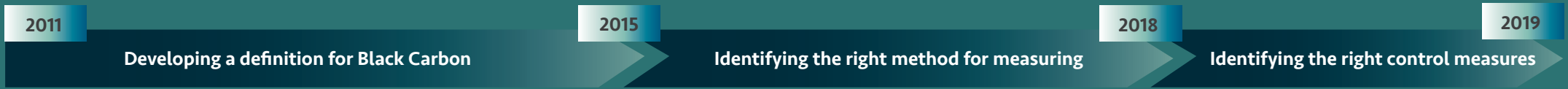


HOW CAN WE REDUCE BLACK CARBON EMISSIONS FROM INTERNATIONAL SHIPPING?



Black Carbon (BC) is a harmful air pollutant and accounts for **7-21%** of shipping's climate warming impact

To address the impact of ship BC emissions on the Arctic, the **International Maritime Organization (IMO)** has started a 3-step work plan:



BC is "a distinct type of material containing carbon or its compounds, formed only in flames during combustion of carbon-based fuels". It has a unique combination of four physical properties:

- 1 It strongly absorbs visible light
- 2 It is refractory; that is, it retains its basic form at very high temperatures
- 3 It is insoluble in water and in organic solvents
- 4 It exists as an aggregate of small carbon spherules



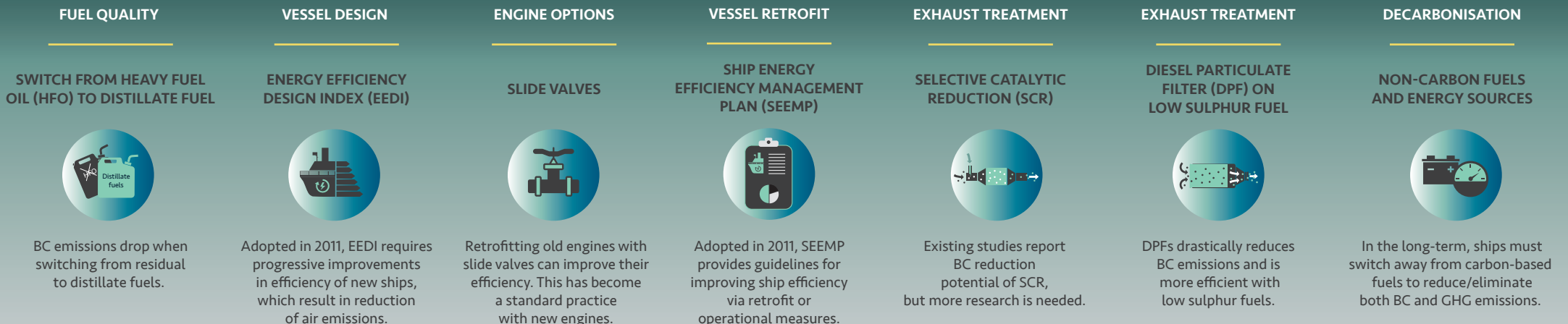
Following several years of research, a workshop hosted by the International Council on Clean Transportation (ICCT) in 2017 recommended three measurement methods, identified as reliable, robust and easy to use:

- 1 Filter Smoke Number (FSN)
- 2 Photo Acoustic Spectroscopy (PAS)
- 3 Laser Induced Incandescence (LII)

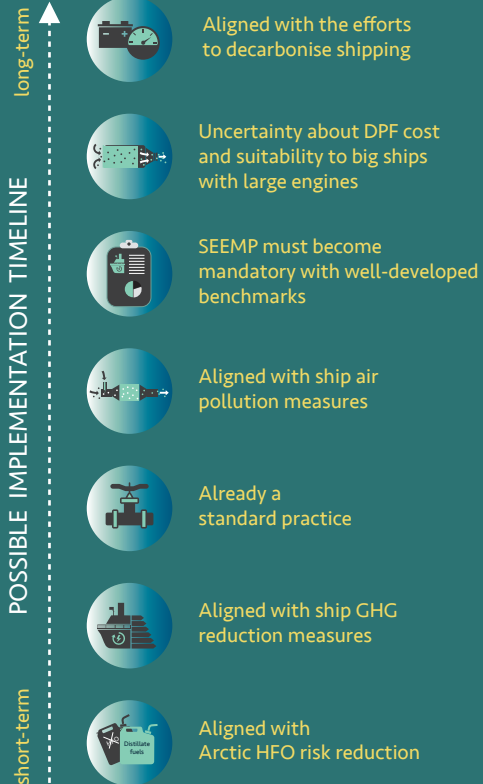
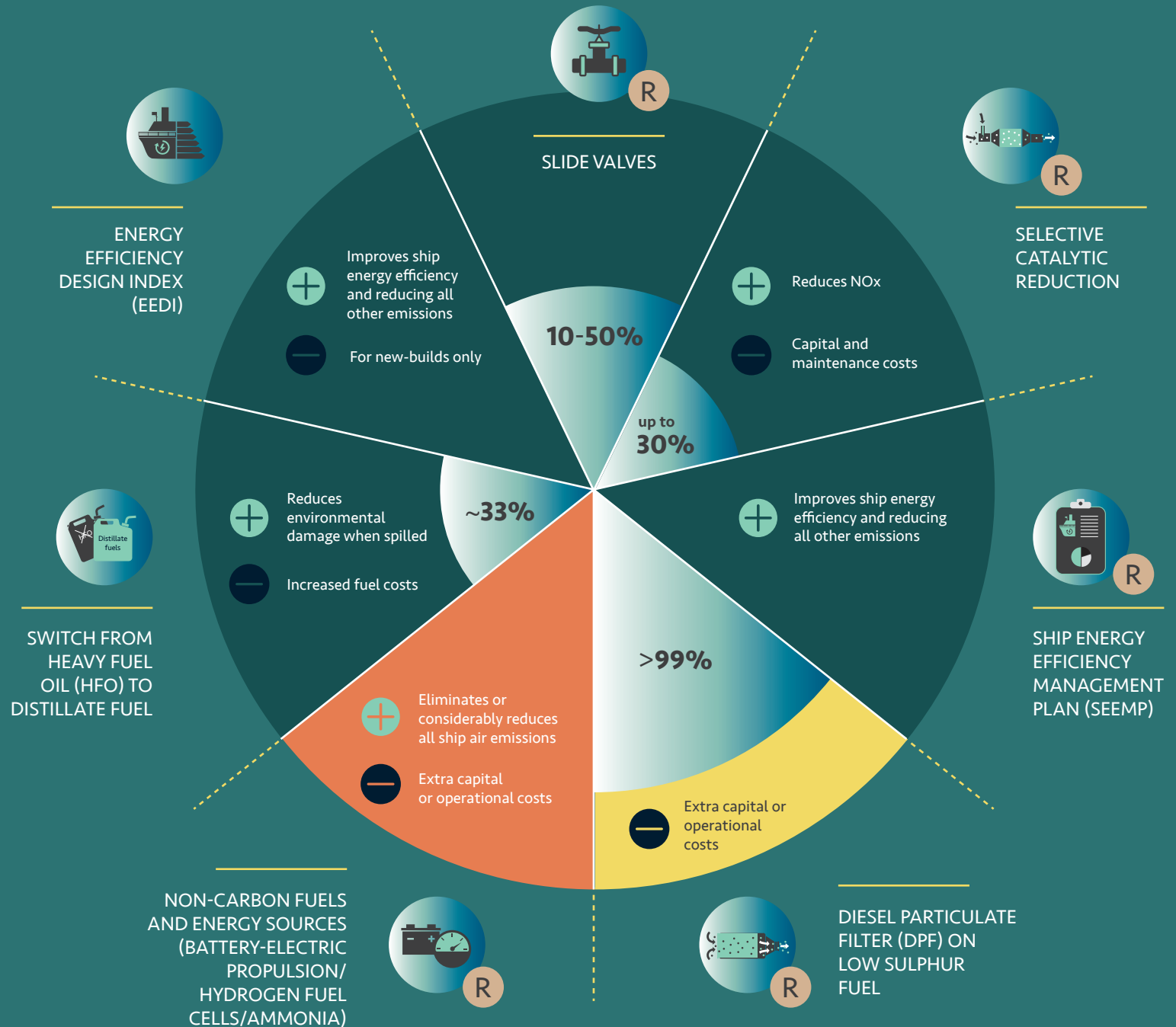
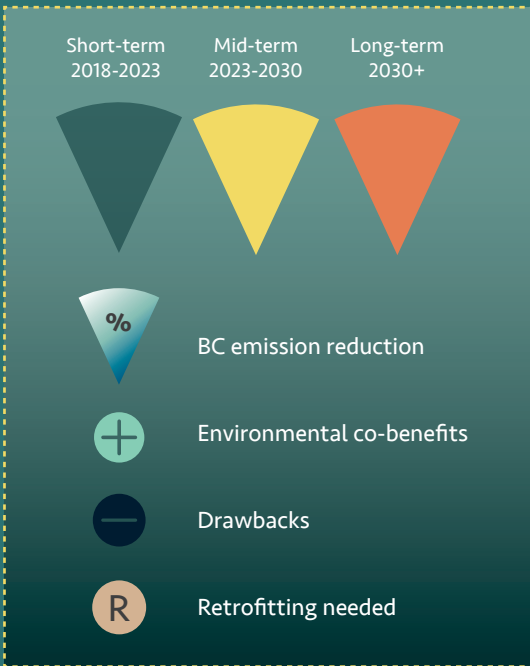


IMO needs to now start investigating and recommending the most appropriate **abatement measures** among those available and under development.

...SO WHAT ARE THE MOST EFFECTIVE ABATEMENT OPTIONS?



ZOOMING INTO THE TOP BLACK CARBON ABATEMENT OPTIONS



Sources: Lack, D. (2017); Comer, B., Olmer, N., Mao, X., Roy, B., and Rutherford, D. (2017).

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