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MODELING «GREEN» CORRIDORS IN THE FIELD OF ECOLOGICALLY CLEAN ENERGY IN SHIPPING

Summary. *Taking into account the interaction of authorities between various organizations during the study, as well as when modeling relationships for all stakeholders involved in the development of «green transport corridors», who will be interested and involved in this project on the introduction and investment in the development of technologies related to both greenhouse gas emissions and the improvement of standards to expand the modeling of «green transport corridors» for marine vessels.*

Key words: *Green Transport Corridor Modeling Service, ABS, Green shipping corridors, US Department of Energy (DOE).*

Introduction. In environmental research, opportunities and extensions have emerged from the modeling of green shipping corridors for marine vessels. These studies will further be used to support international design and development initiatives in the field of implementation of clean energy in shipping. These studies also consider the modeling of the complex relationship for all stakeholders involved in the development of the «green corridor», and they will interest and involve in this project the necessary solutions for their implementation, as well as supporting political decisions and attracting investment investments in this project.

Green shipping corridors will be the basis for successful promotion of modeling for decarbonization of ship power plants and environmental protection. But such innovations require a well-founded in-depth analysis. It is necessary to start with an assessment at the stage of technical and economic substantiation and end with modeling of the full life cycle of the development and implementation of the green corridor. It is also necessary to take into account the assets and completed operations of all interested parties. Broader operational, policy and regulatory issues also need to be taken into account. All this must be taken into account, modeling and optimization tools that are ideally suited for critical analysis must also be taken into account, as well as uncertainties arising from many variables that will arise over time and affect the design of green corridors.

ABS has launched a new Green Transport Corridor Modeling Service for shipping, designed to develop and support the international design and development of green energy initiatives to protect the environment [1]. This ABS modeling technology provides the accuracy of a digital doppelganger or digital sandbox. Digital sandboxes allow innovation and new developments to be tested within certain limits in order to safely extend these inventions to new technologies. If it becomes clear that such a technology is not fixed and has unpredictability, there is an opportunity to stop the development from simulation, if necessary. Shaping key decisions about future fuel use by evaluating a range of options, transitions and alternative scenarios seeks to determine the best approach for a particular modeling decision. Such collaboration involves both designing and implementing acceptable innovations at the macro level together with a coalition of stakeholders and finding concrete solutions with interested fuel suppliers, port authorities, terminal operators, ship owners, cargo owners and cargo shippers.



Fig. 1 Simulation to optimize GREEN SHIPPING corridors

A new ABS publication, an Approach to Green Shipping Corridor Modeling and Optimization, is an addition to the modeling service (Fig. 1). Case studies of a green shipping corridor are considered in this simulation. In which two initiatives are considered: the first concerns container transport on the route Singapore - Rotterdam, and the second - on the transport of iron ore on the route Australia - Japan. ABS Global Modeling Center, located in Singapore, uses computer modeling to find the most effective methods of solving emerging system problems. At the same time, ABS uses extensive capabilities in the field of optimization and modeling, paying special attention to supporting customers and interested industries, evaluating the effectiveness of modeling «green corridors». Based on the results of the research, a general decision-making model based on the obtained data is presented. Developed modeling helps to generate a wide range of data. This spectrum includes fleet fuel balance, new vessel construction investment needs, annual port investment, port-specific fuel demand calculation

and forecasting, port-specific fuel storage needs, annual bunkering station fuel purchases and other data capabilities.

The Hub is an interactive platform and toolkit to support the development of green shipping corridors. This is the first action to be taken under the Mission Action Plan. At the Global Forum in Pittsburgh, a spectrum of clean energy actions was published [2]. Members of the Zero - Emission Shipping Mission are taking the initiative to accelerate the transition of zero emission shipping. (Fig. 2) For this, a center was launched to support the development of «green corridors» for shipping. This is an important step towards the achievement of the Mission's goals, because the development of «green corridors» is a key point that allows shipowners to strategically operate and plan the construction of vessels operating on zero-emission fuel, the US Department of Energy (DOE) said and that also stated the head of the executive committee of the Shipping Mission. The new Green Transportation Corridor HUB was launched at the Zero-Emission Shipping Mission's event in the Danish Green Pavilion at COP 27. To make COP 27 a success, tools were created and launched through the Freight Transportation Mission's Green Corridor Hub. to achieve the result of the decarbonization process to achieve zero emissions. At the same time, enabling the public and private sectors to come together to achieve the reality of a zero-emissions decarbonisation process. To support the Mission's ambition for the Hub to be the focal point for all Green Transport Corridor efforts, it has been decided that the first three new infrastructures on the platform will be regularly updated with new information and the latest data available in the future, and new ones will be added. developed tools and received resources to further support the development of "green transport corridors". All tools, resources and documents received on the Hub platform are provided by the members of the Shipping Mission, which will accelerate the transition to marine energy. This will give free access to high-quality data such as:

- Coastal energy and bunkering infrastructure for LNG, methanol and ammonia;
- Transition of vessels to ammonia, hydrogen, LNG, CIS, methanol, introduction of batteries and use of scrubbers;
- Flexible dynamics of fuel prices with weekly updates;
- Flexible visualizations based on data of guaranteed supply quality;
- Technical ideas for making sound technical decisions;
- Constant support of a high level of project implementation and alternative fuel and financial benchmarking of fuel prices in comparison with prices in different regions. The launch of this program will be a call to all stakeholders to engage and benefit from the implementation of "green transport corridors". In combination with the obtained full maritime expertise, it allows to evaluate the vessel for chartering, and to provide all received analyzes and recommendations, after a full inspection of this vessel, to the charterer.



Fig. 2. As part of the Zero-Emission cargo delivery mission, a Green Transport Corridor node has been launched

The Hub has developed three initial tools to support the development of green corridors, which are designed for use by industry and governments alike:

- Route Tracker is an interactive map that provides a complete and up-to-date map for all Green Corridor development initiatives around the world.
- Matchmaker is an interactive tool that allows stakeholders interested in developing green shipping corridors around the world, as well as finding partners in both the maritime and energy industries to reduce their own costs.
- A curated library of key analysis materials, frameworks, guides and resulting assessments relating to green corridors, making key analyzes easily accessible for the first time.

And in addition to these developments, three new actions are being launched through the Hub to support and develop «green corridors» that emphasize their role as a major platform for knowledge exchange, which are divided into [3]:

- The preliminary feasibility study is intended to assess the viability and development of potential projects created by the Maersk McKinney Moller Center for Zero Carbon Shipping.
- Annual report on the progress of the works on the creation of «green transport corridors» for the period of 2022 corridors after COP-26.
- The first route-level data from UMAS and the Movement to Zero coalition, designed to drive the decarbonisation of shipping. Achieving significant reductions in greenhouse gas emissions from activities in the energy and raw materials sectors requires clear data. And not just any data, this requires detailed, comprehensive and accessible data for all customers on a wide range of emissions reduction indicators, so that you can identify emission hotspots in your operations and opportunities to improve emissions reductions. The purpose of this data is to support governments and industry in finding and successfully exploiting their «Green Transport Corridor» opportunities. This is too difficult a task, and in order not to do it blindly, the Carbon Accounting Reporting Tool comes to the rescue. In the maritime industry and, accordingly, in those industries that are related to

the raw materials industry by sea transportation, it is necessary to achieve the goal of the IMB to reduce carbon emissions by 50% by 2050.

The Alternative Fuels Insight (AFI) (Fig. 3) platform provides the shipping industry with an open platform to assess the adoption of alternative fuels and new technologies, and provide accessible data for visualization and analysis. The obtained data is supplemented by a collection of technical resources. AFI helps shipowners and other stakeholders track the global use of alternative fuels and evaluate the best options for their own ships in the maritime industry [4].



Fig. 3. The Alternative Fuels Insight (AFI) platform provides an assessment of the deployment of alternative fuels and technologies

Maritime risk management and environmental assessment organization RightShip has launched a new system that makes safety assessments to improve shipping safety and risk management in the maritime industry. Safety Score was launched in response to this demand in these industries for even more transparent vessel rating methods. Over the past two years, RightShip has been working to develop a new safety indicator in collaboration with all stakeholders in the shipping industry and which would provide a clear, transparent metric that includes only those factors under the control of the operator, which helps to improve the maintenance of shipping safety in the maritime sector. The resulting security assessment will be placed on the new RightShip platform, which

will replace the current Qi platform, and once the security assessment is operational, a predictive risk rating has also been made [5]. RightShip is designed to help stakeholders gain initial insight into the operational performance of charter vessels and encourage shipowners to invest in process and technology improvements that will make the entire supply chain safer. RightShip has created a balanced scorecard that can be used by all its members. For customers looking to perform due diligence, RightShip provides a clearer picture of vessel and DOC holder performance. A safety score is a measure intended to be used as one of many factors in the due diligence process. Therefore, in combination with the obtained full maritime expertise, it allows to evaluate the vessel for chartering, and to provide all the obtained analyzes and recommendations, after a full inspection of this vessel to the charterer. It was stated that RightShip will provide a number of technical resources to support the launch of the new shipping safety rating and facilitate the transition to them. These include educational webinars, trainings, and other events via the Internet and on a special resource page. RightShip and Veson Nautical have announced a new collaboration to provide subscribers to Veson's freight management platform with access to RightShip data.

Conclusions. The analysis of research results shows that maritime transport activities remain the most energy-efficient way of moving goods around the world compared to other modes of transport. Therefore, sea transportation, as before, remains highly profitable, but at the same time it accounts for most of the world's greenhouse gas emissions. The financing of ships should be calculated annually according to its operational characteristics, according to its climatic coherence. This funding should be calculated by calculating the climate compliance of each vessel after a full marine survey and a resulting decarbonisation analysis. To determine the impact of emissions on the climate, the volume of carbon should be calculated using the average efficiency ratio (AER). AER is calculated in units of grams of CO₂ per ton and must be calculated for all voyages of the vessel during

operation during the calendar year. The AER efficiency factor is calculated based on information received from the IMO Global Data Collection System (IMO DCS). In addition to this, the Maritime Cargo Charter is expected to support a number of other initiatives such as, among others, the UN Sustainable Development Goals, the Global Logistics Emissions Council (GLEC) Framework. This issue was addressed and addressed by the Global Logistics Emissions Council (GLEC), a group of companies, non-governmental organizations, green freight programs, and experts dedicated to studying, tracking, and reducing freight carbon emissions. Led by the Smart Freight Center (SFC) and partners, the Global Logistics Emissions Council (GLEC) has jointly developed and tested a method for accounting for carbon emissions into the atmosphere that should be applied by shippers, carriers and logistics service providers in the GLEC Framework.

Many companies report and submit their annual emissions data to the Carbon Disclosure Project (CDP) or include these data in corporate reports for the annual calculation of a ranking indicator that allows tracking of progress by benchmarking annual emissions. In this case, climate indicators of the volume of annual Key Performance Indicators (KPI) are better measured by the intensity of greenhouse gas emissions.

Literature

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