
Postgraduate Certificate in Shipping Decarbonization Strategies

Decarbonization Policy and International Regulation

Absolute Emission Reduction refers to the decrease in total greenhouse gas emissions from a specific source, such as a ship or a company, over a certain period of time. Decarbonization policies aim to achieve absolute emission reduction through various measures, including the use of alternative fuels, energy efficiency improvements, and operational optimizations. Related terms include Relative Emission Reduction and Emission Intensity Reduction.

Adaptation Fund is an international fund that provides financial and technical support to developing countries to help them adapt to the impacts of climate change. In the context of shipping decarbonization, the Adaptation Fund can support projects that reduce the vulnerability of coastal communities and ecosystems to climate-related risks, such as sea-level rise and extreme weather events.

Alternative Fuels refer to fuels that can be used as substitutes for traditional fossil fuels, such as heavy fuel oil and marine gasoil, in ships. Examples of alternative fuels include liquefied natural gas (LNG), liquefied petroleum gas (LPG), hydrogen, and ammonia. The use of alternative fuels is a key strategy for reducing greenhouse gas emissions from shipping, as they can offer significant reductions in carbon intensity compared to traditional fuels.

Ammonia is a zero-carbon fuel that can be used as a substitute for traditional fossil fuels in ships. Ammonia is produced through the reaction of nitrogen and hydrogen, and it can be stored and transported in the same way as other fuels. However, ammonia is highly toxic and requires special handling and safety precautions, which can increase the complexity and cost of its use as a fuel.

Bunker Fuel is the fuel used by ships for propulsion and auxiliary power. Bunker fuel is typically a type of heavy fuel oil that is high in sulfur and other pollutants, which can contribute to air pollution and greenhouse gas emissions. The use of bunker fuel is a major contributor to the environmental impacts of shipping, and efforts to reduce bunker fuel consumption and emissions are a key focus of decarbonization policies and regulations.

Carbon Capture and Storage (CCS) refers to the process of capturing carbon dioxide emissions from sources such as power plants and industrial processes, and storing them in geological formations or other secure storage sites. CCS can be used to reduce greenhouse gas emissions from shipping by capturing emissions from ships' engines and storing them in onboard storage tanks or ashore.

Carbon Intensity is a measure of the amount of greenhouse gas emissions per unit of energy consumed or per unit of cargo transported. Carbon intensity is an important metric for evaluating the environmental performance of ships and shipping companies, as it can help identify opportunities for reducing emissions

and improving energy efficiency.

Carbon Neutral refers to a situation in which the net greenhouse gas emissions from a particular activity or process are zero. In the context of shipping, carbon neutrality can be achieved through the use of zero-carbon fuels, such as hydrogen or ammonia, or through the purchase of carbon offsets to compensate for emissions.

Carbon Offset refers to a credit or certificate that represents a reduction in greenhouse gas emissions achieved through a project or activity, such as reforestation or renewable energy generation. Carbon offsets can be purchased by companies or individuals to compensate for their own emissions and achieve carbon neutrality.

Carbon Pricing refers to the assignment of a monetary value to greenhouse gas emissions, either through a carbon tax or a cap-and-trade system. Carbon pricing can provide a financial incentive for companies and individuals to reduce their emissions and invest in low-carbon technologies and practices.

Clean Development Mechanism (CDM) is an international emissions reduction project mechanism under the Kyoto Protocol that allows developed countries to invest in emissions reduction projects in developing countries and receive credits for the reductions achieved. The CDM can be used to support the development of low-carbon shipping projects, such as the use of alternative fuels or energy-efficient ship designs.

Decarbonization refers to the reduction or elimination of greenhouse gas emissions from a particular source or activity, such as a ship or a company. Decarbonization is a key goal of international climate policy, and it requires a transition away from fossil fuels and towards low-carbon energy sources and technologies.

Decarbonization Policy refers to a set of laws, regulations, and incentives that aim to reduce greenhouse gas emissions from a particular sector or activity, such as shipping. Decarbonization policies can include measures such as carbon pricing, fuel efficiency standards, and support for the development and deployment of low-carbon technologies.

Emission Control Area (ECA) is a designated geographic area in which ships are subject to special regulations and restrictions on emissions, such as sulfur emissions or nitrogen oxide emissions. ECAs are established by the International Maritime Organization (IMO) to protect human health and the environment from the impacts of ship emissions.

Energy Efficiency Design Index (EEDI) is a measure of a ship's energy efficiency, based on its design and construction characteristics. The EEDI is used to evaluate the energy efficiency of new ships and to set standards for minimum energy efficiency performance.

Energy Efficiency Operational Indicator (EEOI) is a measure of a ship's energy efficiency in operation, based on its fuel consumption and cargo throughput. The EEOI is used to evaluate the energy efficiency of ships in

service and to identify opportunities for improvement.

Fuel Efficiency refers to the ability of a ship or a company to minimize fuel consumption and reduce greenhouse gas emissions. Fuel efficiency can be improved through a range of measures, including the use of energy-efficient ship designs, the optimization of operational practices, and the use of alternative fuels.

Global Sulphur Cap is a regulation established by the International Maritime Organization (IMO) that limits the sulfur content of fuels used by ships to 0.5% or less. The Global Sulphur Cap aims to reduce sulfur emissions from ships and improve air quality, particularly in coastal areas and ports.

Greenhouse Gas (GHG) refers to a gas that contributes to the greenhouse effect and climate change, such as carbon dioxide, methane, or nitrous oxide. GHGs are emitted by a range of sources, including ships, and can have significant impacts on the environment and human health.

Hydrogen is a zero-carbon fuel that can be used as a substitute for traditional fossil fuels in ships. Hydrogen can be produced from a range of sources, including renewable energy, and it can be stored and transported in the same way as other fuels. However, hydrogen is highly flammable and requires special handling and safety precautions, which can increase the complexity and cost of its use as a fuel.

International Maritime Organization (IMO) is a specialized agency of the United Nations that is responsible for developing and implementing international regulations and standards for the safety, security, and environmental protection of shipping. The IMO plays a key role in the development and implementation of decarbonization policies and regulations for the shipping sector.

International Regulation refers to the system of laws, regulations, and standards that govern the international shipping industry. International regulation is established by the International Maritime Organization (IMO) and other international organizations, and it covers a range of issues, including safety, security, and environmental protection.

Liquefied Natural Gas (LNG) is a type of alternative fuel that can be used as a substitute for traditional fossil fuels in ships. LNG is a cleaner-burning fuel than traditional fuels, and it can offer significant reductions in greenhouse gas emissions. However, LNG is still a fossil fuel, and its production and use can have significant environmental impacts.

Low-Carbon Fuel refers to a fuel that has a lower carbon intensity than traditional fossil fuels, such as heavy fuel oil or marine gasoil. Low-carbon fuels can include alternative fuels, such as LNG or hydrogen, as well as biofuels and other renewable energy sources.

Marine Environment Protection Committee (MEPC) is a committee of the International Maritime Organization (IMO) that is responsible for developing and implementing international regulations and standards for the protection of the marine environment. The MEPC plays a key role in the development and implementation of decarbonization policies and regulations for the shipping sector.

Methane is a potent greenhouse gas that is emitted by a range of sources, including ships and other fossil fuel combustion processes. Methane has a high global warming potential, and its reduction is a key goal of decarbonization policies and regulations.

Nitrogen Oxide (NO_x) is a pollutant that is emitted by ships and other fossil fuel combustion processes. NO_x can contribute to air pollution and negative health impacts, particularly in coastal areas and ports.

Offsetting refers to the practice of compensating for greenhouse gas emissions from one source by reducing emissions from another source. Offsetting can be used by companies and individuals to achieve carbon neutrality, but it can also be controversial and may not always be effective in reducing overall emissions.

Port State Control is a system of inspections and enforcement that is used to ensure that ships comply with international regulations and standards, including those related to environmental protection. Port state control can be used to enforce decarbonization policies and regulations, and to prevent pollution and other environmental impacts from shipping.

Renewable Energy refers to energy that is generated from natural resources, such as sunlight, wind, or water, which can be replenished over time. Renewable energy can be used to power ships and reduce greenhouse gas emissions, and it is a key component of decarbonization policies and regulations.

Ship Energy Efficiency Management Plan (SEEMP) is a plan that is required by the International Maritime Organization (IMO) for all ships over 400 gross tons. The SEEMP aims to improve the energy efficiency of ships and reduce greenhouse gas emissions, and it requires ships to implement a range of measures, including energy-efficient practices and technologies.

Sulfur Emissions refer to the release of sulfur dioxide and other sulfur compounds into the atmosphere, primarily through the combustion of fossil fuels. Sulfur emissions can contribute to air pollution and negative health impacts, particularly in coastal areas and ports.

Sustainability refers to the ability of a system or process to be maintained over time without depleting natural resources or causing harm to the environment. Sustainability is a key goal of decarbonization policies and regulations, and it requires a transition away from fossil fuels and towards low-carbon energy sources and technologies.

Wind Propulsion refers to the use of wind as a source of propulsion for ships. Wind propulsion can be achieved through the use of sails or other wind-assisted technologies, and it can offer significant reductions in greenhouse gas emissions and fuel consumption.

Zero-Carbon Fuel refers to a fuel that has zero greenhouse gas emissions, such as hydrogen or ammonia. Zero-carbon fuels can be used to power ships and reduce emissions, and they are a key component of decarbonization policies and regulations.

International Maritime Organization (IMO) 2020 regulation is a set of rules that aim to reduce greenhouse gas emissions from ships, including a 0.5% global sulfur cap, and a requirement for ships to reduce their carbon intensity by at least 40% by 2030, compared to 2008 levels. The regulation also includes a requirement for ships to implement energy-efficient measures, such as slow steaming and weather routing.

IMO 2030 regulation is a set of rules that aim to reduce greenhouse gas emissions from ships, including a requirement for ships to reduce their carbon intensity by at least 50% by 2050, compared to 2008 levels. The regulation also includes a requirement for ships to implement energy-efficient measures, such as the use of alternative fuels and energy-efficient technologies.

IMO 2050 regulation is a set of rules that aim to reduce greenhouse gas emissions from ships, including a requirement for ships to reduce their carbon intensity by at least 80% by 2050, compared to 2008 levels. The regulation also includes a requirement for ships to implement energy-efficient measures, such as the use of zero-carbon fuels and energy-efficient technologies.

Paris Agreement is an international agreement that aims to limit global warming to well below 2 degrees Celsius and pursue efforts to limit it to 1.5 degrees Celsius above pre-industrial levels. The agreement includes a commitment to reduce greenhouse gas emissions and transition to a low-carbon economy.

United Nations Framework Convention on Climate Change (UNFCCC) is an international treaty that aims to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The UNFCCC includes a commitment to reduce greenhouse gas emissions and transition to a low-carbon economy.

European Union (EU) Emissions Trading System (ETS) is a cap-and-trade system that aims to reduce greenhouse gas emissions from certain industries, including aviation and shipping. The EU ETS includes a requirement for ships to monitor and report their emissions, and to purchase allowances to cover their emissions.

EU Ship Recycling Regulation is a set of rules that aim to reduce the environmental impacts of ship recycling, including a requirement for ships to be recycled in a safe and environmentally friendly manner. The regulation also includes a requirement for ships to be designed and built with recyclability in mind.

International Chamber of Shipping (ICS) is a trade association that represents the global shipping industry. The ICS includes a range of members, including shipowners, ship managers, and shipbuilders, and it provides a range of services, including advocacy, training, and technical support.

World Shipping Council (WSC) is a trade association that represents the global shipping industry. The WSC includes a range of members, including shipowners, ship managers, and shipbuilders, and it provides a range of services, including advocacy, training, and technical support.

Ballast Water Management (BWM) is a set of practices and technologies that aim to reduce the

environmental impacts of ballast water, including the spread of invasive species and the pollution of waterways. BWB includes a range of measures, such as ballast water treatment and ballast water exchange.

Biofouling is the accumulation of organisms, such as algae and barnacles, on the hull of a ship. Biofouling can increase the drag and fuel consumption of a ship, and it can also spread invasive species and pollute waterways.

Carbon Intensity Reduction (CIR) is a measure of the reduction in greenhouse gas emissions per unit of energy consumed or per unit of cargo transported. CIR is an important metric for evaluating the environmental performance of ships and shipping companies, and it can help identify opportunities for reducing emissions and improving energy efficiency.

Clean Shipping Index (CSI) is a rating system that evaluates the environmental performance of ships and shipping companies. The CSI includes a range of metrics, such as energy efficiency, emissions, and waste management, and it provides a score that can be used to compare the environmental performance of different ships and shipping companies.

Decarbonization Strategy is a plan that outlines the steps that a company or organization will take to reduce its greenhouse gas emissions and transition to a low-carbon economy. Decarbonization strategies can include a range of measures, such as the use of alternative fuels, energy-efficient technologies, and carbon offsetting.

Energy Efficiency Technologies (EET) are technologies that aim to reduce the energy consumption and greenhouse gas emissions of ships. EET includes a range of measures, such as energy-efficient lighting, insulation, and propulsion systems.

Environmental Impact Assessment (EIA) is a process that aims to identify and evaluate the potential environmental impacts of a project or activity, including the use of alternative fuels and energy-efficient technologies. EIA includes a range of steps, such as screening, scoping, and mitigation, and it can help identify opportunities for reducing environmental impacts and improving sustainability.

Fuel Cell is a device that converts chemical energy into electrical energy, often using hydrogen as a fuel. Fuel cells can be used to power ships and reduce greenhouse gas emissions, and they offer a range of benefits, including high efficiency and low emissions.

Greenhouse Gas (GHG) Emissions are emissions that contribute to the greenhouse effect and climate change, including carbon dioxide, methane, and nitrous oxide. GHG emissions are a major environmental impact of shipping, and they can be reduced through a range of measures, including the use of alternative fuels and energy-efficient technologies.

IMO GHG Study is a study that aims to evaluate the greenhouse gas emissions from ships and identify opportunities for reduction. The study includes a range of metrics, such as energy efficiency and emissions,

and it provides a comprehensive overview of the environmental performance of the shipping industry.

International Convention for the Prevention of Pollution from Ships (MARPOL) is a treaty that aims to reduce the environmental impacts of shipping, including pollution from oil, chemicals, and garbage. MARPOL includes a range of regulations and standards, such as the use of double-hull tankers and the implementation of waste management plans.

Life Cycle Assessment (LCA) is a process that aims to evaluate the environmental impacts of a product or system, including the use of alternative fuels and energy-efficient technologies. LCA includes a range of steps, such as raw material extraction, manufacturing, and end-of-life disposal, and it can help identify opportunities for reducing environmental impacts and improving sustainability.

Low-Carbon Economy is an economy that is based on low-carbon energy sources and technologies, such as renewable energy and energy efficiency. A low-carbon economy can help reduce greenhouse gas emissions and mitigate the impacts of climate change, and it offers a range of benefits, including improved energy security and reduced air pollution.

Marine Debris is debris that is found in the marine environment, including plastic bags, bottles, and other waste. Marine debris can harm marine life and pollute the environment, and it can also damage ships and other marine infrastructure.

Ocean Fertilization is a process that aims to stimulate the growth of phytoplankton in the ocean, often through the addition of nutrients such as iron. Ocean fertilization can help reduce greenhouse gas emissions by sequestering carbon dioxide, and it offers a range of benefits, including improved marine productivity and biodiversity.

Port Emissions are emissions that occur in ports, including emissions from ships, trucks, and other equipment. Port emissions can contribute to air pollution and negative health impacts, particularly in coastal areas and ports, and they can be reduced through a range of measures, including the use of alternative fuels and energy-efficient technologies.

Renewable Energy Certificate (REC) is a certificate that represents the environmental benefits of one megawatt-hour of renewable energy. RECs can be traded and sold, and they can help promote the development and use of renewable energy.

Ship Recycling is the process of dismantling and recycling a ship at the end of its life. Ship recycling can help reduce waste and pollution, and it offers a range of benefits, including the recovery of valuable materials and the creation of jobs.

Sustainable Shipping is a concept that aims to reduce the environmental impacts of shipping, including greenhouse gas emissions, pollution, and waste. Sustainable shipping includes a range of measures, such as the use of alternative fuels and energy-efficient technologies, and it offers a range of benefits, including

improved energy efficiency and reduced environmental impacts.

United Nations Convention on the Law of the Sea (UNCLOS) is a treaty that aims to establish a framework for the use of the world's oceans, including the protection of the marine environment. UNCLOS includes a range of provisions, such as the protection of marine life and the prevention of pollution, and it provides a comprehensive overview of the rights and responsibilities of states in the use of the oceans.

Vessel Traffic Management (VTM) is a system that aims to manage and regulate vessel traffic, including the use of alternative routes and speeds. VTM can help reduce greenhouse gas emissions and improve safety, and it offers a range of benefits, including improved efficiency and reduced congestion.

Waste Management is the process of managing and disposing of waste, including waste from ships. Waste management includes a range of measures, such as recycling and disposal, and it can help reduce pollution and protect the environment.

Weather Routing is a process that aims to optimize the route of a ship, often to reduce fuel consumption and greenhouse gas emissions. Weather routing includes a range of measures, such as the use of weather forecasts and route optimization software, and it can help improve energy efficiency and reduce environmental impacts.

Zero-Emission Ship is a ship that produces no greenhouse gas emissions, often through the use of alternative fuels and energy-efficient technologies. Zero-emission ships can help reduce environmental impacts and improve sustainability, and they offer a range of benefits, including improved energy efficiency and reduced emissions.