KUALA LUMPUR 2012 WORLD GAS CONFERENCE

25th world gas conference

"Gas: Sustaining Future Global Growth"

GAS QUALITY HARMONIZATION: THE EUROPEAN SITUATION

Part 1 GASQUAL project results

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Date:7 June (Thu.) 2012

Venue: EF5.B WOC5

Patron

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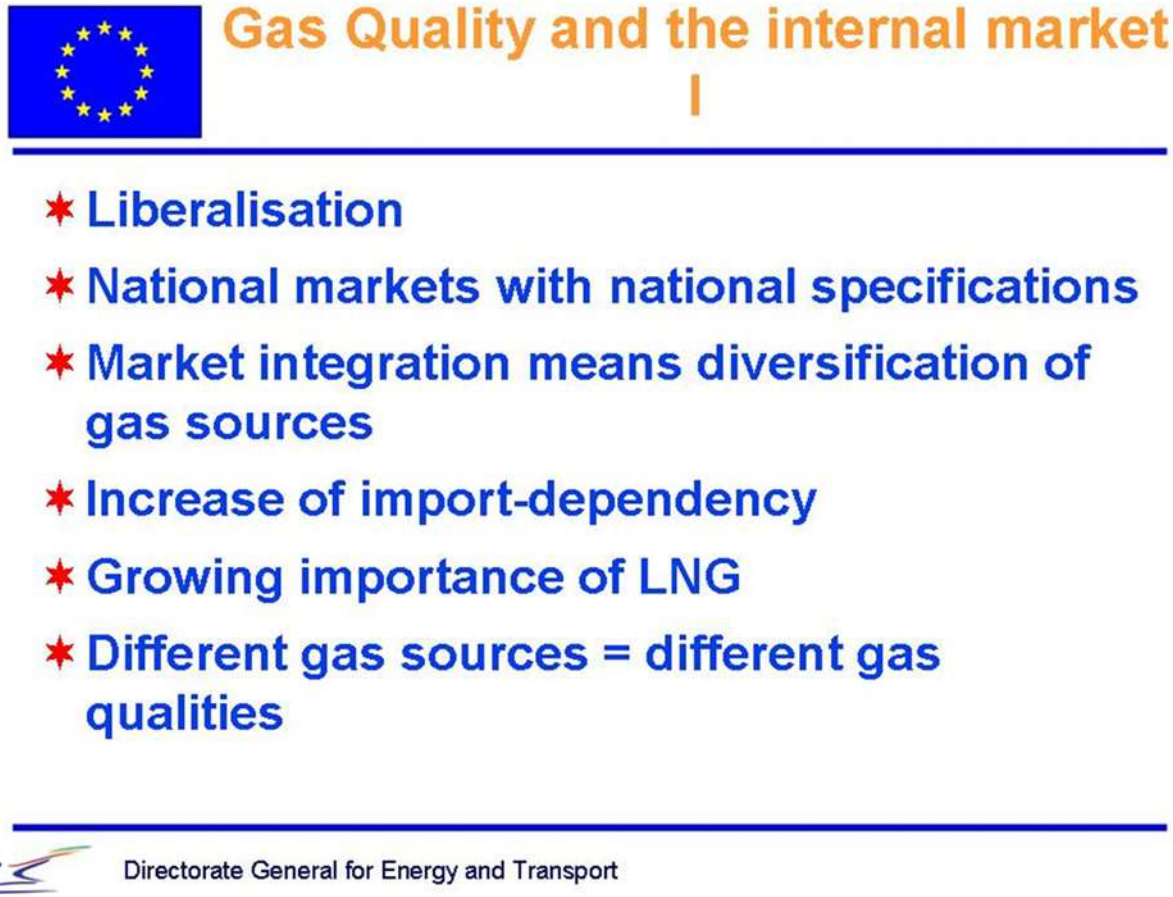
Gas quality & internal gas market

- The need for an harmonized gas quality standard in the EU



Harmonized gas quality standard ..

….for Gas Quality (Natural Gas H)

- Phase 1 : Study **GASQUAL**: Impact of gas quality variations on appliances (safety, operational, emissions, efficiency)

- Phase 2 : Standardisation

GASQUAL Consortium

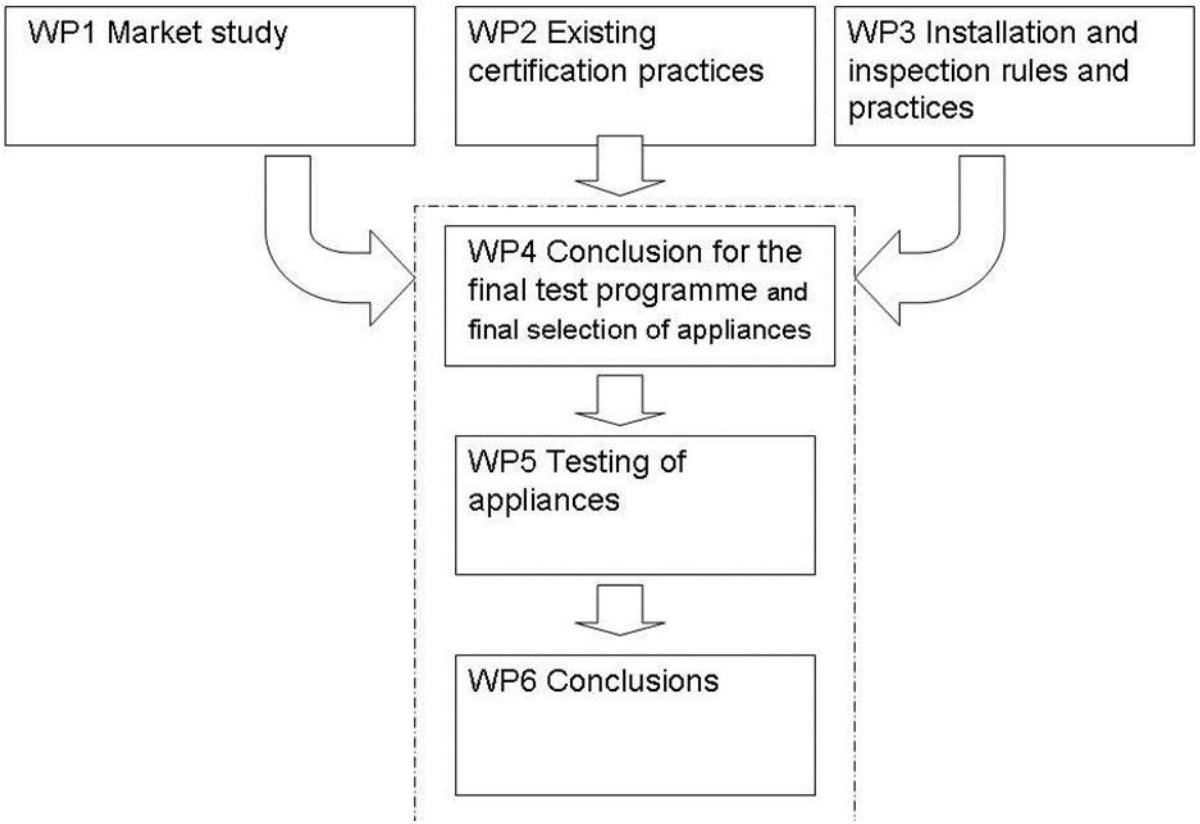
- Coordination DGC – Denmark
- 16 EU partners (from 9 Countries)
- 5 laboratories involved

MARCOGAZ strong role (initiating the project)

GERG involved in the execution

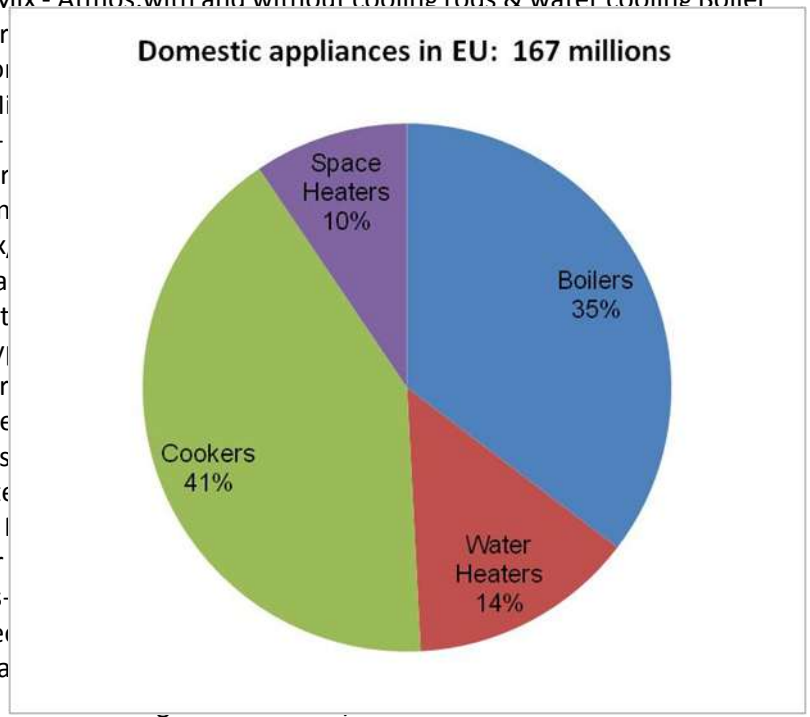
GASQUAL work

- Structure of the work



Gas appliances in EU & market segmentation

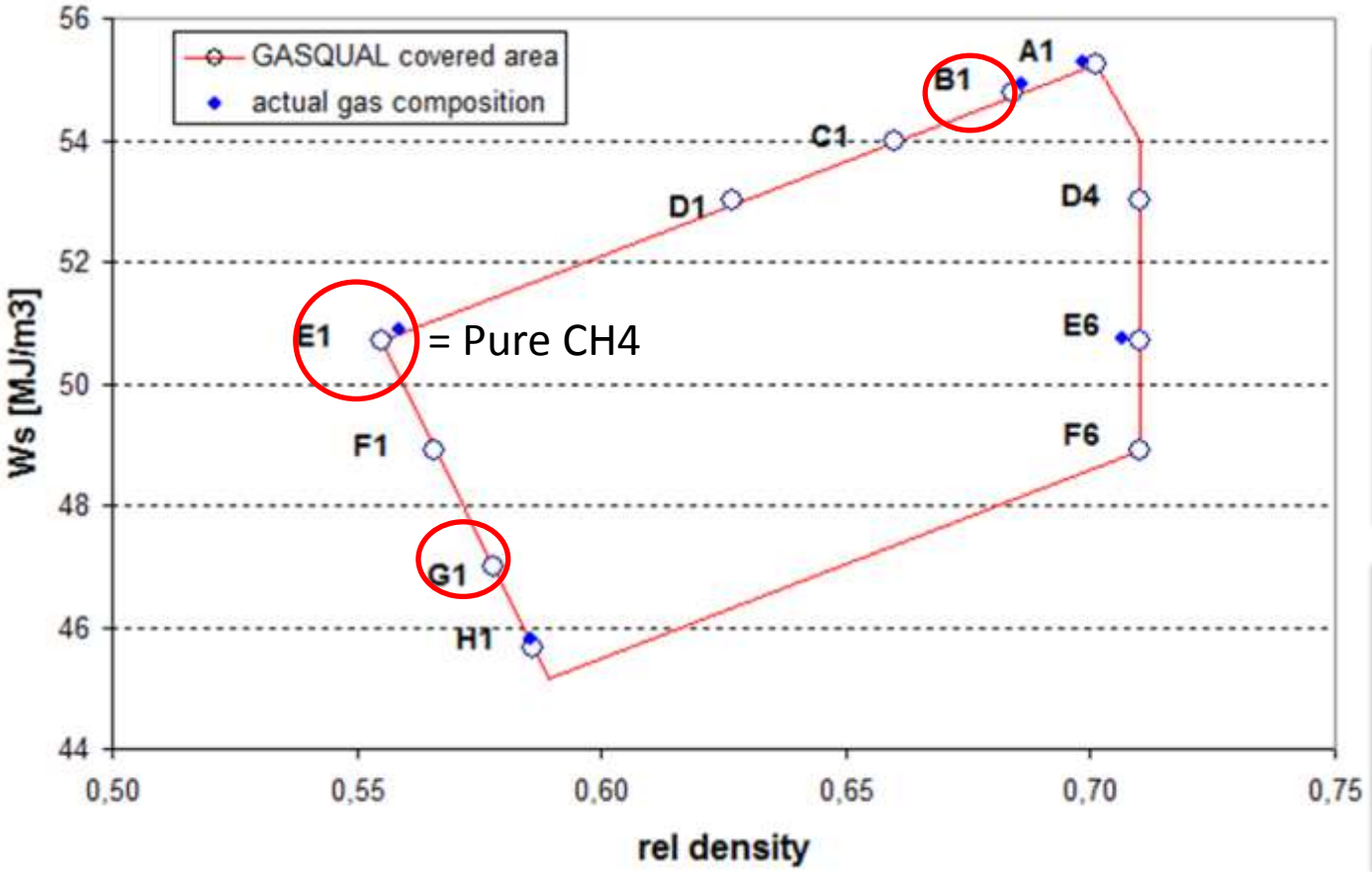
- SEGMENT 01 EN 677 Room Sealed Condensing Boiler
- SEGMENT 02 EN 30. Atmospheric Partially Aerated – Single Ring Built-in Hob
- SEGMENT 03 EN 303-3 Forced Draught Burner
- SEGMENT 04 EN 297 Open Flued. Low NOx PreMix - Atmos.with and without cooling rods & water cooling Boiler
- SEGMENT 05 EN 483 Room Sealed. Low NOx Par
- SEGMENT 06 EN 30 Partially Aerated Surface Co
- SEGMENT 07 EN 483 Room Sealed. Partial PreMi
- SEGMENT 08 EN 483 Room Sealed. Full premix -
- SEGMENT 09 EN 26 Instantaneous Water Heater
- SEGMENT 10 EN 30. Partially Aerated Oven Burn
- SEGMENT 11 EN 297 Open Flued. Partial PreMix
- SEGMENT 12 EN 297 Open Flued Full premix - fa
- SEGMENT 13 EN 613 Open Flued Live Fuel Effect
- SEGMENT 14 EN 30 -Partially Aerated Ribbon Ty
- SEGMENT 15 EN 613 Open Flued Radiant Gas Fir
- SEGMENT 16 EN30-Partially Aerated Oven Burne
- SEGMENT 17 EN 509 Open Flued Decorative Gas
- SEGMENT 18 EN 30-Atmospheric Partially Aerate
- SEGMENT 19 EN89 Storage Water Heater Open
- SEGMENT 20 EN26 Instantaneous Water Heater
- SEGMENT 21 EN 613 Room Sealed Wall Heaters-
- SEGMENT 22 EN 613 Room sealed Live Fuel Effe
- SEGMENT 23 EN 14829 Flueless Gas Fires- Partia
- SEGMENT 24 EN 613 Open Flued Room Heaters
- SEGMENT 25 EN 677 Room Sealed Condensing, Partial PreMix Fanned Boiler
- SEGMENT 26 EN 13278 Open Flued Fanned Live Fuel Effect Gas Fire-Partial PreMix/Conv
- SEGMENT 27 EN 778 Open Flued & Room Sealed Ducted Air Heaters, Partial PreMix/Conv (Atmos. & fanned)
- SEGMENT 28 EN89 Storage Water Heater Room Sealed Partial PreMix/Conv (Atmos. & fanned)
- SEGMENT 29 EN 1458 Tumble Dryer



- Ranking based on
  - Theoretical sensitivity to gas quality variations
  - Number of appliances in segment

(Air gas ratio adjustment increased sensitivity)

Testing points



For each gas:
Test at different
- Pressure
- Voltage

Test at Min & Max

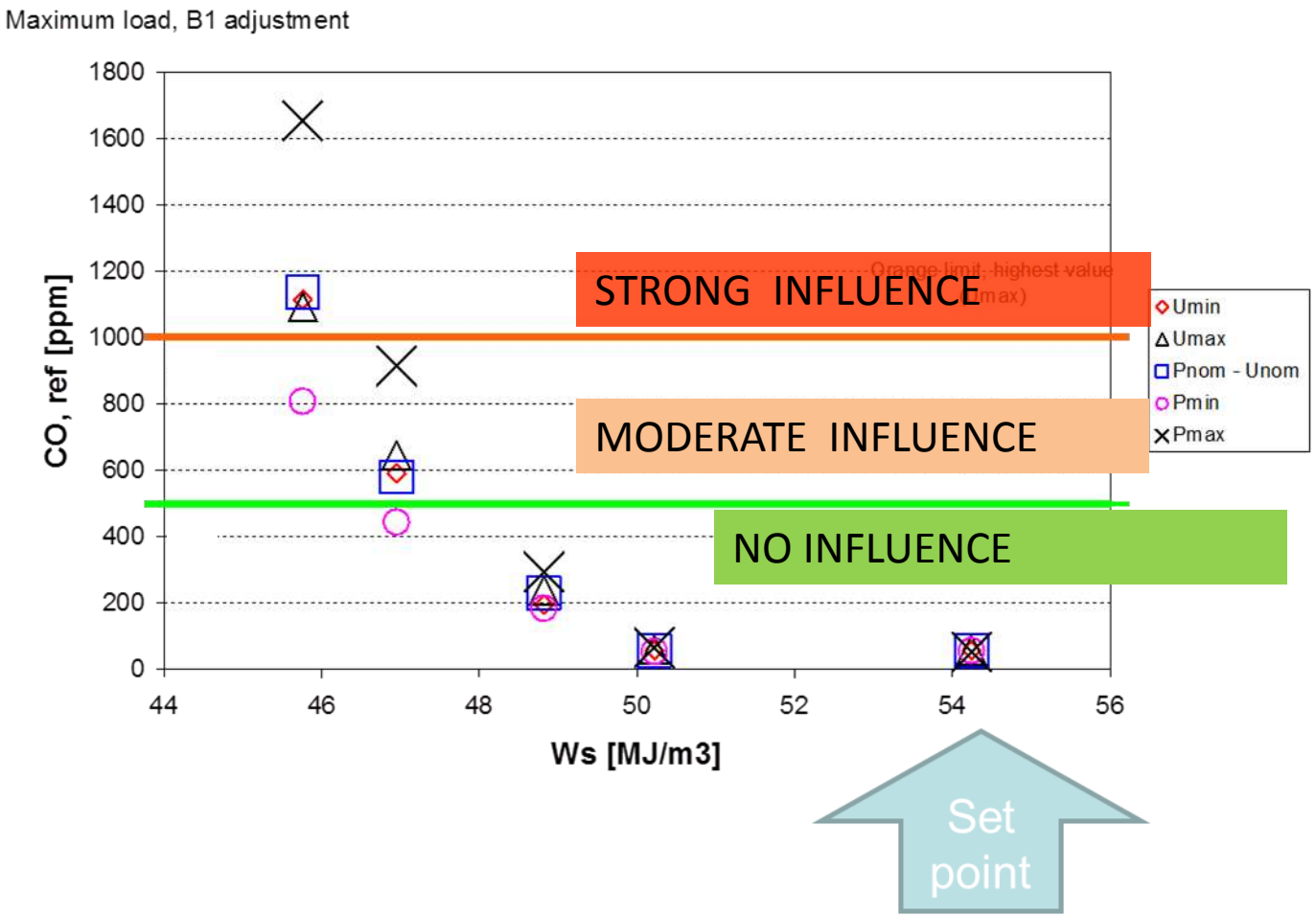
Test at G1 & B1

Test of
- CO
- Other safety
- Operational
- NOx, efficiency

For GASQUAL Wobbe index is always expressed in MJ/m3 15 °C, 15 °C 1013.25 hPa

Range investigated 45 → 55 MJ/m3 ⇔ Variations of +/- 10% compared to G20

Example: Adjustable condensing boiler: adjusted for high Wobbe (Ws)



Method & Results: Ws = main influence parameter

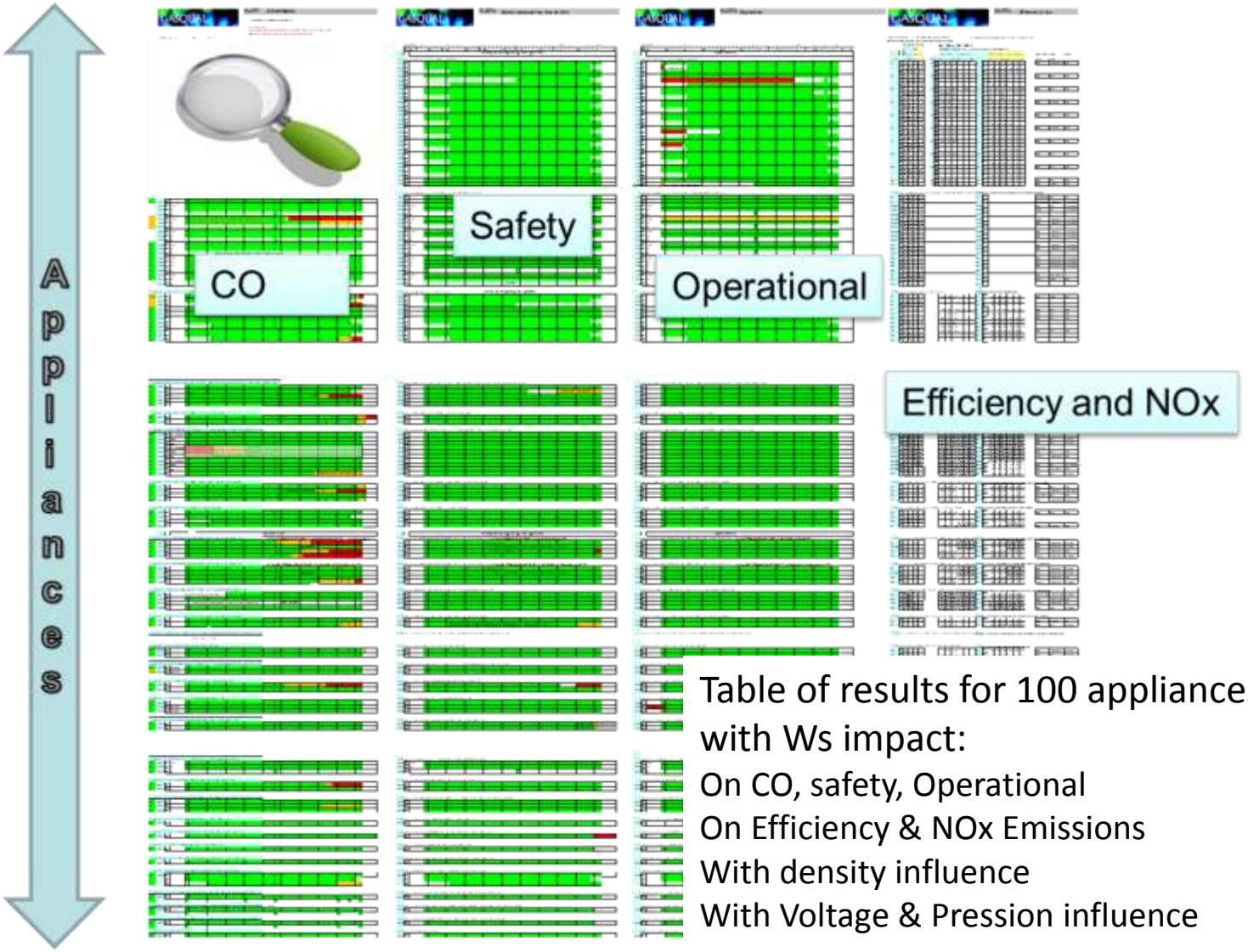


Table of results for 100 appliances with Ws impact:

On CO, safety, Operational

On Efficiency & NOx Emissions

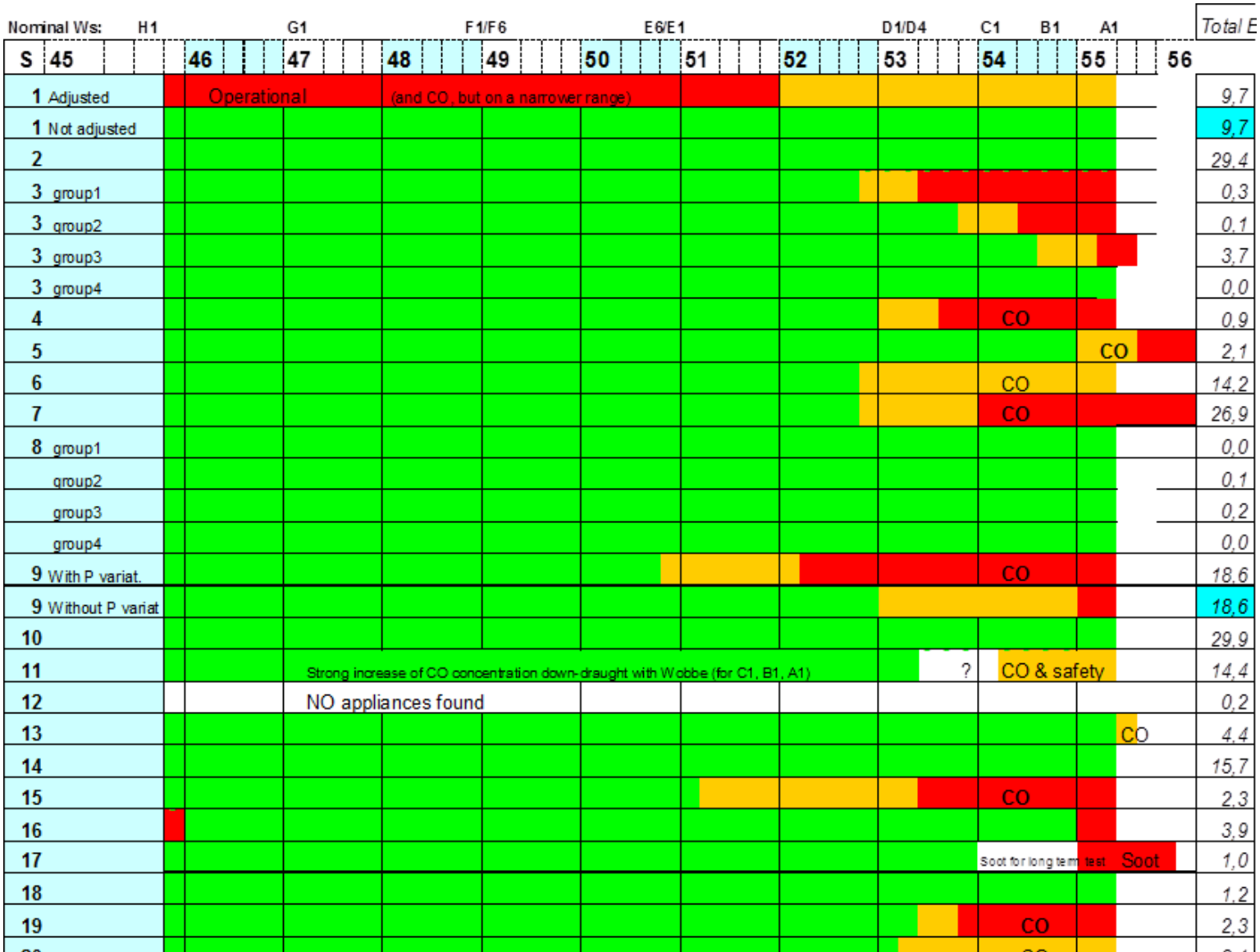
With density influence

With Voltage & Pression influence

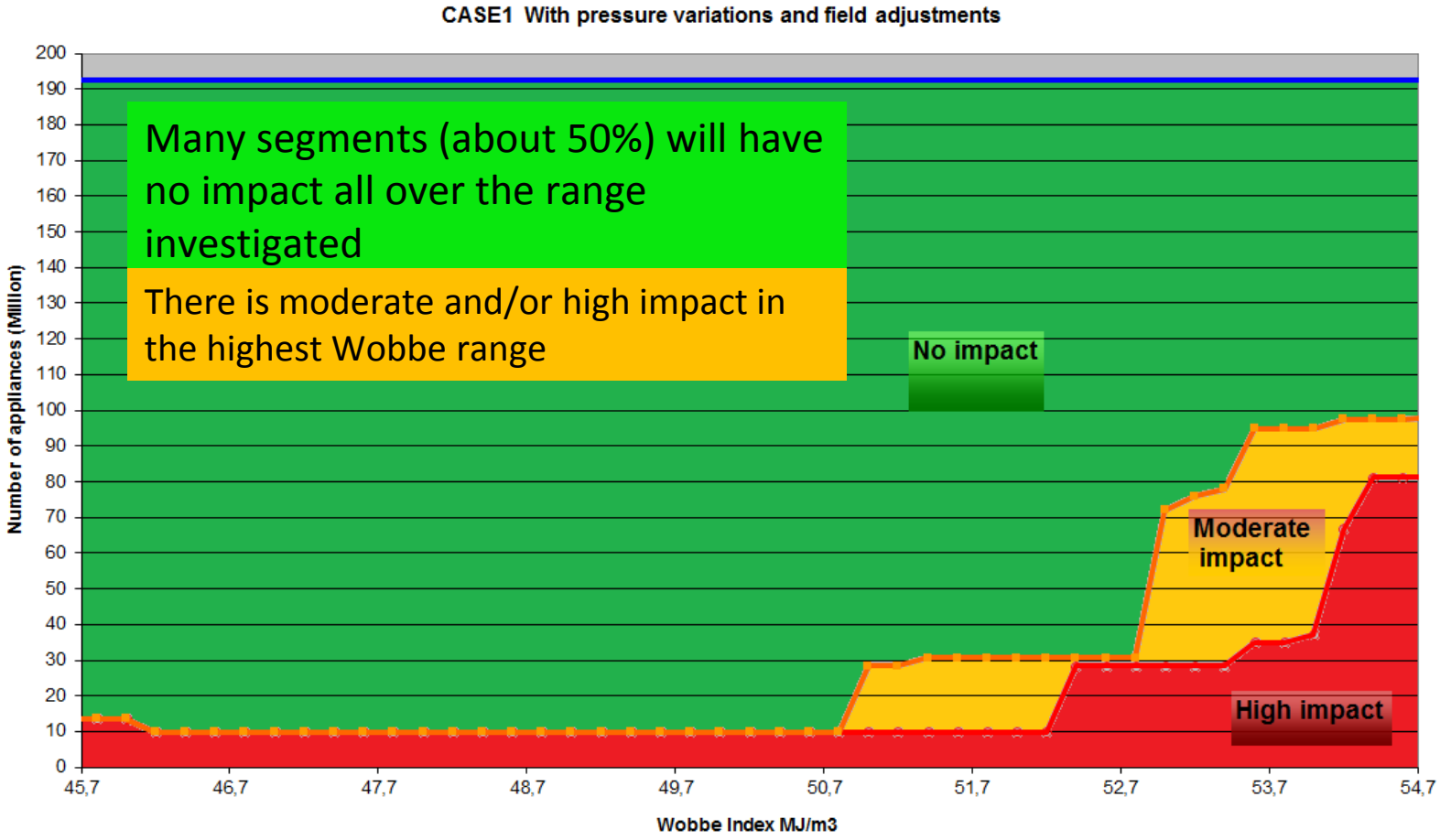
Results in a glance: figure with ALL segments

Impact profile for all segments

Population



Scenarios and impact



Condensing boilers /fully premix burner are strongly impacted in case they have been adjusted (10 M – growing population)

Remedies? Conclusions

- In most of the cases with high or moderate impact of the Wobbe it is due to the **combination of Wobbe variation AND variation of another parameter** such as gas pressure or voltage and not Wobbe variation alone. As a result there are for some appliances also ways to reduce the impact with adequate technical solutions (e.g. Pressure regulators).

- When readjusting appliances to G20 set (pure CH4), the appliance can perform well again over the range investigated

- Use of combustion control will also be a possible solution

- The global impact is country depending (different markets, different gas history, different installation practice)

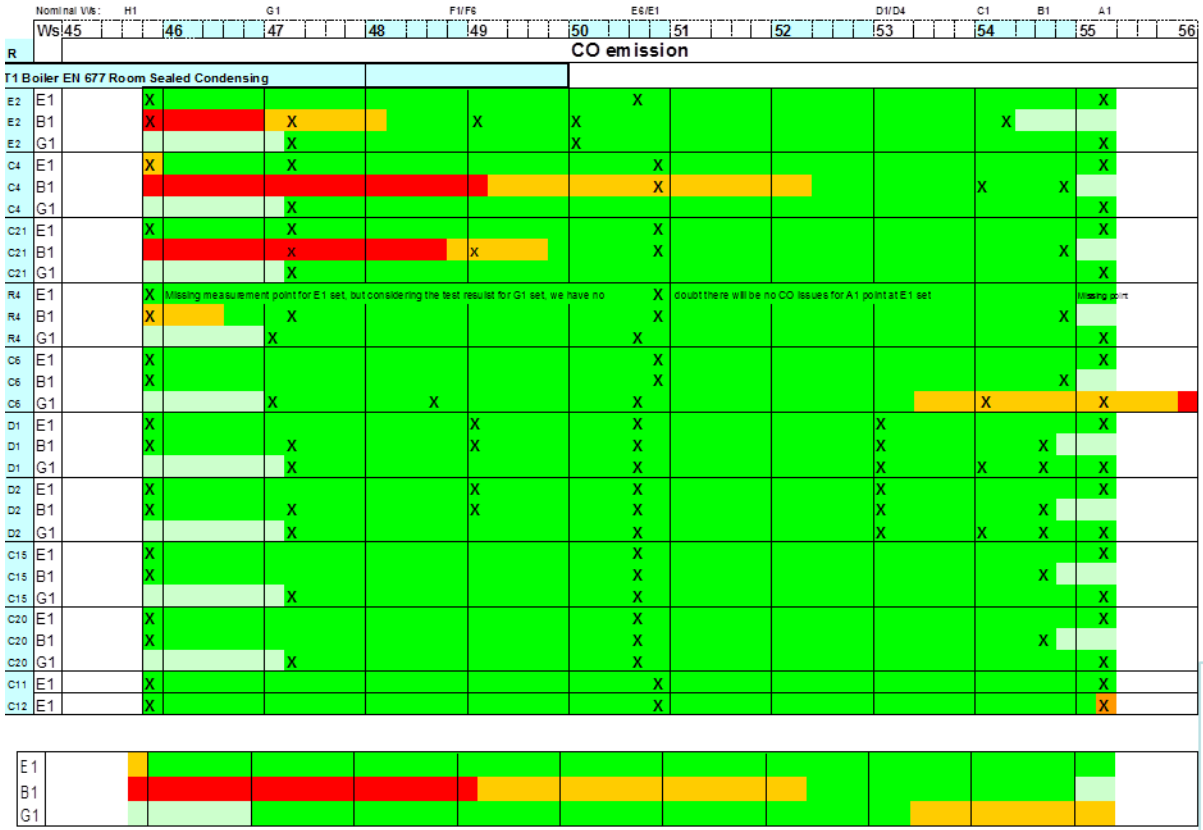
- Solutions are to be found by countries or regions

THANK YOU FOR YOUR ATTENTION

Method & Results: making a simple impact figure for ONE segment

Wobbe range from 45 to 55 MJ/m3

1. Influence expressed as a function of the Wobbe



2. Color code

- No influence
- Moderate influence
- Strong influence

3. Simple representative profile by segment based on <u>Worse case method</u>