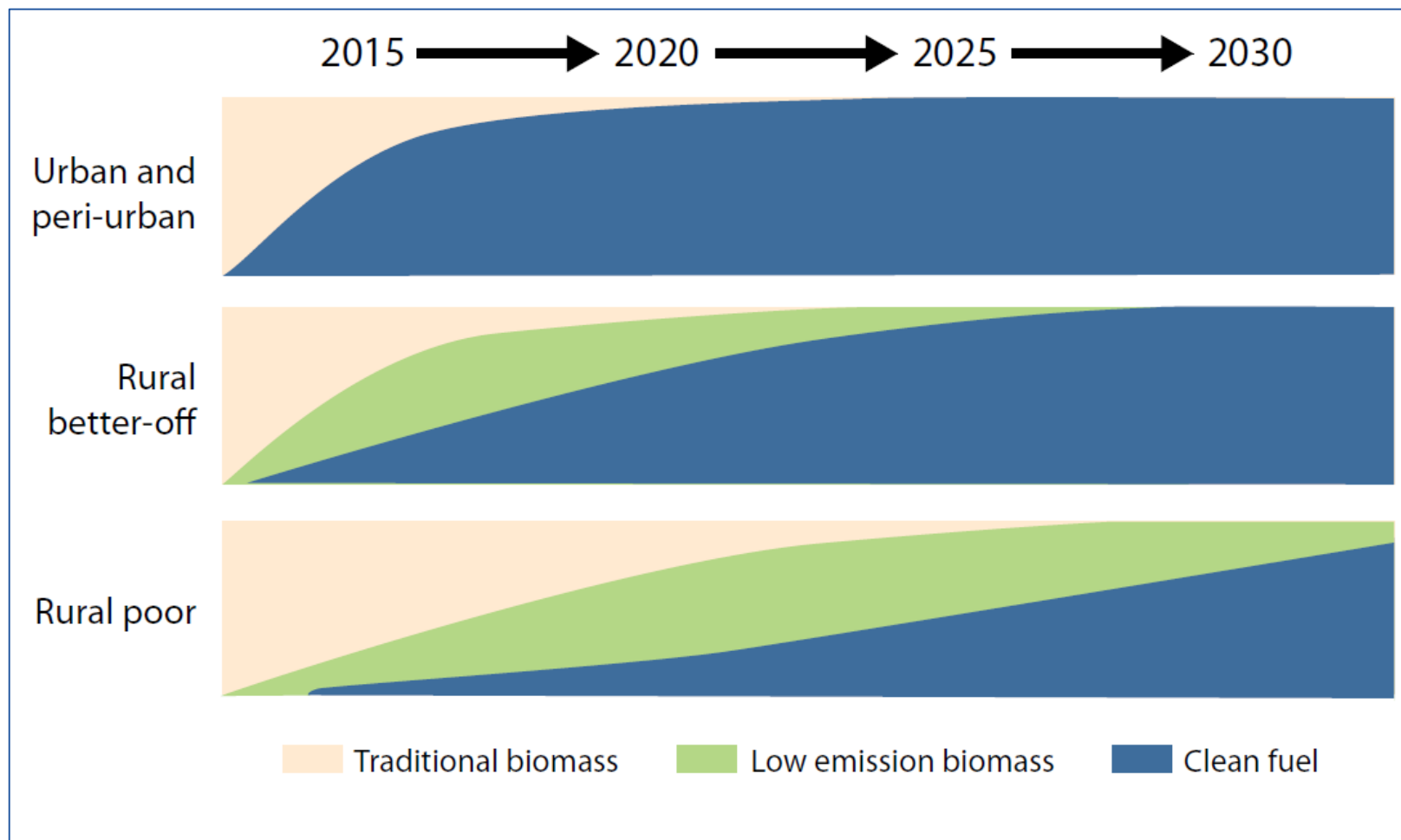
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III	<ul style="list-style-type: none"><li>• Develop protocols for regionally representative model inputs:<ul style="list-style-type: none"><li>• Air exchange rates</li><li>• Duration of device use per day</li><li>• Kitchen volume</li><li>• % emissions vented with chimney</li></ul></li><li>• Work with in-country institutions to collect data</li></ul>	June-July 2016



*Thanks!*



# Framing standards should take account of varying adoption patterns over time and across society ...





# Possible format for tiered health-based standards

- Very low emission (AQG: RR=1) aspirational goal:
  - Important to drive innovation in technology and policy
  - Standards must accommodate intermediate steps
- ISO TC285 WG2 will prepare draft, including:
  - Provisional tiers for: efficiency, PM<sub>2.5</sub>, CO, safety and durability
  - May propose format incorporating 'reasonable performance' for intermediate steps, and timeframe
  - Best practice (standards) for periodic review
  - May include examples of (e.g.) expected emission rates for full range of technology/fuel types