

## Assignment 3

### Pre-Training Assignment Multiple Choice Questions

Use Chapter 5 of Second IMO GHG Study 2009 on “Technological and operational potential for reduction of emissions” and answer the following questions:

- *Please tick only one box for each question.*
- *All the questions must be answered.*

**1 – The main options for improving ship design for energy efficiency include:**

- Ship concept design, design speed and principle characteristics.
- Ship hull and superstructures
- Ship propulsion system and machinery
- All of the above.

**2 – On biofuels, choose the correct statement:**

- All biofuels have a CO<sub>2</sub> benefit.
- There is only one generation of biofuels
- Current biofuels has no link with food sources.
- The present potential for shipping CO<sub>2</sub> reduction through the use of biofuels is limited.

**3 – On LNG, choose the correct statement:**

- The net benefit of LNG is about 15% reduction in CO<sub>2</sub> emissions.
- On-board storage and space requirement for LNG as fuel is not an issue.
- Ship with LNG as fuel will not be an attractive option for Emissions Control Areas.
- All of the above.

**4 – The potential reduction in ship CO<sub>2</sub> emissions through improved design:**

- Overall is 10% to 30%.
- Hull and superstructure design improvement can give 2 to 20%.
- Low carbon fuel can reduce by up to 10%.
- Renewable energy has no potential.

**5 – The potential reduction in ship CO<sub>2</sub> emissions through improved operation:**

- The overall potential is 10 to 50%.
- Voyage management can give a saving of up to 30%.
- Better fleet management and logistics improvements can give a saving up to 30%.
- All of the above are correct.

**6 – Choice of future fuel and its impact on CO<sub>2</sub> emissions:**

- High sulphur fuel with scrubber: The scrubber needs energy of the order of 1-2% of main engine's MCR, thus will increase overall CO<sub>2</sub> emissions.
- LNG as marine fuel will require more space on-board thus will increase overall CO<sub>2</sub> emissions.
- All biofuels reduce CO<sub>2</sub> emissions and are widely available.
- Choice of fuel does not influence CO<sub>2</sub> emissions but mainly the NO<sub>x</sub> and SO<sub>x</sub>.

**7 – Relative importance of various GHG emissions from ships in 2007 shows that:**

- 90% of such gases are CO<sub>2</sub>
- 98% of such gases are CO<sub>2</sub>
- There is no ship's GHG emissions other than CO<sub>2</sub>
- N<sub>2</sub>O is more than 7% of the shipping GHG emissions.

**8 – On waste heat recovery:**

- There is more scope for heat recovery from auxiliary engines than the main engine.
- Ship main engines are very efficient and there is scope for waste heat recovery of the order of about 3%.
- Recovery of energy from the exhaust can generate additional power equivalent to about 10% of the total engine power.
- There is no ship in operation yet with waste heat recovery system for power generation.

**9 – In the case where the operating profile of a ship is variable:**

- Diesel-electric propulsion may be considered as one good option for energy efficiency.
- Diesel-electric propulsion is always more efficient than the mechanical systems.
- Diesel-electric propulsion is only sometimes less efficient than the mechanical systems.
- None of the above.

**10 – To have the highest possible propeller efficiency, it is best to have:**

- The largest propeller blade diameter possible together with the lowest rpm possible.
- Higher number of propeller blades.
- The lower diameter propeller operating at higher speeds.
- None of the above.

**11 – Better ship transport energy efficiency (fuel used per tonne.mile carried) results in by:**

- Increasing the size of the ship (carrying cargo in larger ships).
- Operating the ship at slower speeds.
- Reducing time in port through improved port operation and cargo handling.
- All of the above.