Taking Stock: IMO's progress on regulating black carbon

Bryan Comer, PhD
Senior Researcher, Marine Program

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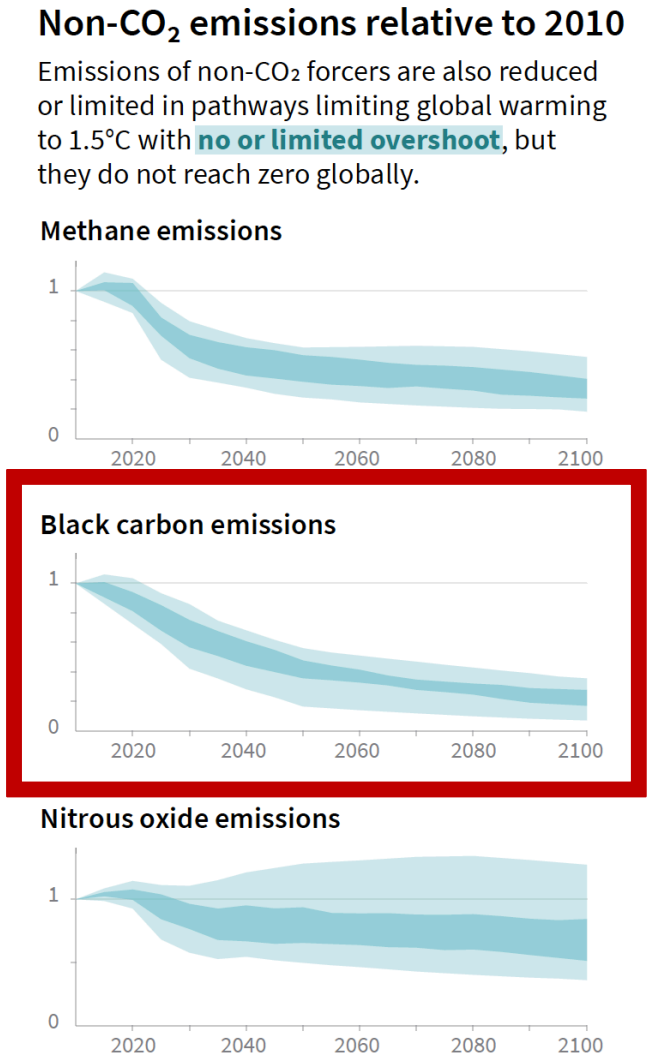
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

Plan

- Explain why we care about BC
- Explain IMO's progress on:
  - Defining BC
  - Measuring BC
  - Controlling BC
  - Regulating BC

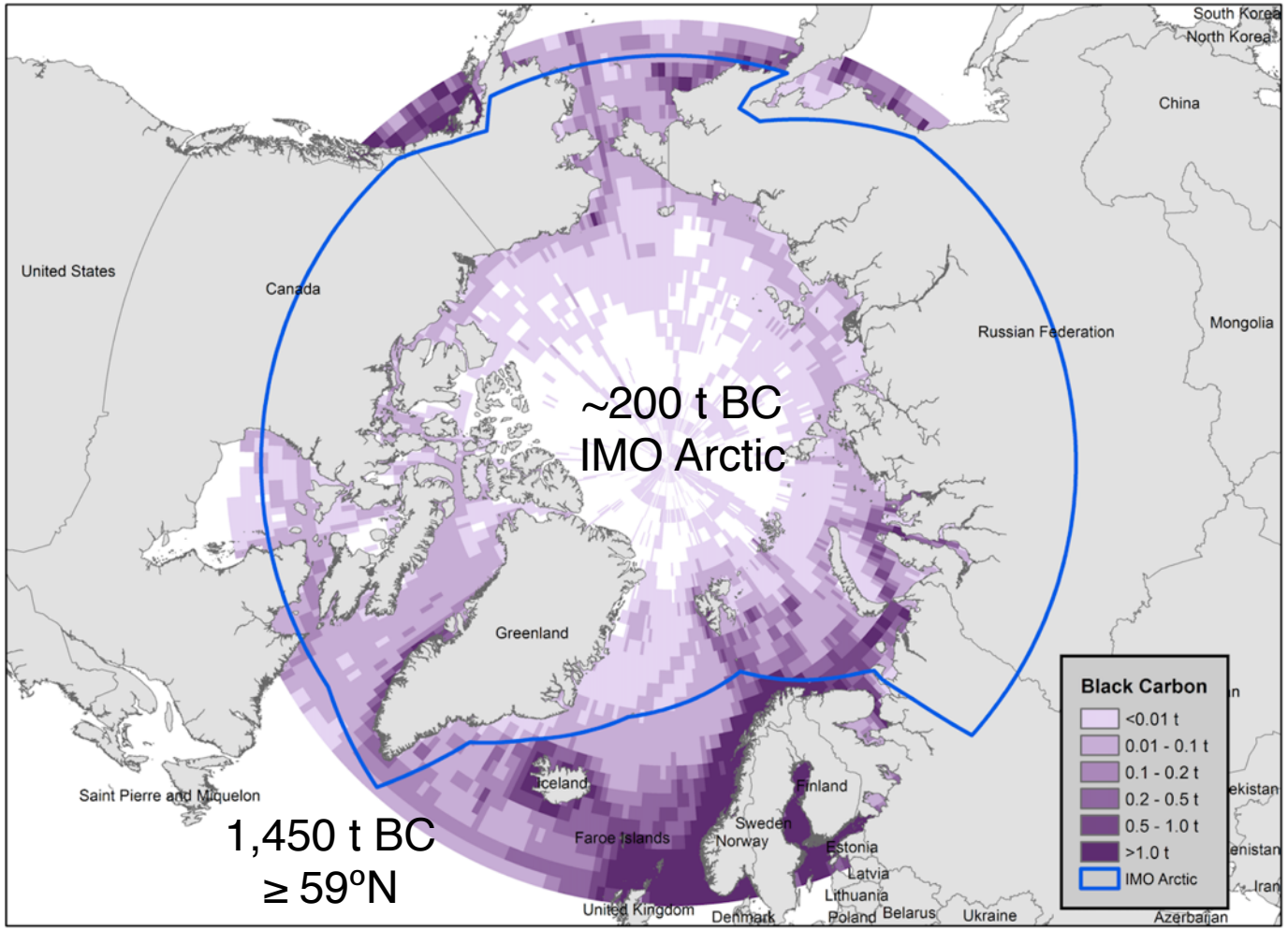
IPCC: BC must fall to achieve 1.5°C



"Modelled pathways that limit global warming to 1.5°C with no or limited overshoot involve **deep reductions** in emissions of methane and **black carbon** (35% or more of both by 2050 relative to 2010)." (IPCC SR 1.5, p. SPM-16)

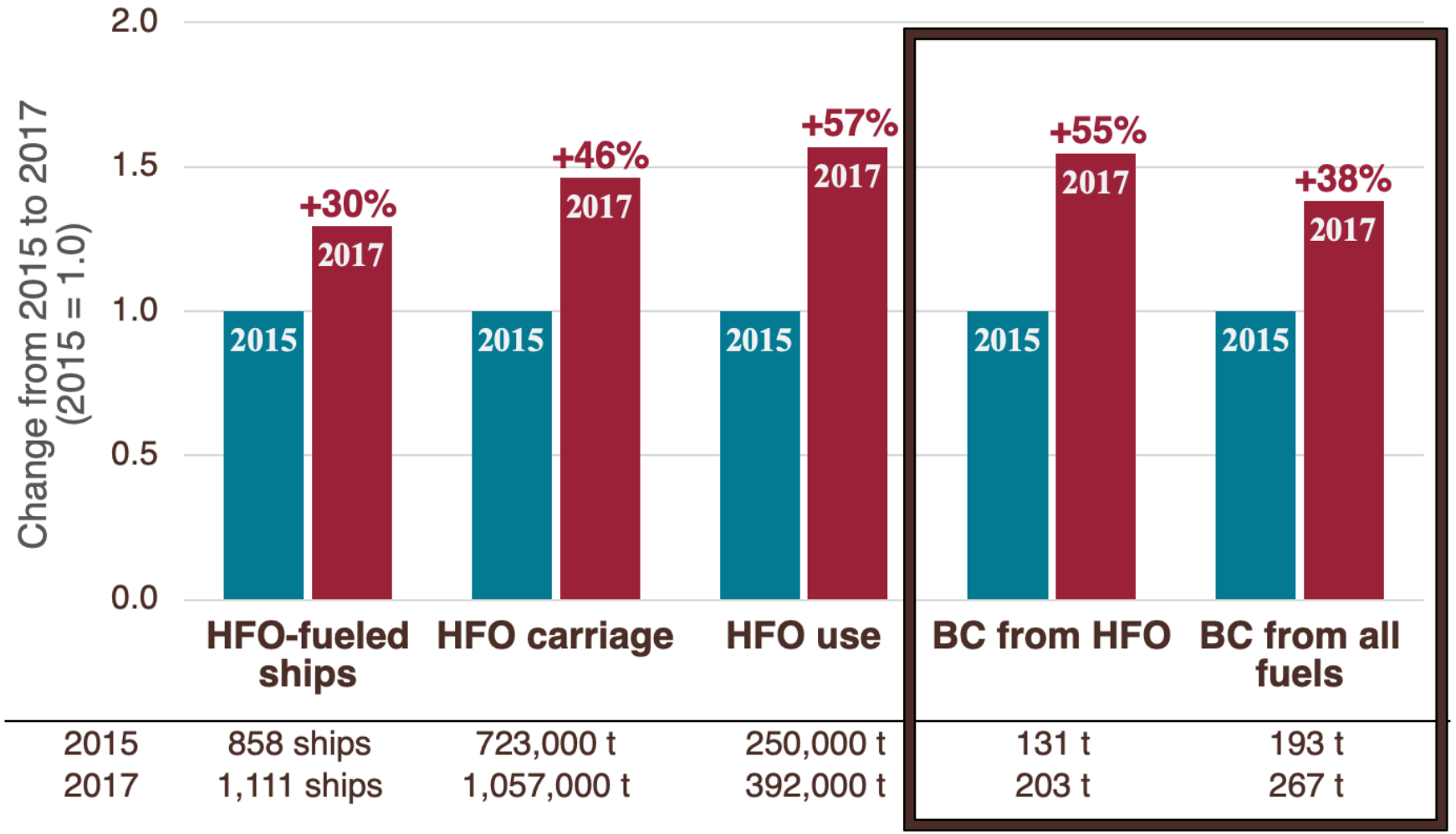
Source: IPCC. (2018). SR 15. Summary for Policymakers. Available at: https://www.ipcc.ch/sr15/chapter/summary-for-policy-makers/

Ship Black Carbon Emissions, Arctic Region, 2015



Source: Comer et al. (2017). *Prevalence of heavy fuel oil and black carbon in Arctic shipping, 2015 to 2025.* ICCT. Available at: https://www.theicct.org/publications/black-carbon-emissions-global-shipping-2015

Fuel use and BC emissions are increasing in the IMO Polar Code Arctic

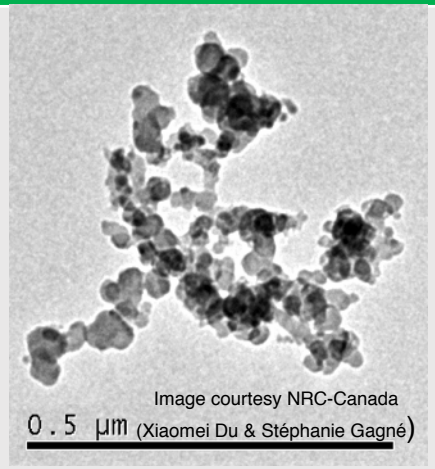
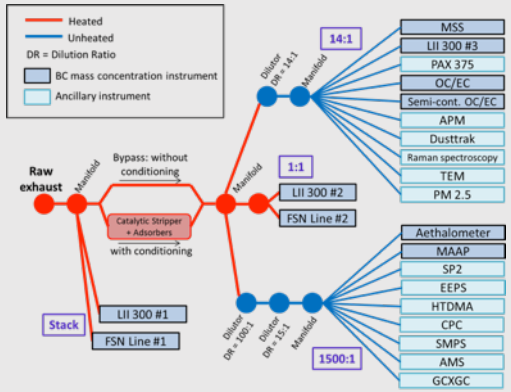
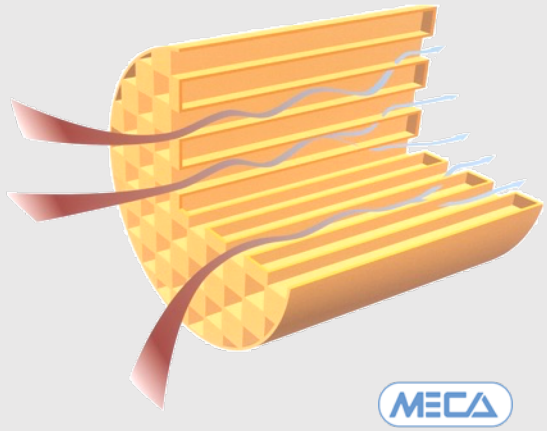


	HFO-fueled ships	HFO carriage	HFO use	BC from HFO	BC from all fuels
2015	858 ships	723,000 t	250,000 t	131 t	193 t
2017	1,111 ships	1,057,000 t	392,000 t	203 t	267 t

IMO's BC work plan

- MEPC 62 (2011) agreed to a work plan to consider the impact on the Arctic of BC emissions from internationals shipping and instructed BLG (now PPR) to:
  - Develop a definition of BC
  - Identify the most appropriate method(s) to measure marine BC
  - Investigate appropriate control measures

IMO completed a 3-step BC work plan this year; now aiming for a policy decision in 2021

Step 1: Definition of BC	Step 2: Appropriate Measurement Methods	Step 3: Appropriate Control Measures	Next Step
			?
			
2015: Definition Bond et al. (2013) (rec. of 1st ICCT wksp)	2018: Measurement Methods FSN, PAS, LII (rec. of 4th ICCT wksp)	2019: Control Measures 41 IMO candidate measures (13 rec. at 5th ICCT wksp)	2021: Control Policies?

13 Appropriate BC control measures according to 5th ICCT workshop participants

Fuels	Exhaust Gas Treatment	Engine Tuning, Propulsion System Design, and other measures
LNG (>99% ↓) Distillate (33% ↓) Biodiesel (75% ↓) Methanol (55%-75%+ ↓)	Diesel Particulate Filters (DPFs) + distillates (>96% ↓) DPF + SCR + distillates (>96% ↓) Electrostatic Precipitators (>91% ↓)	Engine tuning to low BC (BC ↓ varies) Engine control technologies (BC ↓ varies) Hybrid propulsion (BC ↓ varies) Full battery electric vessel (100% ↓) Fuel cells powered by hydrogen, ammonia, or other zero-carbon fuels (100% ↓) Shore power (100% ↓)

Scrubbers are not very effective at removing BC (0-30%)

Slow steaming usually reduces BC but not linearly: BC/kWh increases as speed decreases, but BC/km does go down in most cases.

MEPC 74 established a process for IMO to take a policy decision on BC in 2021

- PPR 7 (Feb 2020) will have the following terms of reference (MEPC 74/10/8, para 5, as referenced in MEPC 74/18, para 5.67):
  1. **Consider regulations:** "Consider regulating or otherwise directly control Black Carbon emissions from marine diesel engines (exhaust gas)…"
  2. **Continue to consider measurement methods:** "Further consider the recommended Black Carbon measurement methods (FSN, PAS, LII)…"
  3. **Develop a standardized way to measure BC:** "Develop a standardized sampling, conditioning, and measurement protocol, including a traceable reference method and an uncertainty analysis, taking into account the three most appropriate Black Carbon measurement methods (FSN, PAS, LII)…. This measurement system should not preclude consideration and agreement on policy options…as its development would in fact benefit from guidance on how possible regulations would be applied…"
  4. **Report back to MEPC:** Submit a report to MEPC 77 in 2021

MEPC 74 established a process for IMO to take a policy decision on BC in 2021

- MEPC also invited **concrete proposals** to PPR 7 on "how to control Black Carbon emissions… and how to develop a standardized sampling, conditioning and measurement protocol…" (MEPC 74/18, para 5.67).

Conclusions

- BC is an important short-lived climate pollutant that, if reduced, can help achieve the Paris Agreement temperature goals.
- We've defined BC.
- We've agreed on appropriate measurement methods.
- We've identified appropriate BC control measures.
- Now we need to identify appropriate BC control policies and standardized measurement protocols.
- The measurement protocols will benefit from first understanding how BC will be regulated or otherwise controlled.

Thank you!

Bryan Comer, PhD
Senior Researcher, Marine Program
International Council on Clean Transportation
bryan.comer@theicct.org
www.theicct.org

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Workshop Participants

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