



Policy Briefs

13.11.2020

Tapio Karvonen, Senior Researcher
University of Turku, Brahea Centre



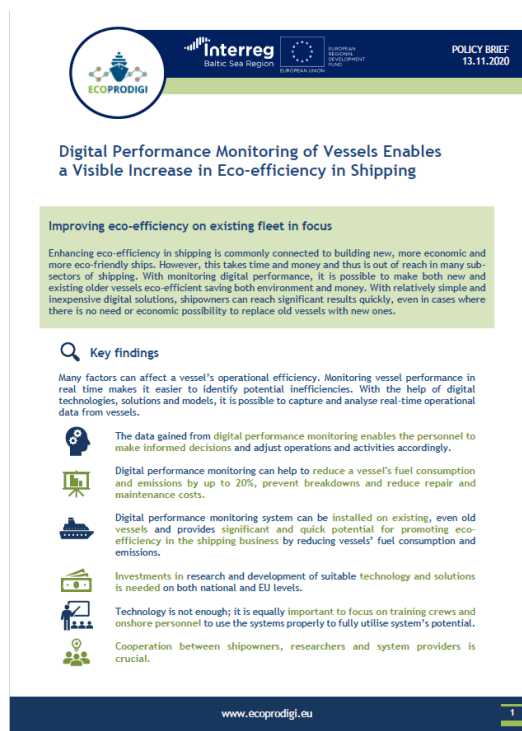
EUROPEAN
REGIONAL
DEVELOPMENT
FUND

www.ecoprodig.eu
[@ECOPRODIGI_BSR](https://twitter.com/ECOPRODIGI_BSR)



Three Cases – Three Briefs

- The policy briefs are already available here in the GoToWebinar application and will be distributed via a download link to all participants as well as policymakers on different national and international levels
- A more specific policy agenda will be published in December 2020



Interreg Baltic Sea Region POLICY BRIEF 13.11.2020
ECOPRODIGI

Digital Performance Monitoring of Vessels Enables a Visible Increase in Eco-efficiency in Shipping

Improving eco-efficiency on existing fleet in focus

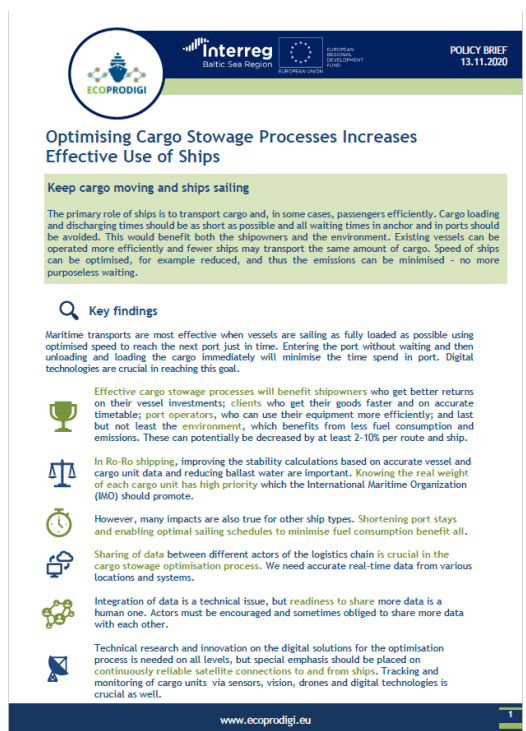
Enhancing eco-efficiency in shipping is commonly connected to building new, more economic and more eco-friendly ships. However, this takes time and money and thus is out of reach in many sub-sectors of shipping. With monitoring digital performance, it is possible to make both new and existing older vessels eco-efficient saving both environment and money. With relatively simple and inexpensive digital solutions, shipowners can reach significant results quickly, even in cases where there is no need or economic possibility to replace old vessels with new ones.

Key findings

Many factors can affect a vessel's operational efficiency. Monitoring vessel performance in real time makes it easier to identify potential inefficiencies. With the help of digital technologies, solutions and models, it is possible to capture and analyse real-time operational data from vessels.

- The data gained from digital performance monitoring enables the personnel to make informed decisions and adjust operations and activities accordingly.
- Digital performance monitoring can help to reduce a vessel's fuel consumption and emissions by up to 20%, prevent breakdowns and reduce repair and maintenance costs.
- Digital performance monitoring system can be installed on existing, even old vessels and provides significant and quick potential for promoting eco-efficiency in the shipping business by reducing vessels' fuel consumption and emissions.
- Investments in research and development of suitable technology and solutions is needed on both national and EU levels.
- Technology is not enough; it is equally important to focus on training crews and onshore personnel to use the systems properly to fully utilise system's potential.
- Cooperation between shipowners, researchers and system providers is crucial.

www.ecoprodigi.eu 1



Interreg Baltic Sea Region POLICY BRIEF 13.11.2020
ECOPRODIGI

Optimising Cargo Stowage Processes Increases Effective Use of Ships

Keep cargo moving and ships sailing

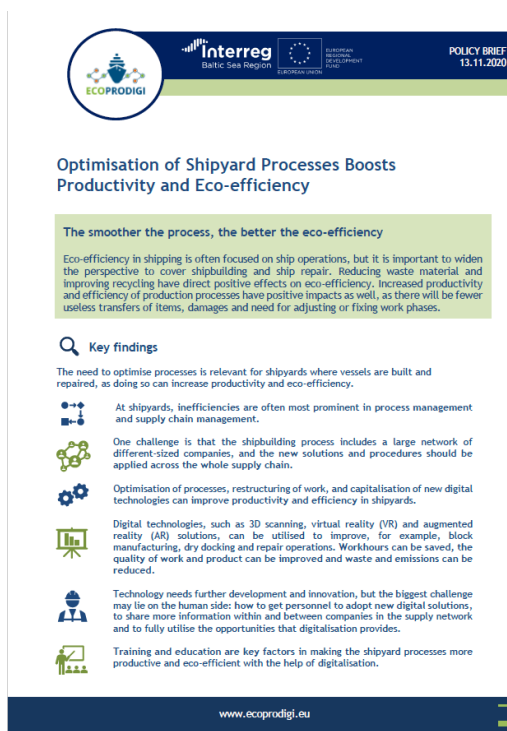
The primary role of ships is to transport cargo and, in some cases, passengers efficiently. Cargo loading and discharging times should be as short as possible and all waiting times in anchor and in ports should be avoided. This would benefit both the shipowners and the environment. Existing vessels can be operated more efficiently and fewer ships may transport the same amount of cargo. Speed of ships can be optimised, for example reduced, and thus the emissions can be minimised - no more purposeless waiting.

Key findings

Maritime transports are most effective when vessels are sailing as fully loaded as possible using optimised speed to reach the next port just in time. Entering the port without waiting and then unloading and loading the cargo immediately will minimise the time spend in port. Digital technologies are crucial in reaching this goal.

- Effective cargo stowage processes will benefit shipowners who get better returns on their vessel investments; clients who get their goods faster and on accurate timetable; port operators, who can use their equipment more efficiently; and last but not least the environment, which benefits from less fuel consumption and emissions. These can potentially be decreased by at least 2-10% per route and ship.
- In Ro-Ro shipping, improving the stability calculations based on accurate vessel and cargo unit data and reducing ballast water are important. Knowing the real weight of each cargo unit has high priority which the International Maritime Organization (IMO) should promote.
- However, many impacts are also true for other ship types. Shortening port stays and enabling optimal sailing schedules to minimise fuel consumption benefit all.
- Sharing of data between different actors of the logistics chain is crucial in the cargo stowage optimisation process. We need accurate real-time data from various locations and systems.
- Integration of data is a technical issue, but readiness to share more data is a human one. Actors must be encouraged and sometimes obliged to share more data with each other.
- Technical research and innovation on the digital solutions for the optimisation process is needed on all levels, but special emphasis should be placed on continuously reliable satellite connections to and from ships. Tracking and monitoring of cargo units via sensors, vision, drones and digital technologies is crucial as well.

www.ecoprodigi.eu 1



Interreg Baltic Sea Region POLICY BRIEF 13.11.2020
ECOPRODIGI

Optimisation of Shipyard Processes Boosts Productivity and Eco-efficiency

The smoother the process, the better the eco-efficiency

Eco-efficiency in shipping is often focused on ship operations, but it is important to widen the perspective to cover shipbuilding and ship repair. Reducing waste material and improving recycling have direct positive effects on eco-efficiency. Increased productivity and efficiency of production processes have positive impacts as well, as there will be fewer useless transfers of items, damages and need for adjusting or fixing work phases.

Key findings

The need to optimise processes is relevant for shipyards where vessels are built and repaired, as doing so can increase productivity and eco-efficiency.

- At shipyards, inefficiencies are often most prominent in process management and supply chain management.
- One challenge is that the shipbuilding process includes a large network of different-sized companies, and the new solutions and procedures should be applied across the whole supply chain.
- Optimisation of processes, restructuring of work, and capitalisation of new digital technologies can improve productivity and efficiency in shipyards.
- Digital technologies, such as 3D scanning, virtual reality (VR) and augmented reality (AR) solutions, can be utilised to improve, for example, block manufacturing, dry docking and repair operations. Workhours can be saved, the quality of work and product can be improved and waste and emissions can be reduced.
- Technology needs further development and innovation, but the biggest challenge may lie on the human side: how to get personnel to adopt new digital solutions, to share more information within and between companies in the supply network and to fully utilise the opportunities that digitalisation provides.
- Training and education are key factors in making the shipyard processes more productive and eco-efficient with the help of digitalisation.

www.ecoprodigi.eu 1



Digital Performance Monitoring of Vessels Enables a Visible Increase in Eco-efficiency in Shipping

- **Monitoring vessel performance in real time makes it easier to identify potential inefficiencies**
- **With the help of digital technologies, solutions and models, it is possible to capture and analyse real-time operational data from vessels**
- **The data gained from digital performance monitoring enables the personnel to make informed decisions and adjust operations and activities accordingly**
- **Digital performance monitoring**
 - **Helps to reduce a vessel's fuel consumption and emissions by up to 20%**
 - **Prevents breakdowns**
 - **Reduces repair and maintenance costs**
- **Digital performance monitoring system can be installed also on existing, even old vessels**
 - **Provides significant and quick potential for promoting eco-efficiency**
 - **Saves both environment and money**
 - **Reduces vessels' fuel consumption and emissions**



Digital Performance Monitoring: Recommendations

- **Investment in developing AI models of high accuracy and quality**
 - The AI models and scripts need to perform well on set criteria for larger groups of vessels, on voyages with variable data sets and for longer periods
- **Training users both onshore and onboard in the discipline of digital vessel performance monitoring is crucial to utilise all the potential it offers**
 - The data provided by the new technology must be understood and applied to everyday operations
- **More emphasis on transforming the existing vessels to be more eco-efficient using different digital performance monitoring solutions**
- **Investment in financing of research and development of needed technology and software**
 - Policymaking on both national and EU levels needed
- Shipowners should be encouraged to **retrofit their existing vessels with new or better digital vessel performance monitoring devices and software**
- EU and the International Maritime Organization (IMO) should promote the use of **international standards for data exchange and performance monitoring**



Optimising Cargo Stowage Processes Increases Effective Use of Ships

- **Maritime transports are most effective when vessels are sailing as fully loaded as possible using optimised speed to reach the next port just in time**
- **Entering the port without waiting and then unloading and loading the cargo immediately will minimise the time spend in port**
- **Effective cargo stowage processes will benefit shipowners, clients, port operators, and the environment**
 - **Fuel consumption and emissions can potentially be decreased by at least 2–10% per route and ship**
- **Shortening port stays and enabling optimal sailing schedules to minimise fuel consumption benefit all**
- **Sharing of data between different actors of the logistics chain is crucial in the cargo stowage optimisation process**



Cargo Stowage Processes: Recommendations

- **Promotion of research on and innovation in different digital solutions and automation related to cargo stowage and operations on both EU and national levels**
- **Training of crews and clients to get full use of the digital solutions**
- **An international IMO-based regulatory framework covering Ro-Ro cargo units**
 - The real weight and dimensions of each cargo unit to be available before the loading plan is made
- **Promoting the transfer of information**
 - Standards for sharing cargo unit and vessel positions across the logistics chain
 - Standards for maritime cyber security
 - International vessel voyage codes for Ro-Ro vessels
- **Readiness to share more information between haulage companies, shipping companies, port operators, and port authorities**
 - Encouragement and, in some aspects, obligation by policymakers
- **Better cargo unit tracking and connectivity as well as satellite connections for transmitting data from ships sailing on oceans**
 - Requirement for reliable functioning of the optimised system
- **Promoting the installation of automated mooring systems and cold ironing**



Optimisation of Shipyard Processes Boosts Productivity and Eco-efficiency

- **Increased productivity and efficiency of production processes** have positive impacts
 - Fewer useless transfers of items, damages and need for adjusting or fixing work phases
- **Reducing waste material and improving recycling** have direct positive effects on eco-efficiency
- **At shipyards, inefficiencies are often most prominent in process management and supply chain management**
 - Shipbuilding process includes a large network of different-sized companies
 - New solutions and procedures should be applied across the whole supply chain
- **Digital technologies**, such as 3D scanning, virtual reality (VR) and augmented reality (AR) solutions, **can save workhours, improve the quality of work and product and reduce waste and emissions**
- **Training and education are key factors in making the shipyard processes more productive and eco-efficient with the help of digitalisation**
 - To get personnel to adopt new digital solutions
 - To share more information within and between companies



Shipyard Processes: Recommendations

- **The whole life cycle of a ship to be more eco-efficient and sustainable**
- **More emphasis on developing 3D technology** – a lot of potential to be applied
- **New operating methods and policies across the supply chain**
 - More information exchange and visibility
- **Special emphasis on enhancing digital capabilities and knowledge of small and medium-sized companies**
 - Partly financed by EU and national programmes
 - Benefits many sectors other than shipbuilding
- **Improved knowledge sharing within organisations** for speeding up the enhancing of eco-efficiency through digitalisation
- **Investments in technological capabilities for processing large amount of data** to share and view data online
- **Education is a top priority** in promoting the digitalisation of shipyard processes
 - To be noticed on both EU and national levels



Thank you!

Tapio Karvonen

University of Turku, Brahea Centre

tapio.karvonen@utu.fi



EUROPEAN
REGIONAL
DEVELOPMENT
FUND

www.ecoprodig.eu

 @ECOPRODIGI_BSR

