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# Black carbon and shipping – Environmental impacts and business potential

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BC is distinguishable from other forms of carbon and carbon compounds contained in atmospheric aerosol because BC has a unique combination of physical properties:

- It strongly absorbs visible light with a mass absorption cross section of at least  $5\text{m}^2\text{g}^{-1}$  at a wavelength of 550 nm
- it retains its basic form at very high temperatures, with vaporization temperature near 4000 K
- It is insoluble in water, in organic solvents including methanol and acetone, and in other components of atmospheric aerosol
- It exists as an aggregate of small carbon spherules



# IMO categories BC abatement technologies as follows:

- 1) Fuel efficiency – vessel design
- 2) Fuel efficiency – monitoring options
- 3) Fuel efficiency – engine options
- 4) Slow steaming
- 5) Fuel treatments
- 6) Fuel quality (traditional fuels)
- 7) Alternative fuels
- 8) Exhaust treatment

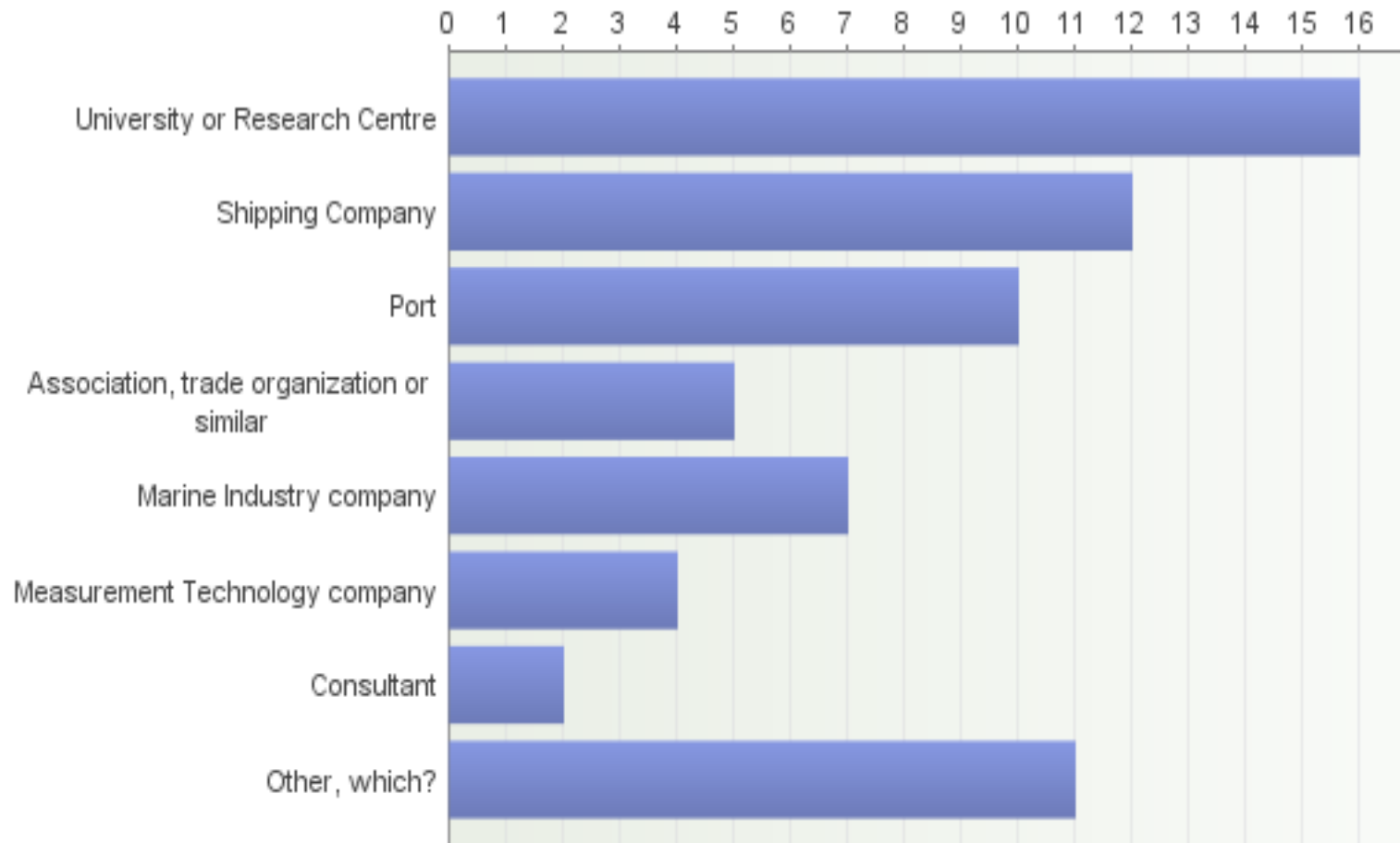




# Data

- An electronic questionnaire study was conducted during August to December of 2015.
- The questionnaire study was carried out in using a web survey system
- The questionnaire was worldwide and respondents were selected from different stakeholder groups
  - academia and research centers
  - Industry
  - consultancy.
- The aim was to reveal interests and current knowledge of BC emissions.
- The questionnaire was sent to 1415 recipients and to 16 different countries.

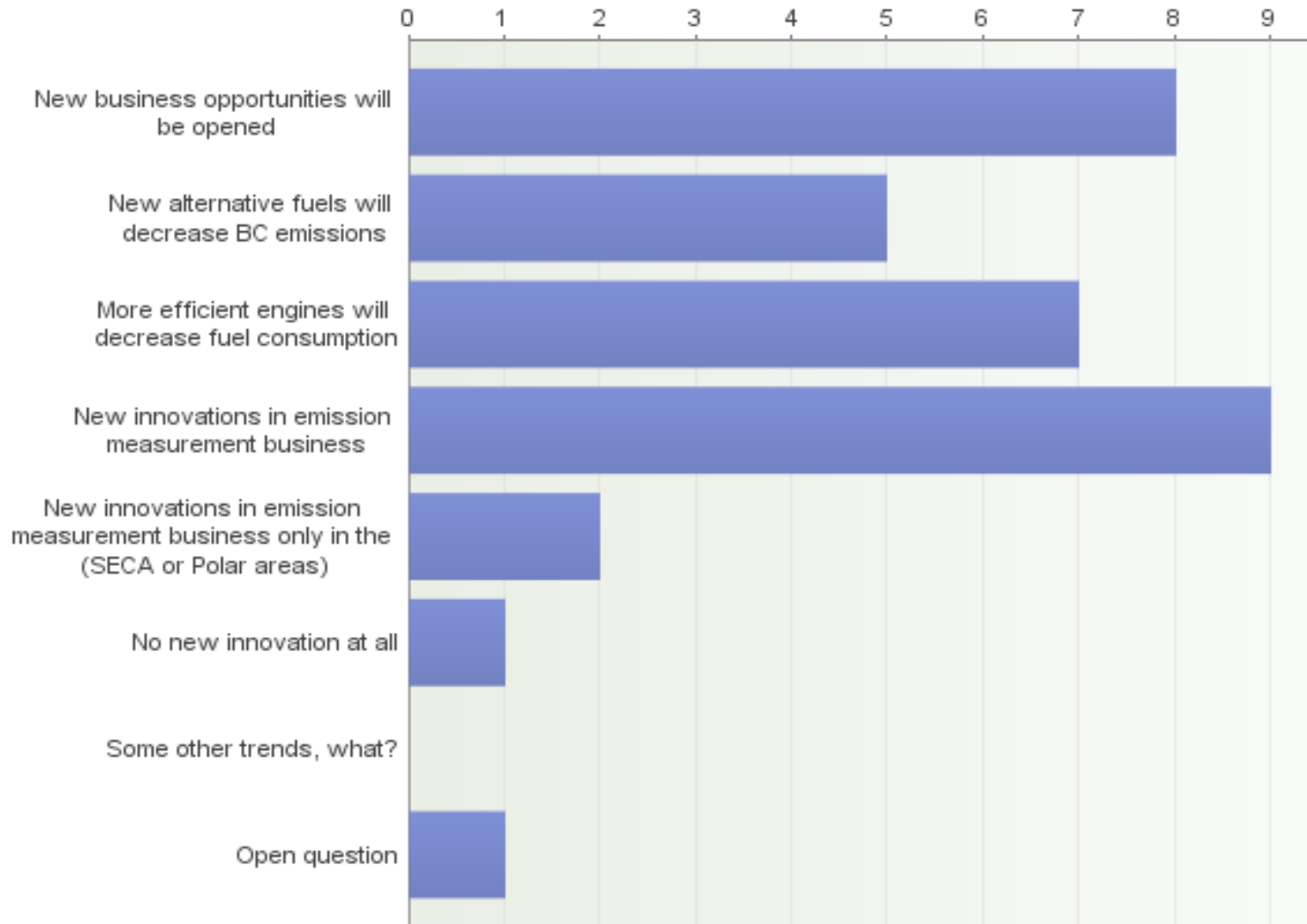
# Types of respondent organizations



# Selected key results

- “Before knowledge” regarding BC emissions: yes = 58% vs. No = 42%
- According to comments the current emission limits for NO<sub>x</sub> and BC are far from the level they could be.
- Role of IMO?

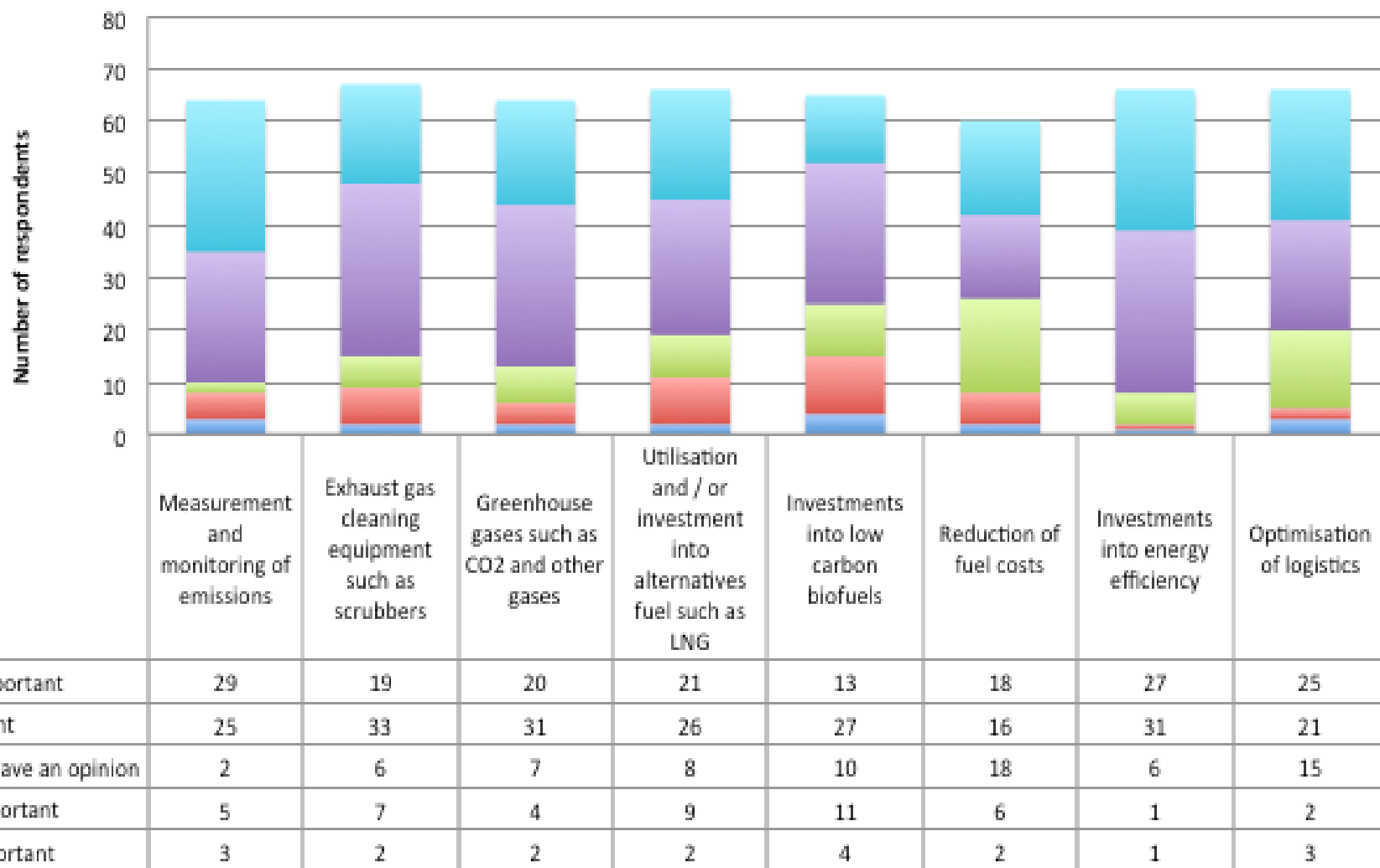
# How do you see the market for BC control technology will develop in the near future (the next 5 years)?





# Overall environmental result:

## How important respondents see these environmental issues







# Conclusions

- Both literature and interviews are supporting same results:
  - The business potential view was not coherent among the respondents
  - There is no demand and interest are still limited as legislation and standards are under development and undecided.
  - The current timeframe was seen to take at least 10 to 20 years in order for the field to develop
- According to respondents they have same opinion that there is no “single solution” on abatement technique that it would decrease BC emissions.

# Thank you for your time!

- Further information:
  - [www.mkk.utu.fi](http://www.mkk.utu.fi)



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