Energy efficiency issues regarding the operation of pushed trains on the Danube

Working Group on Technical Matters

October, 12-13, 2023



The Danube Commission Fleet Modernization Working platform Goals:

- Transfer of more cargo to inland waterways
- \blacktriangleright Increasing the environmental friendliness, energy efficiency and attractiveness of inland water transport
- Enhancing stability and mobility
- \blacktriangleright Achieving climate neutrality



Set of activities :

- Revision of the current regulatory framework
- \succ Creation of a new regulatory framework
- \succ Consideration of fleet modernization issues
- Creation of new approaches to the technical operation of the fleet
- Introduction of digital technologies for fleet traffic control
- Creation of new training standards for inland waterways

Does the existing Danube fleet earn enough to implement activities and achieve goals?

DECARBONIZATION

- EC Action Plan NAIADES III, COM (2021) 324 final,
- Directives (EC) 2016/2397, 2017/1629, 2005/44/EC, Standards ES-TRIN (2023), ES-QIN (2019),
- WG documents CESNI/PT, CESNI/QP, CESNI/TI,
- Reglament (EC) 2016/1628,
- GRENDEL (2018 2020, Project results
- PLATINA 3, Project results
- Basic provisions on navigation on the Danube (DFND)
 2023.
- Initiatives of other Inernational Organizations and Projects (IMO, CCNR, Steering Group *PA* 1a EUSDR and others),
- CCNR Road Map to reduce emissions from inland shipping (2022):

OK, the existing fleet will try to make money...



Increasing energy efficiency is a pressing task for the existing fleet

DC ROADMAP

FOR REDUCING

EMISSIONS FROM INLAND

SHIPPING

CO2/T KM, T.e.

энный фактор между

и аносиния стользуется тот же 2018 гг.) используется

главного двигателя (ГД), кВт;

числитель в этой формуле представляет собой выбросы СО2, знаменатель

MINENT (2015

.SFC

коэффициент выбросов СО2 (безразмерный конве) - коэффициент выбросов СО2 (Фезразмернын к реблением топлива и выбросом СО2), С_F = T_{CO2}

судов и рассчитывается по следующей

гле Ис эффективная мон.

ЕЕІ для судов внутрення

IT BUT

✓ Reducsng operating costs

✓ Improving environmental performance

It has been established that for pusher vessels of pushed convoys, when operating at partial characteristics, as the main operational ones, a reduction in CO2 emissions by 10 ... 12% can be achieved by reducing fuel consumption through rational management: rational voyage planning and operational management during movement (operational reorganization of the composition, change in speed limit) depending on current navigation conditions

\checkmark Gradual transition to new engines

 \checkmark Transition to alternative fuels

Характеристики составов

Класс водного пути	Толкаемые составы: общие характеристики				
	Схема состава	Макси- мальная длина <i>L</i> , м	Макси- мальная ширина <i>В</i> , м	Рабочая осадка в грузу <i>d</i> , м	Дедвейт, т
IV		85	9,5	2,502,80	12501450
Va		95110	11,4	2,504,50	16003000
Vb		172185	11,4	2,504,50	32006000
VIa		95110	22,8	2,504,50	32006000
VIb		185195	22,8	2,504,50	640012000
VIc		270280	22,8	2,504,50	960018000
		195200	33,034,2	2,504,50	960018000
VII		275285	33,034,2	2,504,50	1450027000

$$\mathsf{EEI} = \frac{\log(CO_2 ref/CO_2)}{(C \cdot \log(Dw) + B)}$$

 CO_2ref – emission reference value CO_2 for vessels of same type and dimensions; CO_2 – actual emission value CO_2 for this vessel; Dw – deadweight; C, B – coefficients of the ship dimensions influence on its energy efficiency.

$$\mathsf{EEDI} = \frac{FC_j \cdot CF}{m \cdot dist}$$

 FC_j – fuel consumption on the "*j*" section of the inland waterway; CF – conversion factor for converting harmful emissions to CO_2 ; *m* – weight of transported cargo; *dist* – distance, length of a given section

CONCLUSION

- As part of the energy transition, it is necessary to ensure favorable shipping conditions for further market development and maintaining attractiveness for cargo owners
- Decarbonization and energy efficiency improvements for existing ships is the same goal of the Danube RoadMap
- It is necessary to apply a compromise approach to the formation of a scheme for a comprehensive assessment of improvements in environmental friendliness, fuel efficiency and benefits to society
- The Energy Efficiency Index for Inland Navigation can be transformed into different forms:
 - \checkmark for different types of ships
 - ✓ for voyage stages where various transport technologies could be used
 - ✓ for each of the 5 emission label levels (*PLATINA* 3)

THANK YOU FOR ATTENTION

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