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1. Objectives

Despite the fact that EU Transport policy focuses on Sustainable Transport, there is still some confusion amongst many stakeholders as to what this entails, and how it can be achieved in practice.

The objective of this study is to clarify the needs and challenges for sustainable transport and the role of EU polices and International/National strategies; to review the environmental impact of shipping and ongoing actions to reduce the impact, and suggest ways to accelerate the implementation of policies.

1.2 Target Stakeholders

- Policy makers in analysing policy strategies and in communicating new policy initiatives in this area
- Shippers and freight forwarders to select an appropriate set of indicators to support their decision making
- Transport operators, particularly ports and ship and logistics operators, to evaluate their practices and identify improvement options; special emphasis will be given to responsibility reporting guidelines as maritime transport appears to be lagging behind other sectors in this area

1.3 Glossary terms

Definitions of Sustainable Transport:

- Environmentally Sustainable Transportation (EST) was defined by OECD as follows: “transportation that does not endanger public health or ecosystems and meets mobility needs consistent with (a) use of renewable resources at below their rates of regeneration and (b) use of non-renewable resources at below the rates of development of renewable substitutes”¹.
- “The goal of sustainable transportation is to ensure that environment, social and economic considerations are factored into decisions affecting transportation activity.”²

¹ OECD, Environment Directorate, Environment Policy Committee, “Environmentally Sustainable Transport”, Final Report ENV/EPOC/PPC/T(97)1/FINAL; Paris 1999

² Moving on Sustainable Transportation (MOST), Transport Canada, 1999
<http://www.tc.gc.ca/programs/environment/most/menu.htm>

Definition of Green Transport

- Green corridors- the Logistics Action Plan suggests that priority should be given to the improvement of efficiency and sustainability of freight transport where pressure to do so is highest, namely in urban environments and along the major European transport corridors. The plan will help ensure that Europe's main transport routes become "green," taking account the growing safety, security and environmental concerns.

1.4 Approach

Key areas to be addressed:

1. The broader need for sustainable development
2. The sustainable transport policy perspective
3. Transport environmental impact
4. What shipping is doing
5. Ways for achieving sustainability policy goals

2. The broader needs and strategies for sustainable development

2.1 The sustainable development goals and principles

The first conference on sustainable development was held in Stockholm in 1972 where 113 nations and 500 nongovernmental organisations attended. It was the first time that “attention was drawn to the need to preserve natural habitats to produce a sustained improvement in living conditions for all, and the need for international cooperation to achieve this”. The emphasis was on solving environmental problems but without ignoring social, economic and development factors.

The World Conservation Strategy of 1980 clarified the ideas of sustainable development defined as “development improving the quality of human life while living within the carrying capacity of supporting eco-systems”. This is the kind of development that provides real improvements in the quality of human life and at the same time conserves the vitality and diversity of the Earth. The goal is development that will be sustainable which to more and more people appears as the only rational option.

The concept of sustainable development originated with the 1987 report 'Our Common Future' by the World Commission on Environment and Development (known as the Brundland Commission). Sustainable development refers to "*meeting the needs of the present without compromising the ability of future generations to meet their own needs*". Sustainable development emphasise intergenerational responsibilities and the need for multi-stakeholder coalitions to create the conditions for better quality of life for everyone, now and for future generations.

The Brundland Report in 1987 provided a detailed analysis of sustainable development and alerted the world to the urgency of making progress toward economic development that could be sustained without the destruction of natural resources or the harming of the environment.

The report highlighted three main components to sustainable development:

- environmental protection;
- economic growth;
- social equity.

In 1992 [the 'Earth Summit'](#) (UN Conference on Environment and Development) in Rio de Janeiro agreed the Rio Declaration setting out 27 principles supporting sustainable development, a plan of action ([Agenda 21](#)) and a recommendation that all countries should produce national sustainable development strategies.

The UN Division for Sustainable Development (DSD) is an authoritative source of expertise and information within the United Nations system on sustainable development³.

Creating a sustainable future, economically, socially and environmentally requires governments, society, corporations and individuals to rethink their expectations, their responsibilities and their interactions.

It is nowadays accepted that we are all part of a complex dynamic system whose sustainable development is dependent on establishing a responsible global partnership between governments, companies and people. Such a global partnership should strive *towards growth with equity whilst preserving the integrity of the environment and natural resources for future generations*. This mandates a development process in which the use of natural resources, the directing of investments at national and corporate levels, the orientation of technological

³ <http://www.un.org/esa/dsd/index.shtml>

developments and international co-operation must converge to create conditions for better satisfying human needs and aspirations now and in the future.

2.2 Sustainable development support approaches

It is recognised that sustainable development poses a challenge to the balance of responsibilities between governments, companies, non government organisations and individuals. To achieve sustainable development the main priorities lie with:

- Governments that need to set policies and strategies to mobilise the required actions
- Corporate organizations to put in place sustainable development initiatives

The role of international organisations such as UN in setting the agenda and EU policy to reinforce the urgency for action could not be overemphasized.

2.2.1 The role of Governments in sustainable development

Chapter 8 of Agenda 21 (Rio declaration) calls on countries to adopt National Sustainable Development Strategies (NSDS) that “should build upon and harmonize the various sectoral economic, social and environmental policies and plans that are operating in the country.”

In 2002, the World Summit for Sustainable Development (WSSD) urged global States not only to “take immediate steps to make progress in the formulation and elaboration of national strategies for sustainable development” but also to “begin their implementation by 2005.”

Governments are expected to formulate policies and invest in infrastructure that stimulates sustainable growth and to be directly responsible for supporting sustainable development through fiscal, energy, transport, urban development and other policies. Governments have also the main responsibility in creating awareness and transparency on sustainability issues, promoting knowledge sharing and innovation. Government sustainability strategies have already been formulated in many countries (for example the UK publishes its strategy with regular updates⁴) to address sustainability issues including climate change focusing on high impact sectors such as power generation and transport. Progress in national strategies is monitored / reported by nssd.net⁵

⁴ <http://www.defra.gov.uk/sustainable/government/>

⁵ <http://www.nssd.net/>

2.2.2 Corporate sustainability and corporate responsibility

Corporate Sustainability can be regarded as the corporate response to sustainable development represented by business strategies and practices that address the key issues for the world's sustainable development.

“Corporate sustainability means that your service or product does not compete in the marketplace only in terms of its superior image, power, speed, packaging, etc. Additionally, your business must deliver products or services to the customer in a way that reduces consumption, energy use, distribution costs, economic concentration, soil erosion, atmospheric pollution, and other forms of environmental damage.”⁶

Corporate sustainability is about companies contributing effectively to a global partnership for sustainable development. It is about companies delivering wide societal value including support for health and human rights improvements, regional development and fair globalisation and respecting the environment by promoting technologies to reduce the emission of greenhouse gases and by implementing effective environmental risk management systems.

Corporate sustainability is linked to the corporate social responsibility movement.

Corporate Social Responsibility (CSR) is generally understood to be the way a company balances the economic, environmental and social aspects of its operation, addressing the expectations of its stakeholders.

Since the 1990s, the CSR movement gained prominence in the political-economic debate and in the strategies of leading business organisations. CSR stressed corporate self-regulation associated with ethical issues, human rights, health and safety, environmental protection and social and environmental reporting and voluntary initiatives involving support for community projects and philanthropy

The fundamental CSR, sustainability and governance goals and principles are summarised in the following:

- United Nations Global Compact principles (www.unglobalcompact.org)
- the United Nations Millennium Development Goals (www.un.org/millenniumgoals)
- the United Nations Norms on Human Rights
- the OECD Principles of Corporate Governance - 2004⁷.

⁶ P Hawken ‘The Ecology of Commerce: A Declaration of Sustainability’ 1993 HarperBusiness

⁷ <http://www.oecd.org/dataoecd/32/18/31557724.pdf>

The areas addressed are:

- Human Rights
- Labour Standards
- Environment
- Health
- Anti-Corruption
- Economic responsibility
- Corporate Governance

Corporate Responsibility and Sustainability Goals and Principles			
	Global Compact	The Millennium development Goals	The 'United Nations Norms on Human Rights'
Human Rights	<p>Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights;</p> <p>Principle 2: Make sure that they are not complicit in human rights abuses.</p>	<p>Goal 1 Eradicate extreme poverty and hunger;</p> <p>Goal 2 Achieve universal primary education;</p> <p>Goal 3 Promote gender equality and empower women.</p>	<p>B. Right to equal opportunity and non-discriminatory treatment;</p> <p>C. Right to security of persons;</p> <p>E. Respect for national sovereignty and human rights.</p>
Labour Standards	<p>Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;</p> <p>Principle 4: The elimination of all forms of forced and compulsory labour;</p> <p>Principle 5: The effective abolition of child labour;</p> <p>Principle 6: The elimination of employment discrimination.</p>		<p>D. Rights of workers.</p>
Environment	<p>Principle 7: Businesses should support a precautionary approach to environmental challenges;</p> <p>Principle 8: Undertake initiatives to promote greater environmental responsibility;</p> <p>Principle 9: Encourage the development and diffusion of environmentally friendly technologies.</p>	<p>Goal 7: Ensure environmental sustainability.</p>	<p>G. Obligations with regard to environmental protection.</p>
Anti-Corruption	<p>Principle 10: Businesses should work against all forms of corruption, including extortion and bribery.</p>		
Health		<p>Goal 4 Reduce child mortality;</p> <p>Goal 5 Improve maternal health;</p> <p>Goal 6 Combat HIV/AIDS, malaria, and other diseases.</p>	
Economic responsibility		<p>Goal 8 Develop a global partnership for development.</p>	<p>F. Obligations with regard to consumer protection.</p>
OECD Principles of Corporate Governance - 2004			
<ul style="list-style-type: none"> • Ensuring the Basis for an Effective Corporate Governance Framework • The Rights of Shareholders and Key Ownership Functions • The Equitable Treatment of Shareholders • The Role of Stakeholders in Corporate Governance • Disclosure and Transparency • The Responsibilities of the Board 			

2.2.3 Sustainability related indicators

Sustainability related indicators have been developed to measure progress associated with national sustainable development strategies and for corporate sustainability.

Sustainable Development indicators

The United Nations' Commission on Sustainable Development (CSD) has defined a working list of [sustainability indicators](#) from which countries can choose indicators according to national priorities, problems and targets.

The Environmental Sustainability Index (ESI)⁸ provides a useful source of data. ESI is a measure of overall progress towards environmental sustainability developed for 122 countries. A high ESI ranking indicates that a country has achieved a higher level of environmental sustainability than most other countries and a low ESI ranking signals that a country is facing problems in achieving environmental sustainability along multiple dimensions.

The Environmental Sustainability Index (ESI) benchmarks the ability of nations to protect the environment over the next several decades. It does so by integrating 76 data sets – tracking natural resource endowments, past and present pollution levels, environmental management efforts, and the capacity of a society to improve its environmental performance – into 21 indicators of environmental sustainability.

These indicators permit comparison across a range of issues that fall into the following five broad categories:

- Environmental Systems
- Reducing Environmental Stresses
- Reducing Human Vulnerability to Environmental Stresses
- Societal and Institutional Capacity to Respond to Environmental Challenges
- Global Stewardship

Corporate Responsibility indicators and reporting standards

Corporate sustainability indicators have been mainly developed for sustainable development and by Sustainable Responsibility Indicators (SRI) indexes to evaluate corporate responsibility performance.

⁸ <http://www.yale.edu/esi/>

Reporting standards have been developed, notably GRI (Global Reporting Initiative) and AA1000 (more detail needed) and should provide in the future the definitive set of indicators for benchmarking purposes. Additionally, the International Standards Organisation (ISO) is developing the *ISO 2600 Social Responsibility* standard, aimed to provide practical guidance to a wide variety of organisations on a range of methods and options for implementing social responsibility.

The Dow Jones Sustainability Index assessment approach

The Dow Jones Sustainability Index approach, summarised in the following table, represents a practical way to highlight key sustainability performance areas measured through questionnaire-based techniques and weighted to provide overall sustainability ratings. The criteria reflect organisational design, processes and outputs.

The Corporate Sustainability Assessment Criteria of Dow Jones Sustainability Indexes		
D	Criteria	W(%)
Economic	Codes of Conduct / Compliance / Corruption & Bribery	4.2
	Corporate Governance	4.2
	Scorecards / Measurement Systems	4.2
	Strategic Planning	4.2
	Customer Relationship Management	3.0
	Investor Relations	3.6
Environment	Risk & Crisis Management	4.2
	Environmental Policy / Management	4.8
	Environmental Reporting*	3.6
	Environmental Performance (Eco-Efficiency)	1.8
Social	Labour Practice Indicators	3.0
	Social Reporting*	1.8
	Standards for Suppliers	2.4
	Corporate Citizenship/ Philanthropy	2.4
	Stakeholders Engagement	3.6
	Human Capital Development	3.0
	Knowledge Management/ Organizational Learning	3.0
Talent Attraction & Retention	3.0	

D: Dimension, W: Weighting Each dimension includes sector specific criteria

The FTSE4Good approach

For inclusion in the FTSE4Good Indexes, eligible companies must meet criteria requirements in three areas:

- working towards environmental sustainability;
- developing positive relationships with stakeholders;
- up-holding and supporting universal human rights.

Interesting features include:

- evolving selection criteria to reflect changes in globally accepted corporate responsibility standards;
- higher impact companies have to meet higher standards;
- criteria covering policies, management system and reporting.

GRI Reporting standard

The Global Reporting Initiative (GRI) is a network-based organization that has pioneered the development of the world’s most widely used sustainability reporting framework and is committed to its continuous improvement and application worldwide.

The [Reporting Framework](#) provides guidance on how organizations can disclose their sustainability performance. [The Guidelines \(“G3”\)](#) are the foundation of the Framework. The Framework is applicable to organizations of any size, constituency or location, and has been used already by many hundred organizations around the world as the basis of their sustainability reporting.

An integrated perspective between sustainable development and corporate sustainability

Despite the obvious interrelationship between sustainability issues at global/national/sector level and corporate level as yet there are no serious attempts to link the two together. This effectively undermines both the national sustainability policies and strategies and reduces the potential impact of the corporate sustainability movement.

An integrated perspective between sustainable development and corporate sustainability is shown in the following diagram. (*Reference CSRQuest project – www.csrquest.net*)



The approach highlights the following aspects:

- harmonisation of corporate strategies with national sustainability strategies;
- harmonisation of sustainability indicators measuring the impact of national and international policies with corporate sustainability criteria;
- establishing feedback loops from corporate sustainability performance and best practices to corporate strategy and to the broader sustainable development goals and action plans.

2.3 European sustainable development strategy

The EU's Sustainable Development Strategy (SDS) was originally adopted at the European Council in Gothenburg in 2001 and extended by the European Council in Barcelona.

However one of the main issues of the EU's sustainable development strategy is its relationship with the Lisbon agenda for growth and jobs⁹. The EU's competitiveness agenda implies that the first requirement is economic growth to enable the EU to tackle environmental and social protection.

The Renewed EU Sustainable development strategy adopted by the EU heads of state and government on 16 June 2006 starts from the need for synergies between the SDS and the Lisbon agenda but remains ambiguous in its formulation. However, the need for better regulation and full integration of SDS in all policies is emphasised and identifies seven key challenges with corresponding targets and actions (most of which are repetitions of targets already defined in other policy papers):

- climate change and clean energy
- sustainable transport
- sustainable consumption and production
- conservation and management of natural resources
- public health
- social inclusion, demography and migration
- global poverty and global sustainable development challenges

⁹ The Lisbon strategy to make the EU "the most dynamic and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion, and respect for the environment by 2010" was adopted by the European Council in 2000. It was re-launched in 05 and updated 08 - <http://www.euractiv.com/en/innovation/growth-jobs-relaunch-lisbon-strategy>

In response to the recent economic and financial crisis, in November 2008, the Commission launched a major Recovery Plan for growth and jobs¹⁰. The Recovery Plan also includes proposals for smart investment in tomorrow's skills and technologies to help yield higher economic growth and sustainable prosperity in the longer term. It recognises that measures to support the real economy should be compatible with long-term sustainability goals aimed at developing a dynamic low-carbon and resource-efficient, knowledge-based, socially inclusive society, and promoting this approach globally.

The Recovery Plan and the corresponding national plans already contain a number of initiatives in support of this objective. Work to overcome the crisis is ongoing, in particular in the context of the Lisbon Strategy for growth and jobs, with a *focus on green growth*. In the short term, green measures help to revive the economy and create jobs. In the medium and long term, they also stimulate new technologies and reduce our impact on climate change, the depletion of natural resources and the degradation of ecosystems.

Sustainable transport policies, covering air, land and sea, require intricate reconciliation between apparently conflicting objectives: strong economic growth and detrimental environmental and health impacts. In this regard, there is an urgent need to simultaneously address social, economic, and environmental issues of transport planning by integrating transport policy with land-use and waterways? planning and environmental policy. A successful implementation of such an integrated transport planning has been recognized as an essential pre-condition of sustainable mobility across Europe. However key ongoing challenges include:

- lack of clearly defined integration and sustainability targets
- confusion about the measures to be taken
- lack of clear and resourced responsibilities enhanced by divided institutional responsibilities and organisational changes

Comment: In July 2009 the Commission adopted the [2009 Review of EU SDS](#) -- Reference: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - Mainstreaming sustainable development into EU policies : 2009 Review of the European Union Strategy for Sustainable Development, COM/2009/0400 final

¹⁰ Recovery Plan COM(2008) 800, 26.11.2008 and COM(2009) 114, 4.3.2009, Employment Communication COM (2009)257, 3.6.2009 and Communication "Cohesion policy: investing in the real economy", COM(2008) 876, 16.12.2008.

3. Sustainable Transportation

3.1 Goals and principles

Sustainable transport has been defined in the following three ways:

1) *Environmentally Sustainable Transportation (EST)* was defined by OECD as it follows:

“transportation that does not endanger public health or ecosystems and meets mobility needs consistent with (a) use of renewable resources at below their rates of regeneration and (b) use of non-renewable resources at below the rates of development of renewable substitutes”¹¹.

2) The way to making progress in achieving sustainable transportation is to ensure that environmental, social and economic considerations are factored into decisions affecting transportation activity¹².

3) A *sustainable transportation system* is one that¹³:

- Allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations.
- Is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy.
- Limits emissions and waste within the planet’s ability to absorb them, minimizes consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, reuses and recycles its components, and minimizes the use of land and the production of noise.

By clarifying the definition of sustainable transport as aimed to *balance the interests of the broader set of stakeholders involved in multimodal transport chains*, the measurable impact of sustainable transport can be defined across economic, social and environmental dimensions as follows:

¹¹ OECD, Environment Directorate, Environment Policy Committee, “Environmentally Sustainable Transport”, Final Report ENV/EPOC/PPC/T(97)1/FINAL; Paris 1999

¹² Moving on Sustainable Transportation (MOST), Transport Canada, 1999
<http://www.tc.gc.ca/programs/environment/most/menu.htm>

¹³ Todd Litman, “Developing Indicators for Comprehensive and Sustainable Transport Planning”, Victoria Transport Policy Institute (4/2/2008)

- *Economic impact:* improved efficiency of multimodal transport chains based on innovative transportation and logistics services, development of 'human capital', stakeholder engagement in sustainable wealth creation processes at global, European, national and local levels and participation in the management of the effects of globalisation.
- *Social impact:* improved mobility and accessibility to transport services meeting high standards for quality, safety and security, improved labour standards and working conditions, increased interregional trade by means of efficient and low cost transport services and enhancing quality of life in coastal regions
- *Environmental impact:* the impact of transport operations on environmental degradation including related emissions, energy consumption and waste.

3.2 EU policies and strategies for sustainable surface transport (rail, road and waterborne)

EU policy for Sustainable Transport¹⁴ includes:

1. *The greening of surface transport:* reduction of environmental and noise pollution, including green house gases through technological and socio-economic means; development of clean and efficient engines and power-trains, including hybrid technology and the use of alternative fuels for transport applications in particular hydrogen and fuel cells, taking account cost-efficiency and energy-efficiency considerations; end of life strategies for vehicles and vessels.
2. *Encouraging and increasing co-modality and decongesting transport corridors:* development of sustainable, innovative, intermodal and interoperable regional and national transport and logistics networks, infrastructures and systems in Europe; cost internalisation; information exchange between vehicle/vessel and transport infrastructure; optimisation of infrastructure capacity; optimal use of modes individually or in combination (co-modality) to encourage energy efficient means of transport.
3. *Ensuring sustainable and accessible urban mobility* for all citizens including the disadvantaged: innovative organisation schemes, including clean and safe vehicles and non-polluting means of transport with lower levels of pollution, new high quality public transportation modes and rationalisation of private transport, communication

¹⁴ "Keep Europe moving – Sustainable mobility for our Continent" (COM 2006, 314)

infrastructure, integrated town planning and transport including their relationship with growth and employment.

4. *Improving safety and security* in the design and operation of vehicles, vessels, infrastructures and within the total transport system.
5. *Strengthening competitiveness*: improvement of design processes; development of advanced power-train and vehicle and vessel technologies; innovative and cost-effective production systems and infrastructure construction; integrative architectures.

The above are reflected in the policy goals and actions summarised in the [SKEMA Policy Index](#).

The Communication "A sustainable future for transport: Towards an integrated, technology-led and user friendly system" adopted by the Commission on 17 June 2009 indicates that with respect to the goals of the EU SDS, as indicated in the progress report of 2007¹⁵, *the European transport system is still not on a sustainable path on several aspects*. In other words we are not achieving the necessary progress towards the sustainable transport targets in reducing emissions.

It is acknowledged that marine pollution and maritime accidents have considerably reduced and the EU has established one of the most advanced regulatory frameworks for safety and for pollution prevention (lastly with the third Maritime Safety Package¹⁶). Also, transport policy has been strengthened with respect to transport employment conditions (legislation on working time, minimum level of training, mutual recognition of qualifications).

The communication accepts that '*the environment remains the main policy area where further improvements are necessary*'. The transport sector has greatly increased its activity while making insufficient progress in reducing its energy and greenhouse gas (GHG) emissions which grew more than any other sector compared to 1990 levels.

¹⁵ COM(2007) 642. COMMUNICATION FROM THE COMMISSION TO THE COUNCIL. AND THE EUROPEAN PARLIAMENT. Progress Report on the Sustainable Development Strategy ...

¹⁶ On 11 March 2009, the third maritime safety package has been adopted by the European Parliament. http://ec.europa.eu/transport/maritime/index_en.htm

3.3 Transport impact

3.3.1 Targets for sustainable transport

Essentially Environmentally Sustainable Transport means achieving targets for environmental criteria associated with health and climate protection. Particularly significant reductions are needed for the following criteria compared to 1990 levels as specified in the following table¹⁷.

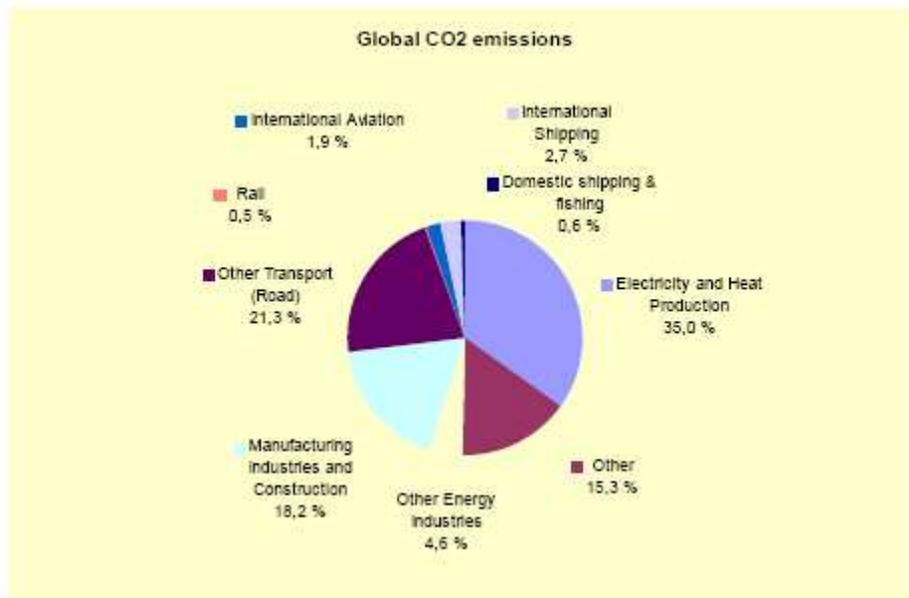
- Noise
- Air quality
- Acidification
- Climate protection

Noise	noise sources	-75%
Air quality	NOx	-50%
	PM	-99%
Acidification	SOx	-75%
Climate protection	GHG/ CO ₂	-50%

Based on scenarios for 2030

3.3.2 Shipping CO2 output and trends

Globally, shipping has been estimated to account for between 1.8% and 3.5% of global carbon dioxide emissions¹⁸ as shown also in the diagram below.



¹⁷ OECD Guidelines towards sustainable transport 2002

¹⁸ CE Delft (2007), Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive

The CO₂ emissions for international shipping was of the order of 850 million tonnes CO₂ in 2007 as shown in the following table.

	Low bound	Consensus	High bound
Total shipping emissions (activity based)	854	1190	1224
Total less fishing (activity based)	796	954	1150
IEA domestic shipping	111	111	111
International shipping (hybrid estimate)	685	843	1039

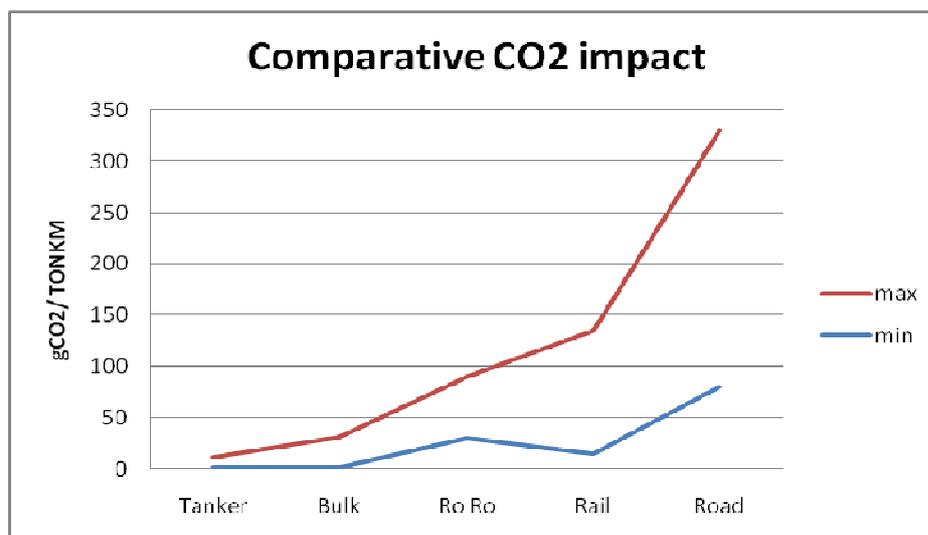
Consensus estimate: 843 million tonnes CO₂ = 2.7%

With reference to the following table shipping total CO₂ output is higher than that from aviation and approximately half that from road transport.

Mode	million tones CO ₂
Rail	100
Aviation	800
Shipping	950
Road	1950

Carbon dioxide emissions from ships do not come under the Kyoto agreement or any proposed European legislation but the significance of the quantities produced raises concerns regarding sustainable transport targets. (But see comments under ‘Regulatory initiatives from IMO’ on Page 26)

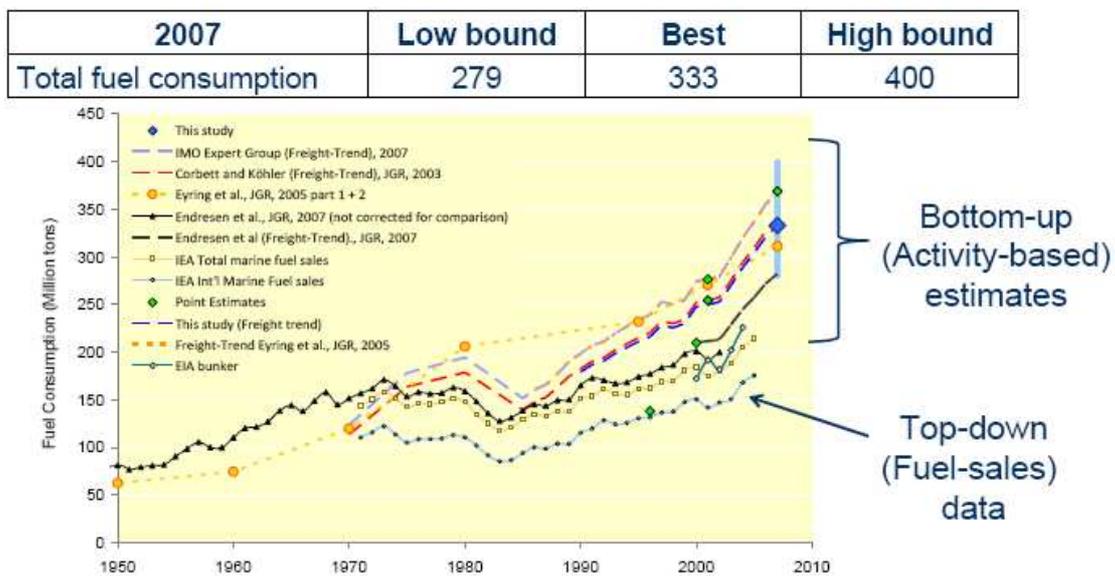
Shipping is a very fuel efficient way for moving bulk freight and remains the lowest carbon mode of transport for long distance movement of freight on a per tonne basis as shown in the following diagram. It should be also pointed out that rail is also a ‘low carbon’ mode and in fact lower than high speed Ro-Ro vessels.



Source IMO

The relationship between fuel consumption and the amount of CO₂ emitted has been the subject of several studies and the most accepted figure is 3.17 tonne of CO₂ per tonne of fuel used. (Reference Ship Emissions Study, National Technical University of Athens, Laboratory of Maritime Transport, prepared for Hellenic Chamber of Shipping, May 2008).

Despite the relatively good CO₂ performance of shipping compared to other forms of transport, the problem is that maritime transport energy consumption has been increasing as shown in the following diagram due to the increase in transport demand, which means that GHG emissions and other air pollutants have increased steadily over the last ten years.



Source: IMO (2008) – graph from ‘The Role of Shipping in Green Logistics’ K Cullinane –IAME 2009

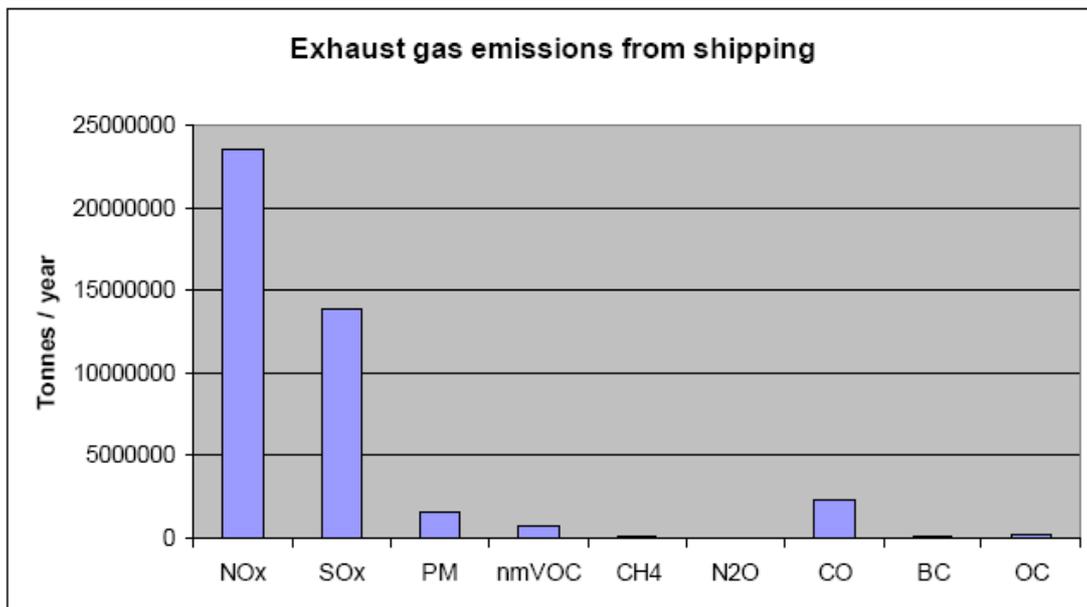
According to Communication "A sustainable future for transport: Towards an integrated, technology-led and user friendly system", the GHG emissions can be seen as the product of three components: the amount of the activity that generates the emissions; the energy intensity of that activity; and the GHG intensity of the energy that is being used. Applying this analysis to past developments in transport, the communication indicates that the sector has greatly increased its activity while making insufficient progress in reducing its energy and GHG intensity.

Decoupling transport growth from GDP growth, which was one of the objectives of the 2001 White Paper and of the SDS was not achieved in freight transport primarily due to the strong increase in global trade and the deepening integration of the enlarged EU. The growth of freight transport is also linked to economic practices – concentration of production in fewer sites to reap economies of scale, de-localisation, just-in-time deliveries, wide-spread

recycling of glass, paper, metals – that allowed reduction of costs and, possibly, of emissions in other sectors at the expense of higher emissions from transport. Further, transport did not reduce significantly its GHG intensity by switching to cleaner energy sources and still depends to 97% on fossil fuels.

3.3.3 Shipping NOx, SOx and other emissions

Estimates from other shipping emissions are shown below



Source: Marintek (2008)

Key concerns relate to:

- SOx. Sulphur content (by mass) in fossil fuels is directly related to the formation of sulphur oxides in the funnel. Excess SOx causes acidification and affects human health. The scale of the effect is regional with increased levels of SO2 near major ports.
- NOx. High temperatures in the engine room are responsible for the formation of nitrogen oxide. Excess NOx causes acidification, eutrophication, ground level ozone, aerosol formation and health problems. The scale of the effect is regional.
- Particles (PM). Human health risks and acid rain. The scale of the effect is regional and local. A recent study estimating premature deaths around the world resulting from particulate matter (“PM”) air pollution from international shipping. This study is the

first scientific analysis to demonstrate that international shipping emissions have significant global impacts on human health. It was released on the Internet on 5 November 2007 by the American Chemical Society journal *Environmental Science & Technology*.

3.4 Current approaches for addressing maritime sustainability issues

Current approaches for addressing sustainability issues can be subdivided into two categories:

1. Regulatory initiatives from IMO and EU directives
2. Business efforts to provide improved environmental performance

3.4.1 Regulatory initiatives

Regulatory initiatives from IMO

IMO is developing a mandatory regime to control greenhouse gas (GHG) emissions from international shipping. The first inter-sessional meeting of IMO's Working Group on Greenhouse Gas Emissions from Ships was held in Oslo, Norway (23 to 27 June 2008). IMO is working to have measures in place to control GHG emissions before the first commitment period under the Kyoto Protocol expires at the end of 2011¹⁹.

The measures under consideration are:

1. *Mandatory CO2 Design Index*

The design index will contain a required minimum level of fuel efficiency related to a baseline, which will be established based on fuel efficiency for ships delivered between 1995 and 2005.

2. *Interim CO2 operational index*

1. The interim CO2 operational index, adopted by the IMO Marine Environment Protection Committee (MEPC) in the 53 session in July 2005, has been used to establish a common approach for trials on voluntary CO2 emission indexing, enabling ship-owners and operators to evaluate the performance of their fleet with regard to CO2 emissions. As the amount of CO2 emitted from a ship is directly related to the consumption of fuel oil, CO2 indexing also provides useful information on a ship's performance with regard to fuel efficiency.

¹⁹ Under the Kyoto Protocol, industrialized countries agreed to reduce their collective green house gas (GHG) emissions by 5.2% from the level in 1990.

The FLAGSHIP project has been developing Business models to 'Operate ships sustainability' exploiting the ideas of linking fuel efficiency with the CO2 operational index (<http://www.flagship.be>)

3. *Economic instruments with GHG-reduction potential*

The Oslo meeting had a thorough and in-depth discussion related to the further development of different economic instruments with GHG-reduction potential including, inter alia, a global levy on fuel used by international shipping and the possible introduction of emission trading schemes for ships. Proposals for both open emission trading schemes, where ships will be required to purchase allowances in an open market in line with power stations or steel mills, and closed schemes, where the trading will only be among ships, were considered.

Revised regulations on ship emissions

The Marine Environment Protection Committee (MEPC) of the International Maritime Organization (IMO) has approved proposed amendments to the MARPOL Annex VI regulations to reduce harmful emissions from ships.

The main changes would see a progressive reduction in sulphur oxide (SO_x) emissions from ships, with the global sulphur cap reduced initially to 3.50% (from the current 4.50%, effective from 1 January 2012; then progressively to 0.50 %, effective from 1 January 2020, subject to a feasibility review to be completed no later than 2018.

The limits applicable in Sulphur Emission Control Areas (SECAs) would be reduced to 1.00%, beginning on 1 March 2010 (from the current 1.50 %); being further reduced to 0.10 % , effective from 1 January 2015.

Progressive reductions in nitrogen oxide (NO_x) emissions from marine engines have also been agreed, with the most stringent controls on so-called "Tier III" engines, i.e. those installed on ships constructed on or after 1 January 2016, operating in Emission Control Areas.

The revised Annex VI will allow for an Emission Control Area to be designated for SO_x and particulate matter, or NO_x, or all three types of emissions from ships, subject to a proposal from a Party or Parties to the Annex which would be considered for adoption by the Organization, if supported by a demonstrated need to prevent, reduce and control one or all

three of those emissions from ships.

In the current Annex VI, there are two SECAs designated, namely, the Baltic Sea and the North Sea area, which also includes the English Channel.

It is worth mentioning that attention is now focusing on *reduction of ships emissions in ports*²⁰. The U.S. Environmental Protection Agency (EPA) has established its intent to reduce air emissions from industrial and land transportation sources, by launching a [campaign to improve air quality at major port areas](#).

EPA recently announced plans to create a 230-mile enforcement zone around most of the nation's coastline where [regulators would enforce air emissions standards](#) around major port areas. The regulations would primarily target large commercial ships and would apply to both U.S. and internationally-chartered vessels.

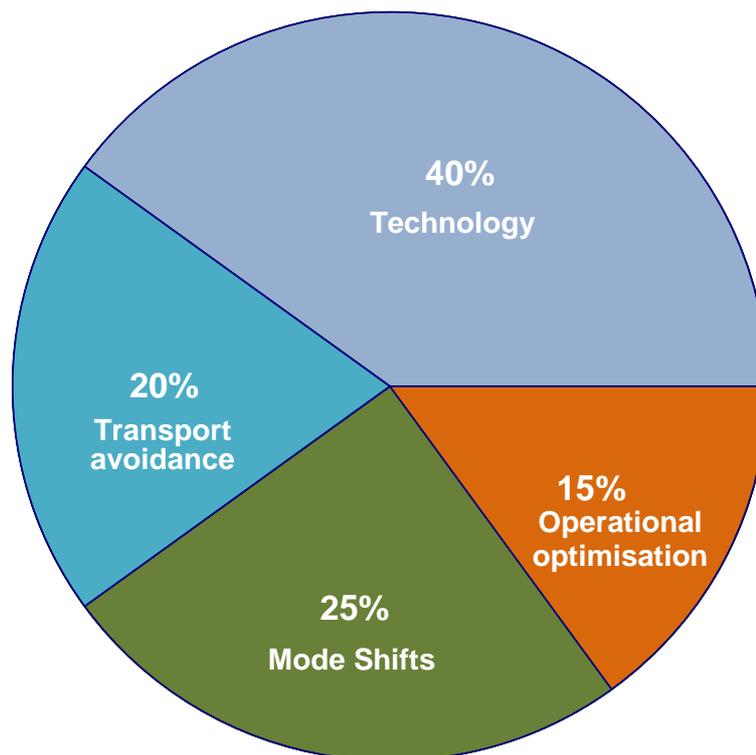
²⁰ On July 17, 2009, the joint proposal from the United States and Canada to amend MARPOL Annex VI to designate specific areas of our coastal waters as an Emission Control Area (ECA), was accepted in principle at the International Maritime Organization (IMO). In addition, France has joined the ECA proposal on behalf of its island territories of Saint-Pierre and Miquelon, which form an archipelago off the coast of Newfoundland. The proposal will circulate among member states for six months. In March 2010, member states who are parties to MARPOL Annex VI will vote to adopt an amendment designating the North American ECA.

3.4.2 Business initiatives

There are a number of routes to reduce the environmental impact from maritime transport which can be summarized as described in the following diagram. An estimate of the potential contribution of each method is given but these estimates are only indicative.

The consensus is that technological innovation is likely to provide the larger contribution. There is also significant scope to improve transport sustainability by optimising the use of modes singly or in combination and optimising operational practices.

Transport avoidance by changes associated with responsible supply chains and responsible consumer attitudes are regarded by many as the most important method to achieve sustainable development targets. However progress could be slow although undoubtedly signs are that the 'responsibility' movement is gaining ground.



Potential Contribution of Measures to achievement of Sustainable maritime transport goals

New technologies

Probably the larger potential is from new technologies aimed to increase simultaneously efficiency and sustainability performance including:

1. *Ship design developments:*
 - a. Long Lifetime Design to increase the useful life of ships and reduce degradation effects
 - b. Efficient hull forms and propellers
 - c. Designs to promote intermodal transport services.
2. *Propulsion technology developments:*
 - a. Alternative energy sources particularly fuel cells
 - b. Diesel engine developments particularly from increased electronic control of engine processes
 - c. Advanced propulsion systems including Hybrid Propulsion Systems, Podded Propulsion, All Electric Ship, Wind Assisted Ships and Shore-side Power Supplies

Additionally environmental ship technologies are expected to deliver improvements in shipping impact with reference to:

- Emissions
- Water pollution
- Ecosystem effects
- Scrapping effects

Enhanced ship operation processes

Improved ship shore communications, and ICT technologies offer the potential of optimised planning for ship and fleet operations and importantly to monitor and control operational parameters to achieve both economic and environmental performance targets.

The fuel consumption and emissions of most propulsion engines deteriorate rapidly outside a range of loading conditions or when engines are not properly maintained. Consequently, optimising processes for fleet scheduling, ship maintenance and purchasing spare parts can result in substantial economic gains and reduction in emissions.

Mode shifts

Mode shifts translates to co-modality- optimal use of all modes of transport singly and in combination.

Modal shift from road to waterborne and rail has been a major objective of the EU as well as the USA freight transport policy, in the interest of reducing the load on the environment, freeing up road capacity and supporting sustainable development. Despite this, apart from very specific niches there has been less change in the market shares of rail, inland waterways or short sea, than was expected in Europe. Until now, companies have shown to be reluctant to consider major changes in the way they run their transport processes.

The new concepts of “co-modality” opens up new possibilities to study modal shift at a company, regional, national or continent level. Particularly in Europe key drivers to expand short sea shipping are:

- Improved integration of SSS in multi-modal, logistic transport chains
- Elimination of barriers to the efficient operation of short sea shipping

4. Recommendations for the development of sustainable maritime transport *in the EU?*

4.1 Key Influence Factors

The factors which influence the pathways of sustainability related progress in various sectors are:

- Convergence and strength of EU and national Sustainable Development strategies and sector specific policies
- Balanced use of regulation and corporate responsibility

4.2 The policy perspective

A cursory examination of national SD strategies across EU States would indicate slow progress and possibly less so in specific sectors such as the maritime transport which is primarily concerned with international trade.

On the other hand the EU transport policy has embraced sustainability concepts and has placed sustainability issues at the heart of its programme. The crucial point is, however, how well the EU sustainable transport policy will be implemented.

The first phase of policy implementation, targeting increased awareness and knowledge sharing is underway.

However, implementation success is critically dependent on stakeholder engagement across the maritime transport sector. For this, it will be necessary to establish practical means of engaging stakeholders in the development of sustainable maritime transport. Such practical instruments include:

- Focus on developing green corridors emphasising business benefits
- Alignment of policy actions such as e-Freight and e-Maritime to address sustainability goals
- Monitoring outcomes in a highly transparent way and refining strategies

4.2.1 Focus on developing green corridors

The Logistics Action Plan²¹ suggests that priority should be given to the improvement of efficiency and sustainability of freight transport where pressure to do so is highest, namely in urban environments and along the major European transport corridors.

Transport corridors denote concentration of freight traffic between major hubs and relatively long distances of transport. Along these corridors co-modality supported by advanced technology could accommodate rising traffic volumes while promoting environmental sustainability and energy efficiency.

Green transport corridors should reflect an integrated transport concept where short sea shipping, rail, inland waterways and road will complement each other to enable the choice of environmentally friendly transport. Initially green corridors could be used to demonstrate both business and environmental benefits which will promote wider participation in business initiatives to ensure that Europe's main transport routes become "green".

Already the Marco Polo programme and TEN-T guidelines on the development and the integration of multimodal transport chains is creating progress in this area. Possibly increased visibility on what has been achieved, the key ongoing projects would facilitate accelerated developments.

²¹ Freight Transport Logistics Action Plan COM(2007) 607 final

4.2.2 Directing e-Freight and e-Maritime to address sustainable goals

European initiatives in e-Freight and e-Maritime could play a key role in enabling the realization of sustainability goals by:

- enabling maritime transport stakeholders to integrate their processes and systems to improve competitiveness
- facilitating selection of environmental options from shippers and freight forwarders
- creating transparency to the carbon footprint for freight transport along different routes and modes
- providing monitoring and decision support for security, safety and environmental risk management both at business, national and EU levels
- help monitor the impact of sustainable transport policies at national and EU levels.

4.2.3 Monitoring and benchmarking sustainability performance

In the framework of the Third Maritime Safety package (*Reference?*), the Council and the European Parliament have agreed to a modification of Directive 2002/59/EC establishing a Community vessel traffic monitoring and information system (the "VTM Directive").

One of the main objectives of the amended Directive is to guarantee that all Member States will be interconnected via the Community maritime information exchange system SafeSeaNet (SSN)²², in order to obtain a complete overview of the movements of ships and dangerous or polluting cargoes in European waters. SSN is the EU platform for maritime data exchange and therefore could play a major role in facilitating co-operation between EU states not only on safety and security matters but also on monitoring and benchmarking sustainability performance initially with specific reference to developing 'green corridors'.

²² SafeSeaNet aims at the collection, storage and exchange of information for the purpose of maritime safety, port and maritime security, marine environment protection and the efficiency of maritime traffic and maritime transport. (<https://extranet.emsa.europa.eu/>)

4.3 The corporate responsibility perspective

4.3.1 Overall trends

Since the 1990s, the Corporate Social Responsibility (CSR) is seen as a way for *corporate self-regulation* involving, codes of conduct, improvements in occupational health and safety, environmental protection and social and environmental reporting.

The CSR and corporate sustainability movements are building momentum during the last decade with the support from governments and the investment community through Socially Responsible Investing (SRI)²³ and associated corporate sustainability indexes.

It is generally accepted that businesses are doing more than ever before in guarding against ethical compromises, recognising their social and environmental responsibilities, creating enhanced governance transparency and becoming more accountable to their stakeholders.

However today, only a handful of companies have made corporate sustainability their business philosophy. There are also many companies that have adopted in name only corporate responsibility strategies ..

Corporate responsibility is not practiced in any serious form in the shipping sector possibly because none of the key drivers are applicable. One of the strongest drivers for corporate responsibility is the preference of investors for 'responsible' companies which can increase share value. As public companies in shipping are a small minority, unfortunately this has little influence.

4.3.2 The Role of Ecoports

Possibly the crucial benefit for companies adopting CSR or corporate sustainability is preservation of their social licence to operate through enhanced reputation and social capital. Again the international nature of shipping business means that social licence to operate is not needed except in liner trades. However, this is an important driver for ports which have shown a stronger propensity for corporate responsibility. Ports have traditionally strong ties with their local communities and indeed they have developed the concept of 'port

²³ Socially responsible investing (SRI), supported by a number of [strategies](#) and [indexes](#), is an investment process that considers the social and environmental consequences of investments, both positive and negative, in addition to the normal financial analysis.

communities' which essentially enables them to adopt stakeholder oriented strategies and strong social impact. The EcoPorts Foundation (EPF)²⁴ established in 1999 by a group of 8 large European ports is a good example of this trend. The primary purpose of EPF today is to act as network platform enabling European Port Communities to exchange environmentally effective solutions, and work together in collaborative projects addressing sustainability issues in ports and related to the logistic chain.

It suggested here that the route to ensuring a good contribution from corporate responsibility to achieving sustainable maritime transport goals is through the ports. For this ports will need to take a leading role in establishing 'responsible coalitions' involving all stakeholders in related 'green corridors' including transport operators, shippers and freight forwarders and authorities. Further such coalitions could be linked to 'sea basin' strategies for the Arctic Ocean, the Baltic Sea and the Mediterranean addressing the specific challenges of these regions.

The role of EPF and similar organisations in promoting such strategies will be of course vitally important.

²⁴ <http://www.ecoport.com>

4.4 Conclusions

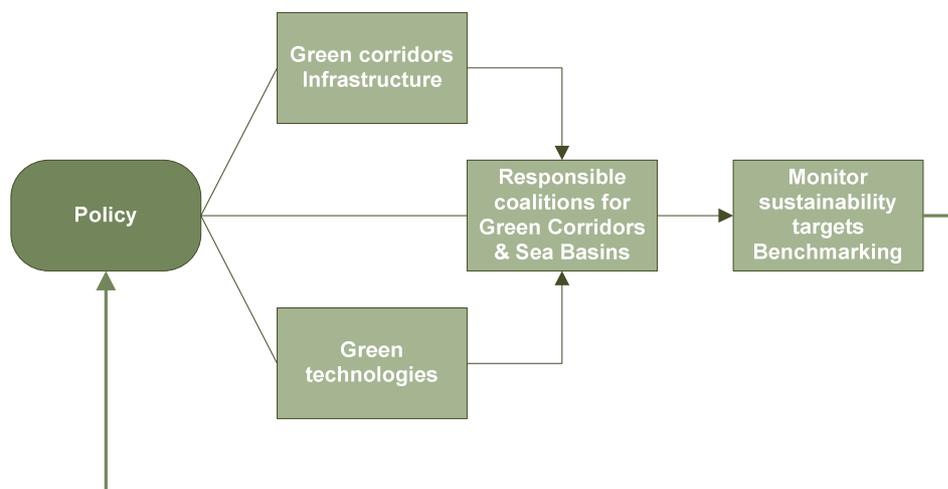
To conclude, regulation will probably be the primary instrument in maritime transport in achieving environmental sustainability targets.

However, port led ‘responsible coalitions’ involving all stakeholders in related ‘green corridors’ could be an effective way to bring about the potential benefits from corporate responsibility. Responsibility strategies in such cases will be focusing on increased competitiveness and improved environmental performance by:

- investment in technology to control safety, security and environmental risks producing additionally cost-cutting benefits;
- eco-efficiency which means making more from less by reducing ecological impacts and resource intensity throughout the end-to-end transport service;
- continuous improvement in supply chain processes.

The study has highlighted a policy gap with respect to link between sustainability and corporate responsibility. This could be addressed in future policy communications with specific reference to port led ‘responsible coalitions’ involving all stakeholders in related ‘green corridors’ as indicated above.

The proposed strategy is illustrated in the following diagram.



Sustainable policy objectives become the driving force. It leads to action plans for developing Green Corridor Infrastructure and Green technologies. Specific policies are developed to promote Corporate Responsibility initiatives focusing on coalitions to implement optimised sustainability performance in key trade corridors. Possibly the most important element of the approach is setting a benchmarking system to monitor progress, to promote visibility of best practices and to provide feedback for policy development.

References

Key Publications

- Todd Litman, “Developing Indicators for Comprehensive and Sustainable Transport Planning”, Victoria Transport Policy Institute (4/2/2008)

Additional Publications

- Strategic Tools for the Sustainable Development of Maritime Regions ISSN:0721-5924 Springer Berlin Heidelberg
- Pietro Caratti Sustainable Development Data Availability on the Internet FEEM

Projects

- PROPS D1.1
- SUSTAINABILITY-A-TEST - Advanced Techniques for Evaluation of Sustainability. FP6, Global Change and Ecosystems, 2004-2006
- INSURE “Flexible Framework for Indicators for Sustainability in Regions using Systems Dynamics Modelling”, Global Change and Ecosystems, 2004-2007
- VECTOR - Vulnerability to Climate Change of Coastal Areas and Marine Ecosystems, and their Role in the Mediterranean Carbon Cycle

Key journals, conferences / events

- OECD International Conference on Environmentally Sustainable Transport
- International Journal of Global Environmental Issues (IJGENVI)
<http://www.inderscience.com/>
- Environmental Research Quarterly
- The Sustainable Transport Show and Conference
<http://www.sustainabletransportshow.com/>

Key web sites

- <http://www.dft.gov.uk/pgr/sustainable/>

- www.csrquest.net -4CR Methodology for corporate responsibility and sustainability developed by AUEB and ILS