An introduction to energy efficiency instruments

The ideal energy efficiency indicator should provide an objective, accurate and effective way to communicate performance.

It is common to compare home appliances by a color code and by a letter on a scale from A to F. Cars are compared by fuel consumption per mile. But when it comes to comparing different vessel types, trading patterns and transport work, things get complicated. In spite of this, the shipping industry reached a major policy milestone in July 2011, when 65 governments meeting at the United Nations' International Maritime Organisation (IMO) voted to enforce the Energy Efficiency Design Index (EEDI) standards for the global shipping fleet, marking the start of the process towards reducing emissions. Together with the Ship Energy Efficiency Management Plan (SEEMP), the EEDI will enter into force in 2013. EEDI will mandate improvements in hull design and machinery for new ships, while the SEEMP will require shipowners to have a plan for improving the operational energy efficiency of each of the ships in their existing fleet.

The EEDI has been in place on a voluntary basis since 2009, and classification societies have already verified the EEDI for a number of ships, the first of which was Hapag-Lloyd's boxship *Vienna Express*. Maersk Line received independent verification of its CO_2 emissions data, vessel by vessel, from Lloyd's Register, and Maersk is including the data as one of its eight performance measures.

But because the EEDI targets only new ships, an initiative for establishing a similar design index for existing vessels was taken by Operation Shipping Efficiency, a mission spearheaded by The Carbon War Room, a non-profit climate group co-founded by Virgin Group's Richard Branson and backed by, among others, RightShip, a ship vetting specialist. Their Existing Vessel Design Index (EVDI), hosted on http://shippingefficiency.org, calls for an objective and mandatory measure that provides sufficient commercial incentives and meets their overall goal of mitigating CO_2 emissions from international shipping.

EVDI is a beta version of a service that has no regulatory backing, yet it points to the power of easy access to the environmental performance rankings of ships. Anyone can register, get a username and password, compare the EVDI of two cruise ships and make the environmentally responsible choice as a consumer, just as when buying a dishwasher.

The brand value created for shipowners that stay ahead of the game is one of the benefits of having a common indicator. Those who lead the development of environmentally sustainable shipping industry, are likely to be rewarded by consumers – if not directly, then at least through big brand charterers who carefully optimize their entire supply chain.

EVDI visualization at http://www.shippingefficiency.org

An even more direct reward is offered by the World Ports Climate Initiative (WPCI), which is supported by 55 of the world's key ports and rates ships according to the Environmental Ship Index (ESI) and offers a reduction of port fees to those who go beyond regulatory compliance.

Between regulators, ship designers, equipment manufacturers, yards, shipowners, cargo owners and consumers, there is an endless list of parameters to compare. The creators of energy efficiency indicators face the almost impossible task of unifying the interests of these stakeholders in terms of saving the environment and using less energy. There is no single answer, but we need a simple index for effective communication. The jury is still out on who will strike the right balance between objectivity and simplicity.

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EEDI
Energy Efficiency Design Index

http://www.imo.org

In a nutshell

The EEDI is a non-prescriptive, performance-based mechanism. As long as the required energy efficiency level is attained, ship designers and builders would be free to use the most cost-efficient solutions to comply.

SEEMP
Ship Energy Efficiency Management Plan

http://www.imo.org

In a nutshell

A standard for ship-specific plans entering into force from January 2013. All ships must have a SEEMP on board before the issuance of the first IEEC.

IEEC
International Energy Efficiency Certificate

http://www.imo.org

In a nutshell

The IEEC provides shipowners with certification of compliance to new standards. For new ships, the certificate will state both the attained and required EEDI of the vessel.

EEOI
Energy Efficiency Operational Index

http://www.imo.org

In a nutshell

The EEOI is used in SEEMP and is based on vessel's actual operational data. It is designed to be a representative value of the energy efficiency of the ship operation over a period, which represents the overall trading pattern of the vessel.

EVDI
Existing Vessel Design Index

http://www.shippingefficiency.org

In a nutshell

EVDI™ was developed by RightShip and is the core measure used to calculate the RightShip GHG Emissions Rating.

ESI
Environmental Ship Index

http:// www.environmental-shipindex.org

In a nutshell

The ESI is designed to identify and reward ships that perform over and above the IMO's current international legislation. Ships that maintain ESI registration earn up to to 30 percent reduction on port dues.

Type of instrument	Method	Ship types	Regulatory status
Formula for calculating mass of CO_2 emitted per unit of transport work (metric ton-nautical mile).	The actual EEDI of a vessel is called the "attained EEDI" and is calculated based on guidelines published by the IMO. The result must be below the limit ("required EEDI") prescribed in the International Convention for the Prevention of Pollution from Ships (MARPOL).	EEDI is suitable for ship types designed to transport cargo embracing 72 percent of emissions from new ships and covering oil and gas tankers, bulk carriers, general cargo ships, refrigerated cargo carriers and container ships.	The MEPC of the IMO has made the EEDI mandatory for new ships, and the SEEMP for all ships. It has also added the requirements for survey and certification, including the format for the International Energy Efficiency Certificate (IEEC).
Type of instrument	**Method**	**Ship types**	**Regulatory status**
The SEEMP establishes a mechanism for operators to improve the energy efficiency of ships through a ship-specific plan.	Plan to be maintained on board for self-improvement.	The SEEMP can be implemented on vessels in four steps: planning, implementation, monitoring and self-evaluation and improvement.	The same as EEDI.
Type of instrument	**Method**	**Ship types**	**Regulatory status**
Certificate to be maintained on board as part of normal inspection and audit. IEEC is not connected to a survey scheme and does not have an expiry date. It is specific to each ship.	For new ships, an IEEC is issued at the vessel's initial survey, provided the EEDI has been verified and the SEEMP is on board. For existing ships, the IEEC is issued, provided the SEEMP is on board.	For vessels of 400 gross tonnage and above. The IEEC must be re-issued in the case of a major conversion.	The same as EEDI.
Type of instrument	**Method**	**Ship types**	**Regulatory status**
Formula for calculating the amount of CO_2 emitted per unit of transport work. Unlike the EEDI and EVDI™, the EEOI will change depending on how the vessel is operated and what abatement measures the owners have retrofitted.	The EEOI could provide a basis for consideration of both current performance and trends over time. One approach is to set internal performance criteria and targets based on the EEOI data.	All ships performing transport work.	The same as EEDI. Part of SEEMP.
Type of instrument	**Method**	**Ship types**	**Regulatory status**
Formula for calculating the amount of CO_2 emitted per unit of transport work similar to EEDI.	Values are calculated based on the vessel performance information. Primary sources of this data are RightShip's Ship Vetting Information System, IHS Fairplay database, classification societies and owner/ship-sourced data.	EVDI™ is designed for application with the entire fleet of existing ships.	No regulatory backing. Shippingefficiency.org has organized a call to IMO to as soon as possible apply a design index to existing ships in addition to the application of EEDI to new ships.
Type of instrument	**Method**	**Ship types**	**Regulatory status**
Credits (0 – 100) for above-baseline environmental performance regarding NO_x, SO_x and CO_2.	The ESI use is voluntary, based on shipowner's self-declaration. Upon entering an ESI port, the ship may inform the port of its participation in the ESI.The port may then apply incentives.	All ship types. The ESI score is listed for 733 ships as of June 2012.	World Ports Climate Initiative is supported by 55 ports. The ESI formula is built upon IMO's mandatory limits for NO_x and SO_x and on SEEMP for CO_2 performance.