Recap of Day 1

Dan Rutherford, PhD
Director, Marine Program

4th ICCT Workshop on Marine BC
Washington, DC, USA
October 2017

icct
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

Overview

- Reminder of workshop goal
- Preview of Day 2 agenda
- Recap of criteria for appropriate method(s) to measure marine BC

Goals for 4th workshop

- Main workshop goal: Identify to most appropriate method(s) for measuring marine black carbon
- Additional goals:
  1. Discuss potential submission to PPR 5 on measurement
  2. Understand recent research on marine BC
  3. Identify the barriers and opportunities for controlling marine BC

Agenda – Day 2

Time	Activity	Details
9:30-10:00	Recap of Day 1 Dan Rutherford, ICCT	- Brief recap of Day 1 - Review of criteria
10:00-10:30	Finalize Group Discussion: Criteria for appropriate methods(s)	Goal: Agree on criteria for “appropriate” method(s)
10:30-12:00	Discussion: Which method(s) meet the criteria? Dan Rutherford, ICCT, Facilitator	-Goal: Identify method(s) that meet the criteria
12:00-13:00	Lunch (Provided)	
13:00-14:00	Discussion: What are the most appropriate method(s)? Bryan Comer, ICCT, Facilitator	Goal: Identify the most appropriate method(s) for measuring marine BC emissions
14:00-14:15	Break	
14:15-15:30	Discussion: What will it take to control marine BC? Dan Rutherford, ICCT, Facilitator	Goal: Identify the barriers and opportunities for controlling marine BC
15:30-16:00	Break	

Agenda – Day 2 continued

Time	Activity	Details
16:00-16:30	Summary of Workshop Outcomes Bryan Comer, ICCT	Goal: Agree on key workshop outcomes, including the most appropriate method(s)
16:30-16:45	Closing Remarks Dan Rutherford, ICCT	
16:45	Adjourn	
17:15+	Happy Hour City Tap House 901 9th St. NW, Washington DC, 20001 (Corner of 9th and I St. NW)	Join us for an informal happy hour!

Note: New happy hour location; walking directions from ICCT to City Tap House provided in a handout

Key themes from recent research

- Work outstanding on inventories for policy decisions: EF by engine size, engine speed, engine tier, fuel properties etc. Impact of these factors on BC emissions may be significant.
- Updated work on control measures, with some reduction efficacy seen e.g. scrubbers and fuel switching but with improved certainty. BC should be expressly measured when possible as proxies can be problematic.
- Blended/nonconventional fuels pose a variety of challenges on emissions, durability, safety etc. and further research is needed, including on how to specify fuel parameters for 0.5% and 0.1% sulfur fuels.
- Building blocks of measurement uncertainty: measurement, dilution, staged dilution, filter sampling, filter handling etc. In general, fewer blocks means a more precise measurement.
- Uncertainty of a potential reference method (TOA) is significant and dependent fraction of EC in sample, split point, differences across procedures, even labs etc. Maybe resolvable using EuroMOT GL method?
- FSN and PAS, and maybe TOA are well-correlated under controlled conditions; MAAP and aethelometer are not; data on LII is more limited.
- More research likely needed to inform potential policy decision at MEPC.

Additional key themes from recent research

- Overall link between fuel types (HFO vs. distillate) and BC emissions should be highlighted
- Relevant contribution of shipping to global BC inventories is of great interest to policymakers at IMO
- Revisions to the background document are needed
- Highlight that not all scrubbers control BC in the same way
- Consider IMO's NOx technical code as a model for BC control regime
- Need to look at fuels and technologies in an integrated approach

List of consensus criteria for method(s) to measure marine BC

- Precise for potential certification/evaluation of control measures
- Accurate, useful for developing BC inventories
- Reliable/robust for typical marine engines and fuels
- Low system complexity
- Ease of use/practical
- Practical for measuring at the source:
  - Test bed
  - On-board
- Relevant international standard for marine engines
  - Already exists
  - Can be established or adapted
- Appropriate dynamic range
- Commercially available/viable
- Vetted and used by BC research community and marine industry

Discussion: Which method(s) meet the criteria?

Dan Rutherford, PhD
Director, Marine Program

4th ICCT Workshop on Marine BC
Washington, DC, USA
October 2017

icct
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

Goal

- Goal: Identify the method(s) that meet the criteria for appropriate method(s) to measure marine BC

Matrix of methods/instruments and criteria

- See excel sheet

Lunch time!

Discussion: What are the most appropriate methods?

Bryan Comer, PhD
Researcher, Marine Program

4th ICCT Workshop on Marine BC
Washington, DC, USA
October 2017

icct
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

Goal

- Goal: Identify the most appropriate method(s) for measuring marine BC emissions?

Most appropriate method(s)

- FSN, PAS, LII
  - See criteria matrix Excel file for further detail

Summary of Workshop Outcomes

Bryan Comer, PhD
Researcher, Marine Program

4th ICCT Workshop on Marine BC
Washington, DC, USA
October 2017

icct
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

Goals for 4th workshop

- Main workshop goal: Identify to most appropriate method(s) for measuring marine black carbon
- Additional goals:
  1) Discuss potential submission to PPR 5 on measurement
  2) Understand recent research on marine BC
  3) Identify the barriers and opportunities for controlling marine BC

Key themes from recent research

- Work outstanding on inventories for policy decisions: EF by engine size, engine speed, engine tier, fuel properties etc. Impact of these factors on BC emissions may be significant.
- Updated work on control measures, with some reduction efficacy seen e.g. scrubbers and fuel switching but with improved certainty. BC should be expressly measured when possible as proxies can be problematic.
- Blended/nonconventional fuels pose a variety of challenges on emissions, durability, safety etc. and further research is needed, including on how to specify fuel parameters for 0.5% and 0.1% sulfur fuels.
- Building blocks of measurement uncertainty: measurement, dilution, staged dilution, filter sampling, filter handling etc. In general, fewer blocks means a more precise measurement.
- Uncertainty of a potential reference method (TOA) is significant and dependent fraction of EC in sample, split point, differences across procedures, even labs etc. Maybe resolvable using EuroMOT GL method?
- FSN and PAS, and maybe TOA are well-correlated under controlled conditions; MAAP and aethelometer are not; data on LII is more limited.
- More research likely needed to inform potential policy decision at MEPC.

Additional key themes from recent research

- Overall link between fuel types (HFO vs. distillate) and BC emissions should be highlighted
- Relevant contribution of shipping to global BC inventories is of great interest to policymakers at IMO
- Revisions to the background document are needed
- Highlight that not all scrubbers control BC in the same way
- Consider IMO's NOx technical code as a model for BC control regime
- Need to look at fuels and technologies in an integrated approach

List of consensus criteria for method(s) to measure marine BC

- Precise for potential certification/evaluation of control measures
- Accurate, useful for developing BC inventories
- Reliable/robust for typical marine engines and fuels
- Low system complexity
- Ease of use/practical
- Practical for measuring at the source:
  - Test bed
  - On-board
- Relevant international standard for marine engines
  - Already exists
  - Can be established or adapted
- Appropriate dynamic range
- Commercially available/viable
- Vetted and used by BC research community and marine industry

Most appropriate method(s)

- FSN, PAS, LII
  - See criteria matrix Excel file for further detail

Closing Remarks

Dan Rutherford, PhD
Director, Marine Program

4th ICCT Workshop on Marine BC
Washington, DC, USA
October 2017

icct
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

Next steps

- Workshop materials will be posted to the ICCT website, we'll send around the link
- Potential submissions to PPR 5 on appropriate method(s) to measure marine BC
- 5th workshop tentatively planned for next year in San Francisco on BC control measures.
- Happy hour!
  - City Tap House, 901 9th St. NW (Corner of 9th and I St. NW)

Thank you!

- Thanks to:
  - You, the participants!
  - Brigitte Bernal, ICCT, for helping coordinate the workshop

ICCT Marine BC Contact:
Bryan Comer, PhD
Researcher, Marine Program
International Council on Clean Transportation
bryan.comer@theicct.org

More information on ICCT's BC work:
theicct.org/issues/black-carbon