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Review of native river-sea vessels' fleet

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Inland Transport Committee

Working Party on the Standardization of Technical and Safety Requirements
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Backbone of merchant fleet, working with cargo base of post-Soviet countries, consists primarily of river-sea and restricted navigation dry-cargo, combined vessels, oil tankers and sea going vessels with deadweight up to 8000 t (they are often called coasters).

When analyzing such fleet it should be clearly understood that its main sign is cargo base, since flag of the vessel at specific moment can be very different, often depending on cargo flow that the private ship owner is aiming for.

If it will be necessary to work from river ports, the flag will be Russian or Ukrainian, from sea ports (other de facto river ports, but legally - sea ports) - various options are possible.

River routes for river-sea vessels

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Variations of voyages are also understandable - main marginal dry cargo is grain.

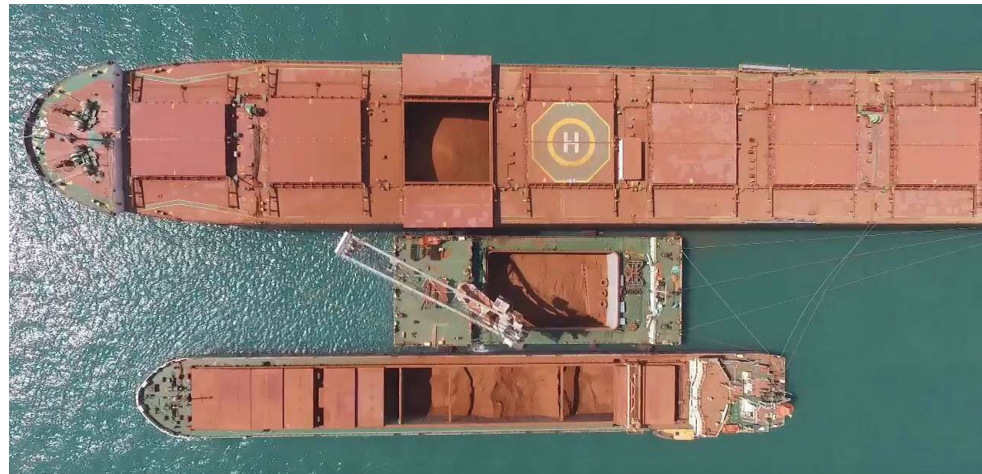
Main voyages in summer navigation (when locks are opened) are from river ports to raid transshipment complexes (RTC).

Of course, this is only a simplified model, in fact also ports of black sea: coal, sulfur to RTC in Caucasus area, iron ore concentrate, plus scrap metal, rolled metal in one form or another, transit voyages with oversized cargoes, timber in the Northwest, etc.

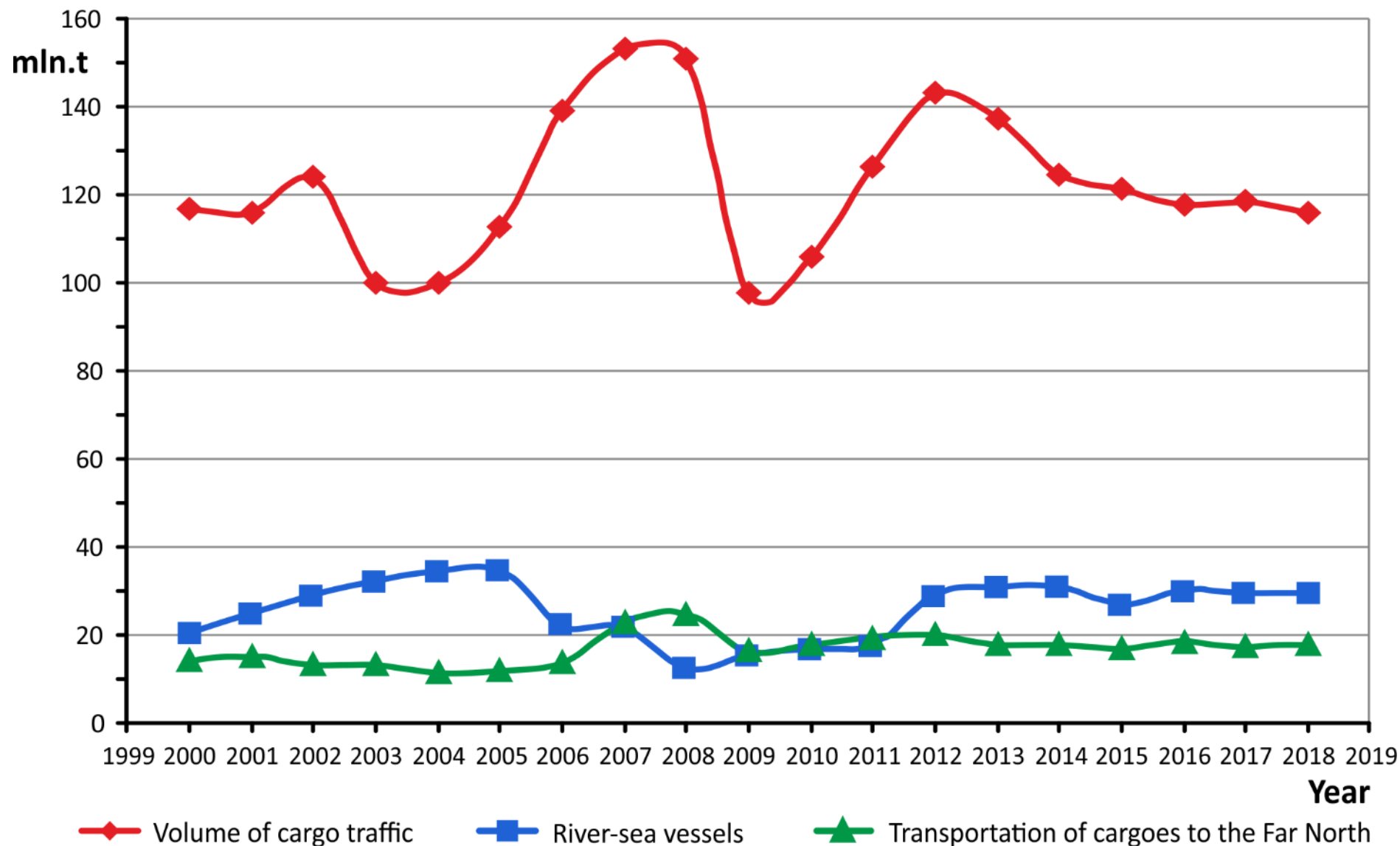
If to talk about cargo base of oil tankers it is clear that this is, as a rule, heavy oil (masout) as well as diesel fuel and other light oil products with flash point of 60 degrees or more.

In addition, vegetable oils and other IMO 2 type chemical liquid bulk cargoes, molasses and some other liquid bulk cargoes, crude oil on the Caspian Sea.

Raid transshipment complex (on example of CV03 project of Marine Engineering Bureau). Ship-to-Ship operations



General volume of transported cargoes by Russian Inland Water Transport



It has been proved by researches made by Marine Engineering Bureau (MEB) that real choice of main characteristics of river and river-sea vessels was defined by way conditions, and also by strategy of future Shipowner, by Shipowner's position at market, by commitment to one or other directions of transportations and types of cargoes. Thus for tankers, as rule, decisions which provided maximal loading capacity in given conditions were optimal. For dry-cargo vessels choice of dimensions based on accepted lot size (3000 tons, 5000 tons) on given draught was also used.

The most demanded vessel's class of water transport is "Volga-Don max" class (70% of cargo vessels built in XXI century).

"Volga-Don max" class is defined by overall dimensions of Volga-Don shipping Canal locks and has maximally possible loading capacity 4200-5500 tons at characteristic river draught 3,60 m (lower value is relating to R1 restricted sailing area class of Russian Maritime Register of Shipping and tug-barge combinations, upper value – to M-PR restricted sailing area class of Russian River Register).

Vessel's class		Overall length L_M , m	Overall breadth B_M , m	Draught d , m	Air draught H_{ad} , m
"Volga-Balt Max"		≤ 185	$\leq 16.95-20.1$	2.90-3.80	≤ 13.2
"Dnipro Max"		≤ 150	≤ 17.2	3.00-3.80	≤ 12.8 (upstream Kremenchug)-16.7 (downstream Zaporozhie)
"Volga-Don Max"		≤ 141	≤ 17.0	3.20-3.70	≤ 13.2
"Belomor-Baltiysk Canal Max"		≤ 132	≤ 13.63	2.90-3.80	≤ 11.9 m
"Danube Max"	Danube – Passau	≤ 135	≤ 13.40	2.00-2.50	≤ 6.7
	Upstream – Passau*	≤ 135	≤ 11.45	1.70-2.00	≤ 6.03

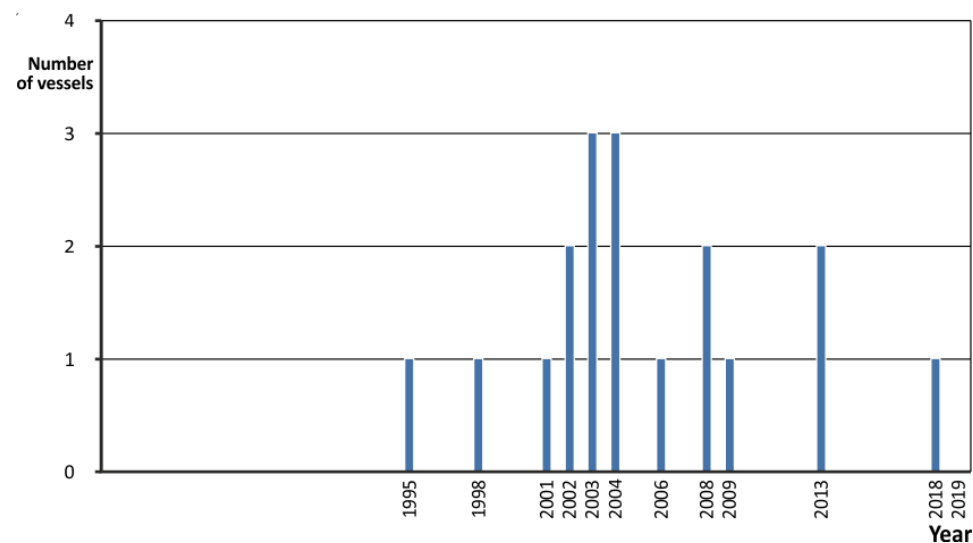
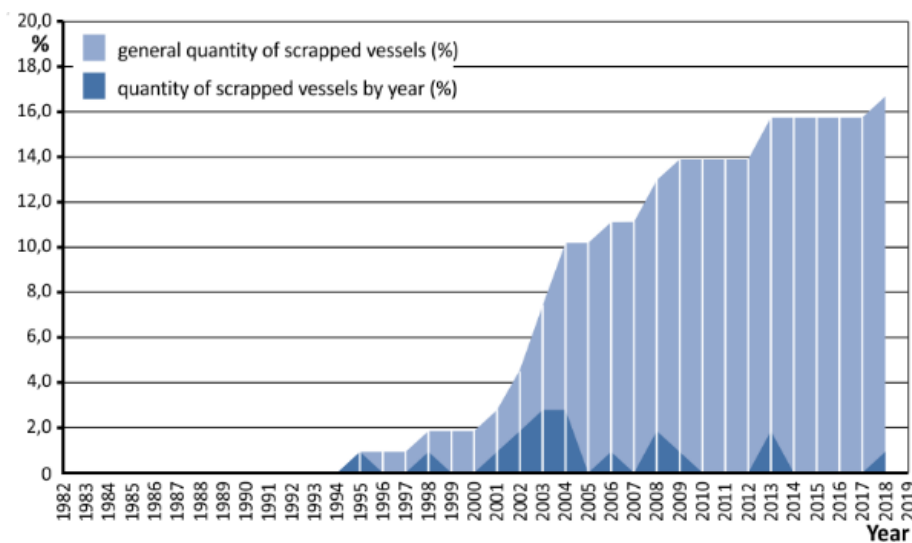
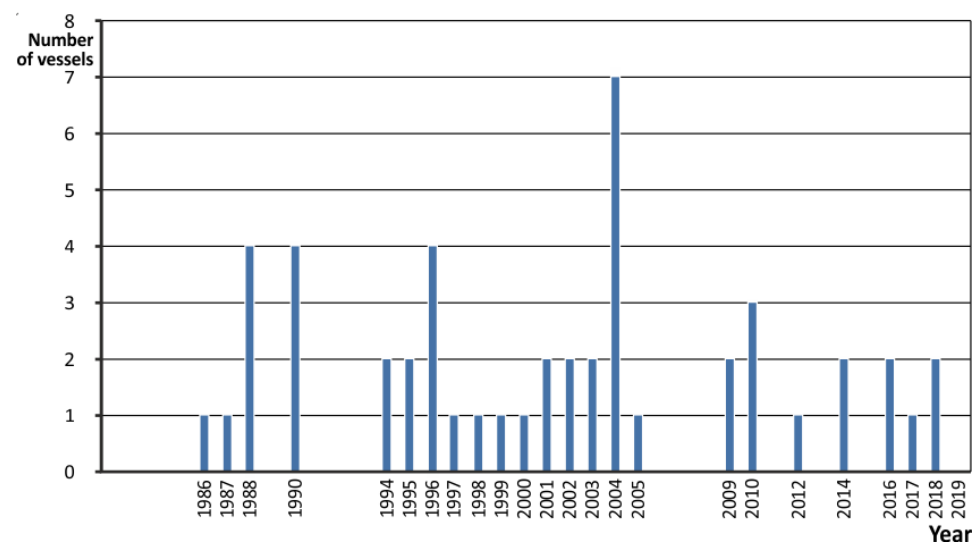
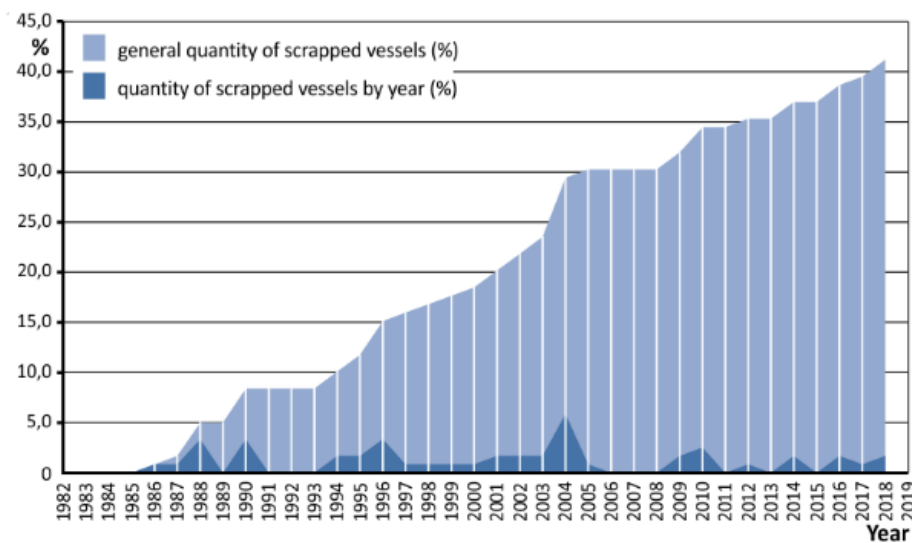
* – including pass-through to Northern Sea (Danube – Main-Rhine system)



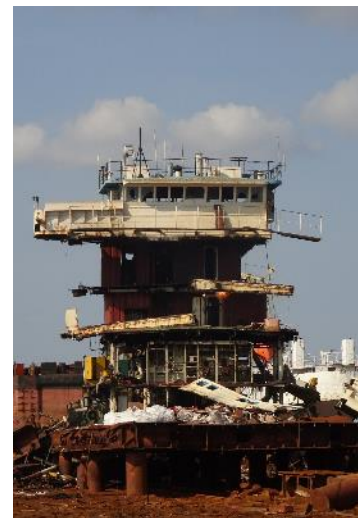
Number of scrapped vessels in %ratio to all vessels and number of scrapped vessels by year distribution.

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507A, 507B pr. ("Volga-Don" type) and 1565 pr. ("Volga-Don" type)



Utilization process of dry-cargo vessels of “Volga-Don” type in 2019



Soviet classic – river-sea “Volgoneft” type tankers

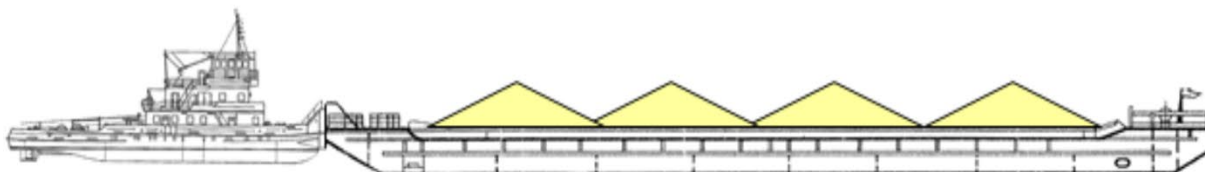
Actual deadweight in river 4700-4800 tons



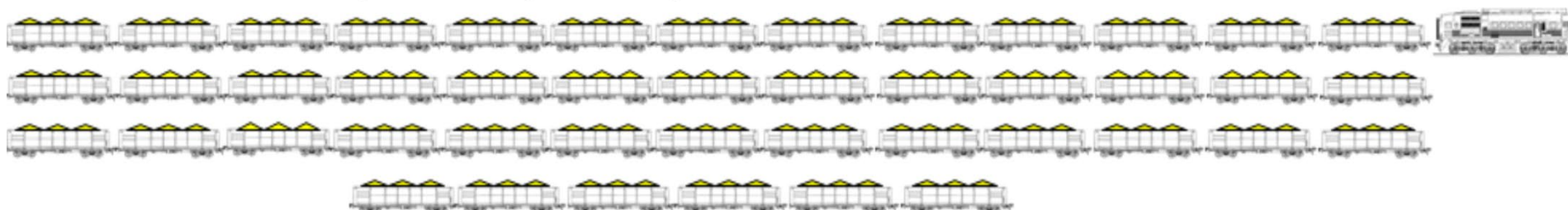
Ecological advantages of river transport

Source: Russian Chamber of Shipping

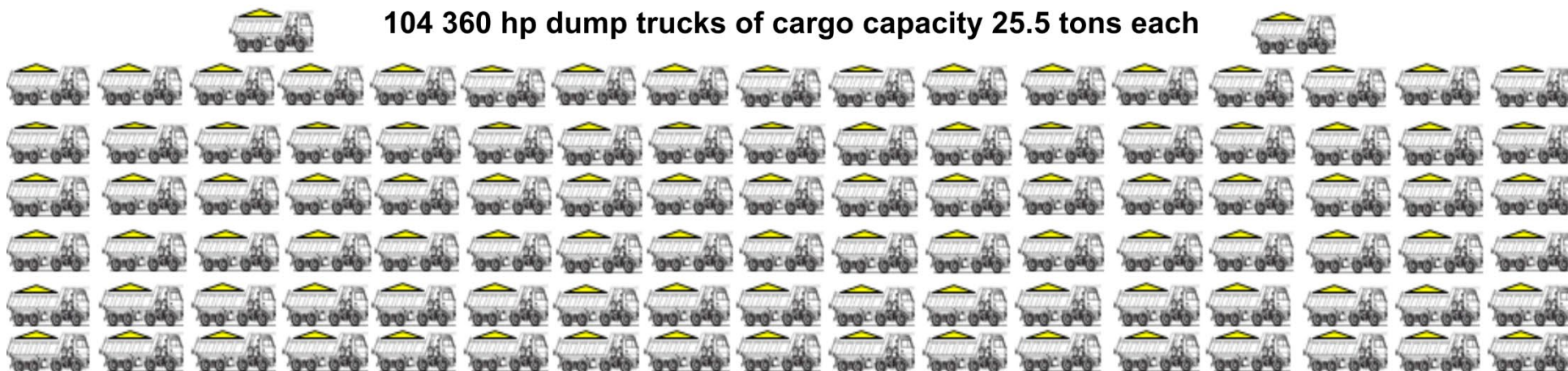
Tug-barge combination with cargo capacity of 2700 tons with 450 hp tug-pusher



45 wagons of cargo capacity 60 tons each with 2000 hp M62M locomotive



104 360 hp dump trucks of cargo capacity 25.5 tons each



From researched 1727 river, river-sea and restricted navigation area dry-cargo vessels of the most known series, which were built from 1956 to 1999, 738 vessels (43%) are written off as for today. 94 from scrapped vessels (13%) were lost in accidents with mean age of 31.1 years (usually rather old vessels). 644 vessels were utilized with mean age of scrapping of 36.1 years.

855 vessels are in operation with mean age of 39.3 years, 204 vessels are out of service with mean age of 42.8 years (640 vessels are under flag of Russian Federation).

Forecast on 2025 – 546 vessels of old types in operation, on 2030 – 201 vessels.

“Volga-Don max” type river-sea dry-cargo vessels of 507, 1565, 05074, 19610 projects are of the biggest interest.

From researched 337 vessels of these projects built before 2000 24% – 80 are written off. 14% – 11 vessels were lost in accidents with mean age of 28,5 years. 69 vessels were utilized with mean age of 33,5 years. 223 vessels are in operation with mean age of 36.8 years, 34 vessels are out of service with mean age of 40.9 years.

Forecast on 2025 – 170 “Volga-Don max” type river-sea dry-cargo vessels of “classic” projects, on 2030 – 93 vessels.

From researched 479 river, river-sea and restricted navigation area oil tankers of the most known series, which were built from 1956 to 1999, 143 tankers (30%) are written off as for today. 11 from scrapped tankers (8%) were lost in accidents with mean age of 24 years. 132 tankers were utilized with mean age of scrapping of 33.8 years.

260 tankers are in operation with mean age of 38.9 years, 132 tankers are out of service with mean age of 39.7 years.

Forecast on 2025 – 174 tankers of old types in operation, on 2030 – 43 tankers.

“Vologoneft” type river-sea oil tankers of 550, 558, 550A, 1577, 630 projects are of the biggest interest.

From researched 206 vessels of these projects built before 2000 29% – 60 are written off. 6% – 4 vessels were lost in accidents with mean age of 17,3 years. 56 vessels were utilized with mean age of 36,5 years. 113 vessels are in operation with mean age of 43.4 years, 33 vessels are out of service with mean age of 45.3 years.

Forecast on 2025 – 75 “Vologoneft” type river-sea oil tankers of “classic” projects, on 2030 – 19 vessels.

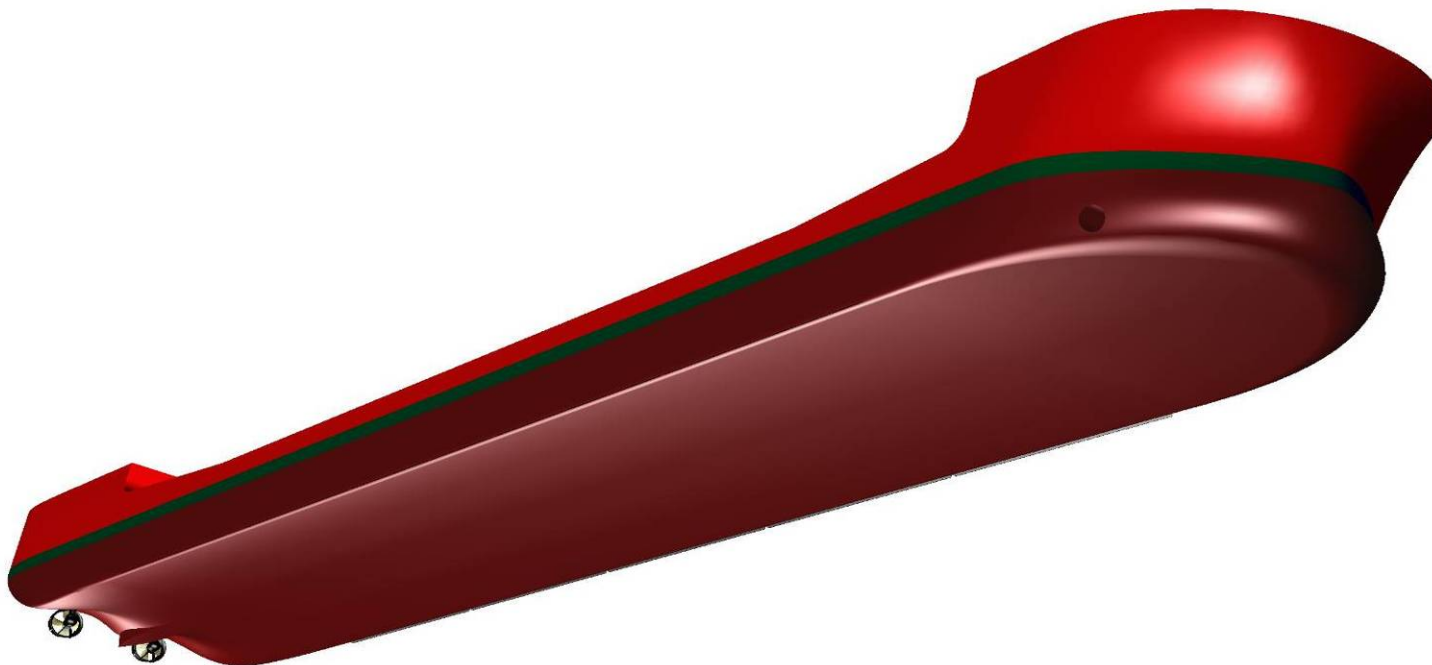
Summary for new river-sea cargo vessels built in 2000-2019 period. 456 vessels have been received

Type of river-sea vessels	Number of vessels																			Built and in building process	
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018		2019
“Volga-Don max” / “Dnipro max” class oil tankers	3		2	6	4	9	4	1	5	4	12	17	22	22	14	13	10	9	5	2	164 + 9
																					Russia 110 + 6, Turkey 25, China 25 Ukraine 3, Azerbaijan 1 + 3
Oil tankers of other classes	5	3	5	2	5	9	5	7	5	3	2	1	4	1	5	2	3		3		70+2
																					Russia 49 + 1, Turkey 12, China 8, Ukraine 1 + 1
Totally oil tankers	8	3	7	8	9	18	9	8	10	7	14	18	26	23	19	15	13	9	8	2	234 + 11
																					Russia 159 + 7, Turkey 37, China 33, Ukraine 4 + 1, Azerbaijan 1 + 3
“Volga-Don max” / “Dnipro max” class dry-cargo vessels	2	1	1		2	3	4	6	4	3	1	9	5	6	3		2	3	6	10	71 + 55
																					Russia 54 + 48, Ukraine 11 + 4, China 4 + 3, Turkey 2
Dry-cargo vessels of other classes	4	3	5	8	6	9	15	17	9	6	6	7	11	4	2	1		15	14	9	151 + 4
																					Russia 58 + 3, China 28 + 1, Turkey 19, Romania 14, Ukraine 10, Vietnam 10, Netherlands 5, Bulgaria 4, Germany 2, Poland 1
Totally dry-cargo vessels	6	4	6	8	8	12	19	23	13	9	7	16	16	10	5	1	2	18	20	19	222 + 59
																					Russia 112 + 51, Китай 32 + 4, Ukraine 21 + 4, Turkey 21, Romania 14, Vietnam 10, Netherlands 5, Bulgaria 4, Germany 2, Poland 1
Totally river-sea vessels	14	7	13	16	17	30	28	31	23	16	21	34	42	33	24	16	15	27	28	21	456 + 70
																					Russia 271 + 58, China 65 + 4, Turkey 58, Ukraine 25 + 5, Romania 14, Vietnam 10, Netherlands 5, Bulgaria 4, Germany 2, Azerbaijan 1 + 3, Poland 1

“Volga-Don max” class tanker is passing through the lock with minimal clearance



Real innovation in action – “superfull” hull form, developed by MEB



MEB RST27 project - Significant Ship 2012, 2013, 2017.

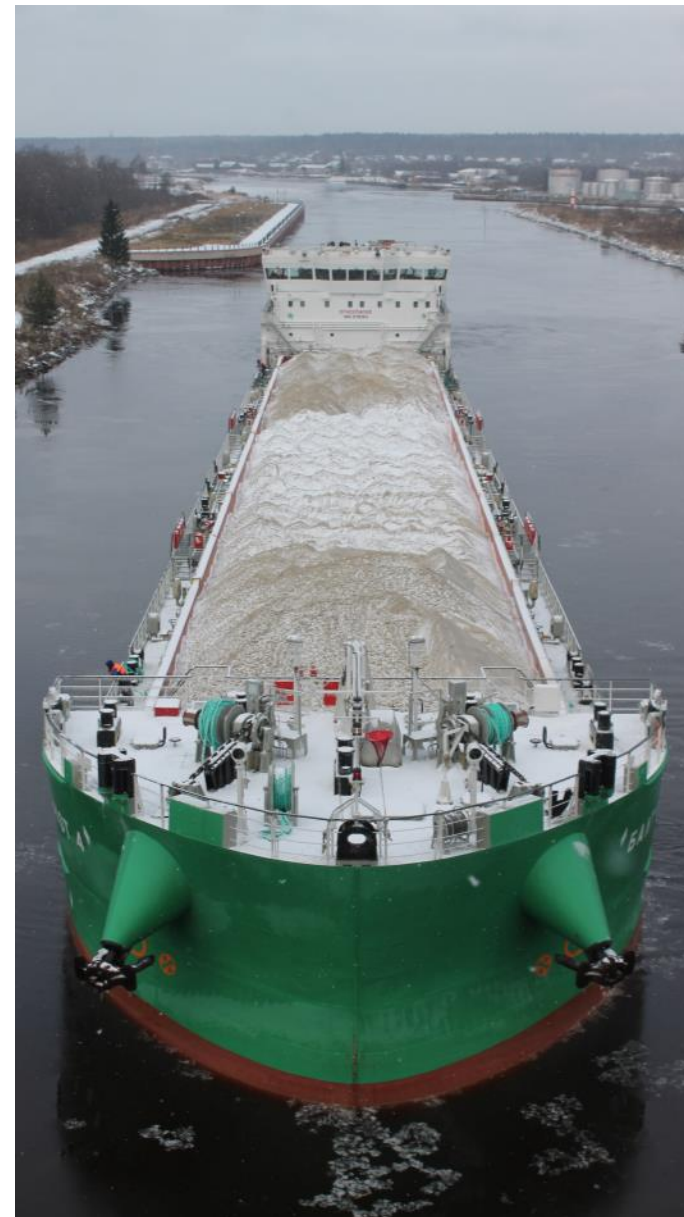
7030 / 5428 DWT river-sea oil product chemical tanker of “VF Tanker” type

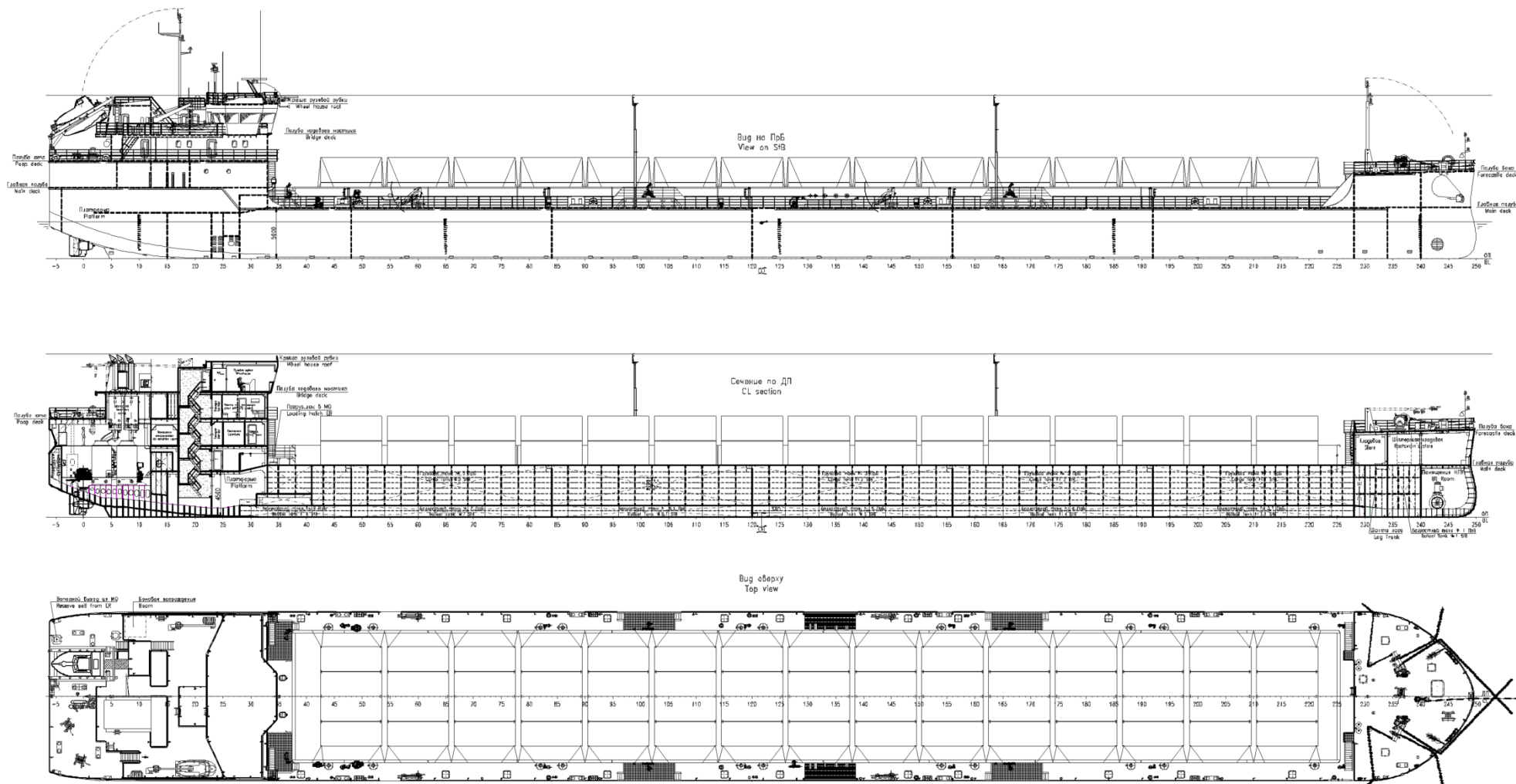
42 vessels built in 2012-2018 + 5 vessels built in 2017-2018 by RST27M modernized project (7902 / 5363 DWT)



MEB RST54 project - Significant Ship 2014.

5745 DWT river-sea combined dry-cargo open-deck vessel / tanker of “Balt Flot” type. 7 vessels built in 2014-2016



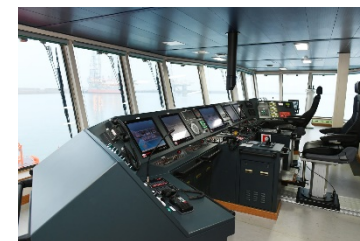
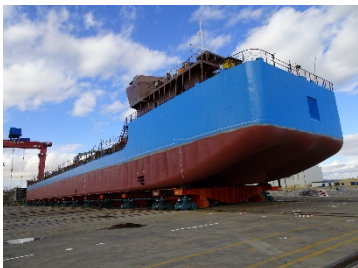


MEB RST12C project.

8009 / 5580 DWT river-sea oil product chemical tanker of “Lacin” type

23

1 vessel built in 2019 + 3 vessels under construction





Advantages of the biggest “superfull” river-sea tankers of “Volga-Don max” class of MEB RST12C project

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On December 13, 2019 Baku Shipyard put into operation the first built in Azerbaijan Caspian river-sea oil product chemical “superfull” tanker of new generation “Lacin” with 8009 tons deadweight. President of the Republic of Azerbaijan Ilham Aliyev took part in solemn ceremony.

New RST12C tankers of "Lachin" type have boosted "Caspian" function:

- 8009 t deadweight at Caspian draught of 4.54 m (RST27 tanker has 7022 t deadweight), increased on 979 t;
- 5580 t deadweight at river draught of 3.60 m (RST27 tanker has 5428 t deadweight), increased on 152 t;
- capacity of cargo tanks is foreseen for oil and oil products at Caspian Region; capacity is increased by trunk raising up to 9190 m³ (RST27 has 8100 m³), i.e. there is 1090 m³ increase.

Simultaneous carriage of 2 sorts of cargo is provided.

MEB RST12C is designed for transportation of crude oil and oil products with density of up to 1.015 t/m³, including gasoline, without restriction on the flash point, ensuring the carriage of goods with a temperature of 50°C, as well as chemical cargoes (IMO 2).

MEB RSD44 river-sea dry-cargo vessel of “Kapitan Ruzmankin” type with low air draught passes St. Petersburg bridges



MEB RSD44 PROJECT.

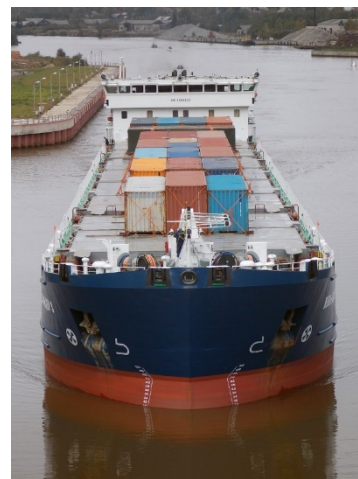
5716 DWT river-sea dry-cargo vessel of “Kapitan Ruzmankin” type with low air draught

10 vessels built (2011-2012)



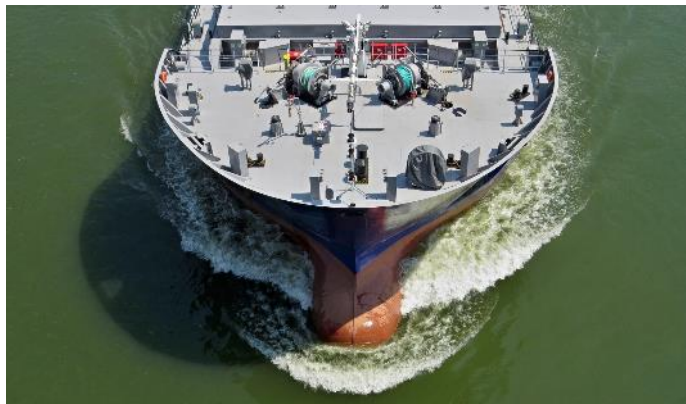
MEB RSD49 project - Significant Ship 2012. 7143 DWT river-sea dry-cargo vessel of “Neva-Leader” type

12 vessels built (2012-2017), 2 vessels under construction



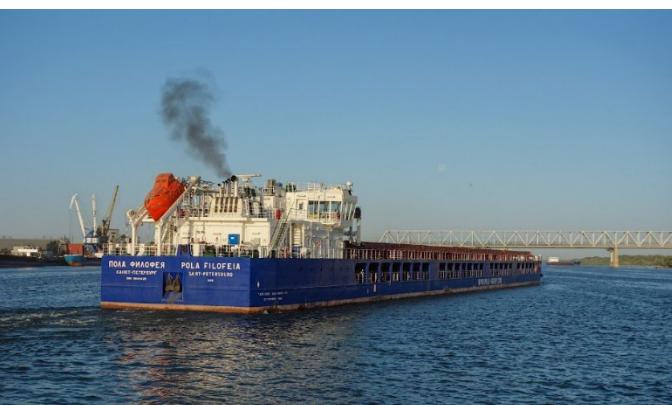
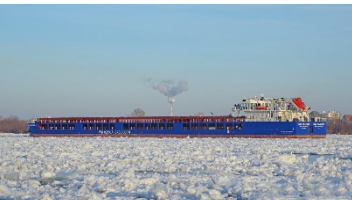
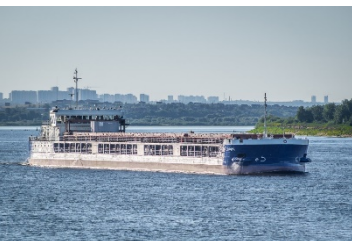
MEB RSD32M project – concept of 2019 year 6220 / 3833 DWT river-sea dry-cargo vessel of “Navis-1” type of “Azov 5000” class

8 vessels built in 2019





14 vessels built in 2018-2019,
27 vessels under construction,
20 vessels are in option





Advantages of the biggest “superfull” river-sea dry-cargo vessels of “Volga-Don max” class of MEB RSD59 project

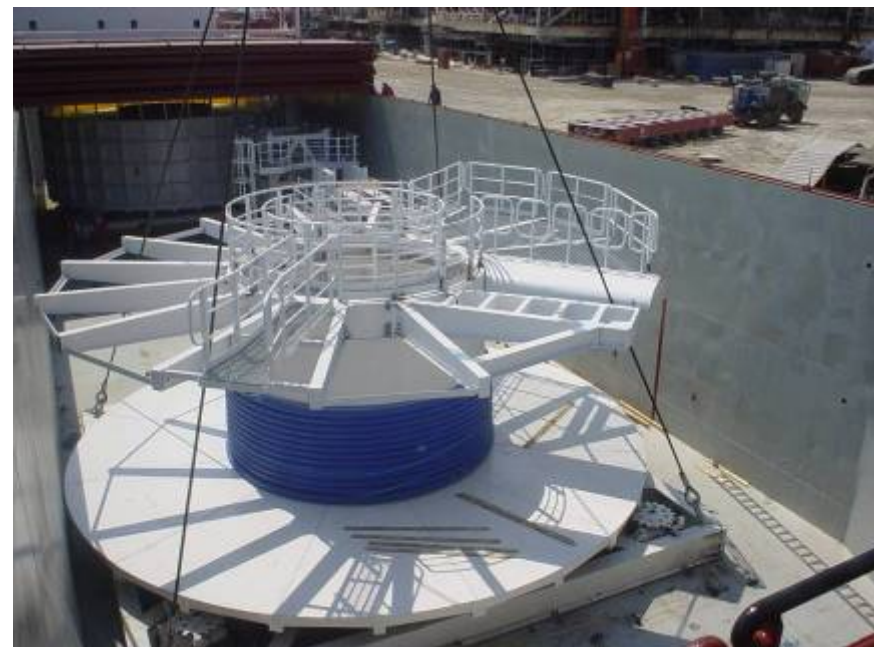
30

Constructed in 2018-2019 fourteen "superfull" RSD59 multipurpose dry-cargo vessels of "Volga-Don max" class have no analogues in the world and are significantly better than all other vessels at the domestic market due to their technical-economic parameters.

Advantages of the RSD59 project in comparison with the best of the previously constructed dry-cargo vessels of “Volga-Don max” class of RSD49 project (by the example of m/v "Pola Fiva" with increased marine function):

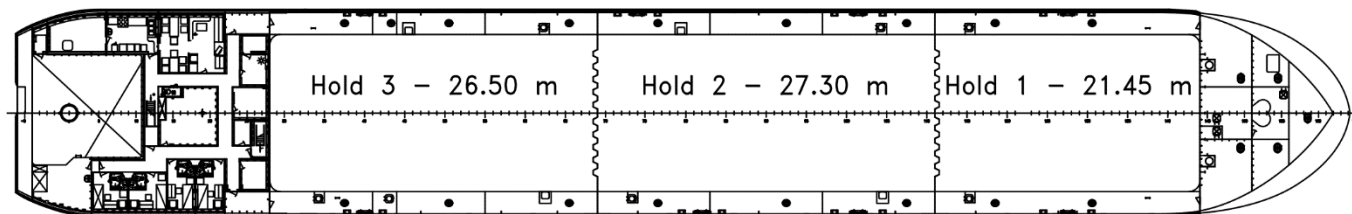
- deadweight at draught of 3.60 m is 5320 t (RSD49 has 4507 t), increase is 813 t;
- deadweight at the maximum draught of 4.706 m is 8144 t (RSD49 has 7143 t at maximum draught of 4.70 m), increase is 1000 t;
- the existence of a long $L = 77.35$ m hold (RSD49 vessel has $L = 52$ m cargo hold) that allows transportation of oversized and heavy cargo; this is relevant for the market of the Caspian region countries;
- the hold's height is increased up to 9000 mm, that is 620 mm bigger than for RSD49 project. Such height allows to load 9'6" containers ("high cube containers"), 3 ones in single stack.

Example of oversized and heavy cargo

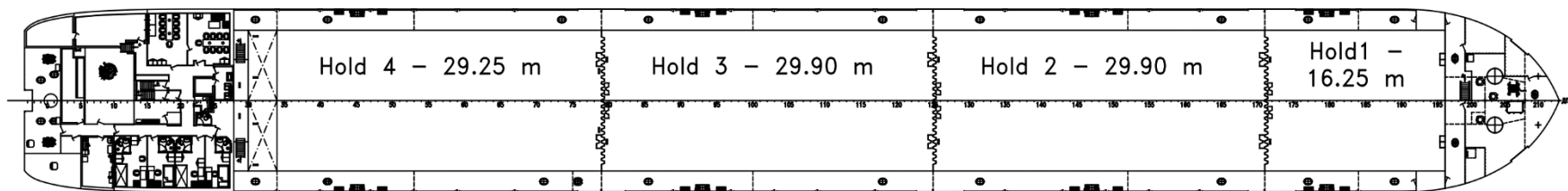


Comparison of holds' plans of river-sea dry-cargo vessels of new projects

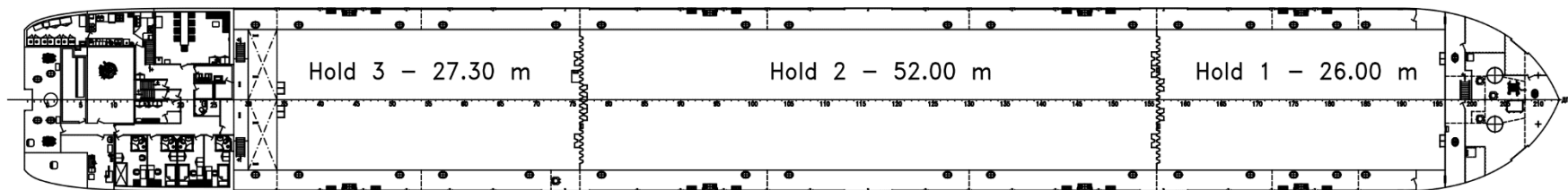
005RSD03



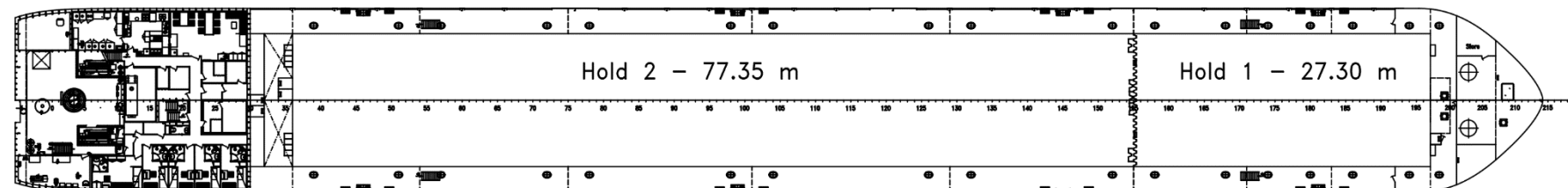
RSD19



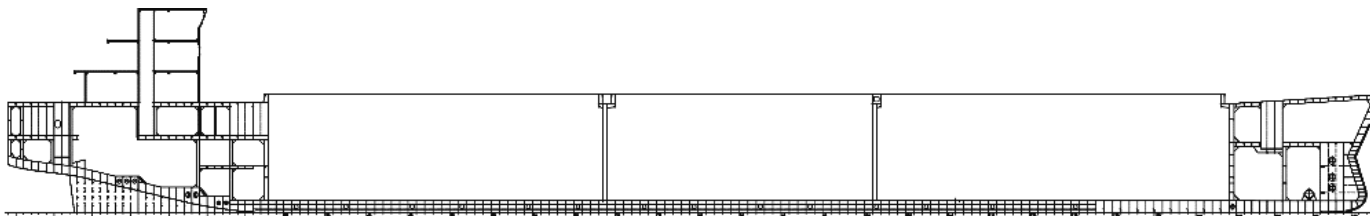
RSD49



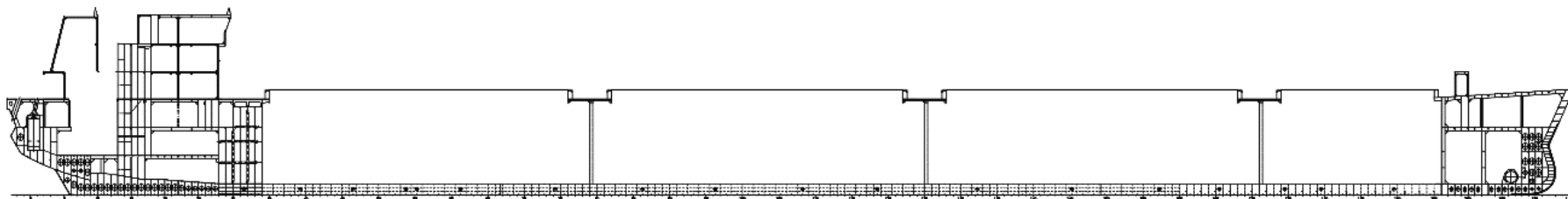
RSD59C



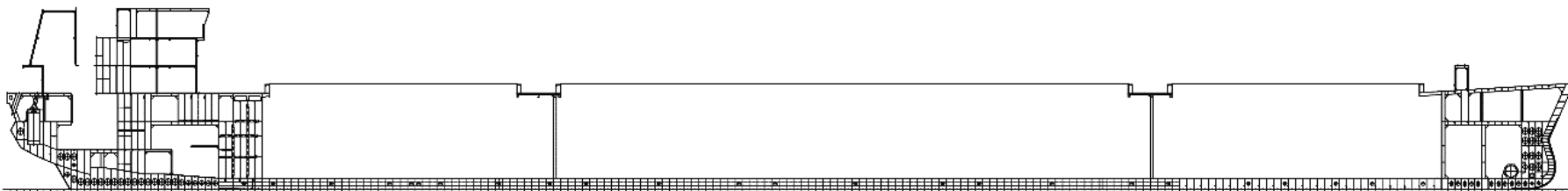
005RSD03



RSD19

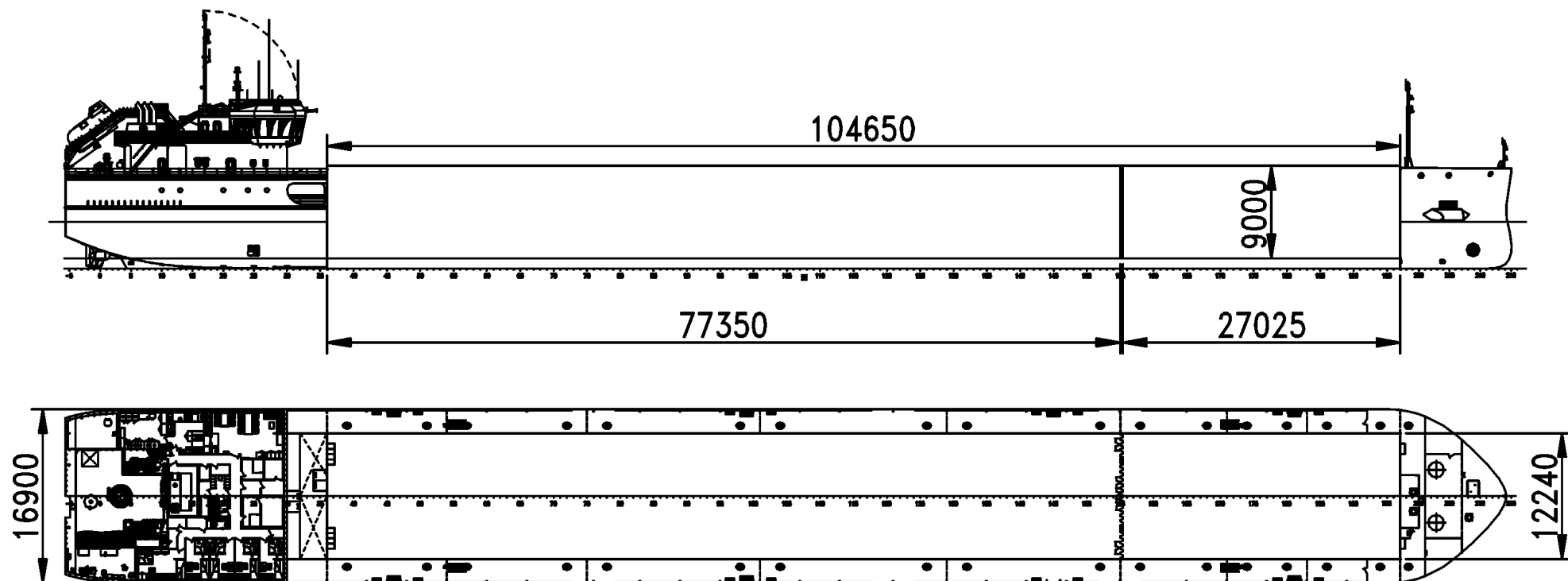


RSD49



RSD59



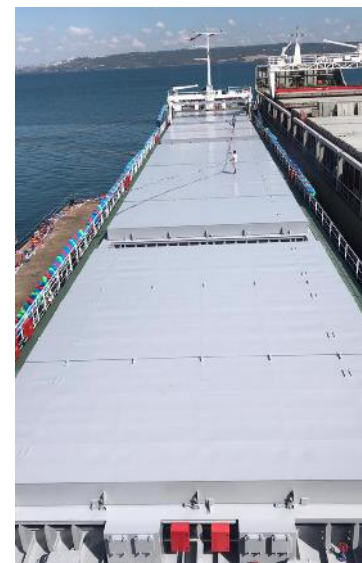
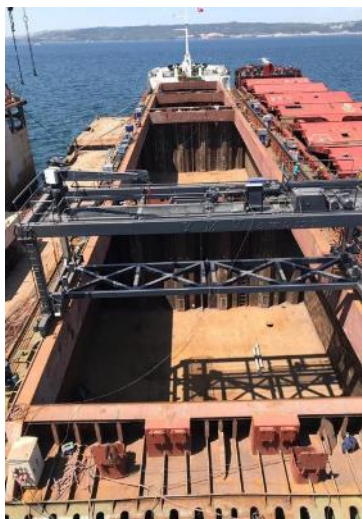




River-sea transportation of oversized cargoes on river-sea barges-pontoons of 16801 project



MEB RSD29 project. 6131 DWT river-sea dry-cargo vessel of "Mammad Amin Resulzadeh" type (rebuilding from 0201L river-sea tanker)



Grain loading on river-sea oil tanker of MEB RST25 project (tanker was specially refitted to be able to transport grain)





MEB RSD04L “Modulus-2” river-sea dry-cargo vessel (dimensional modernization of MEB 003RSD04/ALB03 project on Kherson Shipyard in 2019-2020)



MEB ROB20 oil barge of “Belmax” type 8 barges were built in 2018-2019



440 kW pusher tug of 81172 project of “BTP” type with MEB ROB07 river-sea oil barge



450 kW pusher tug of R-45B project of “Volgar” type with MEB ROB20 oil barge



662 kW pusher tug of 758AM project of “OTA-900” type with MEB 004ROB05 river-sea oil barge



Project	Forecast year of the series write-off	Remaining life time, years	Number of vessels in operation on 2019, un.	Forecast number of vessels on 2025, un.	Forecast number of vessels on 2030, un.
River pusher tugs 440-800 kW					
RT-600, 1741, 441 (662) kW	2042	23	269	210	130
Volgar, R-45, 440 kW	2038	19	72	50	30
Shluzovoi, 887, 440 kW	2032	13	92	55	20
BTP, 81170 and others, 442 kW	2044	25	28	23	14
Rechnoi, 908, 450 kW	2034	15	58	28	11
BK-600, 737, 441 (662) kW	2031	12	28	20	6
Plotovod, R-33 and modifications, 468 (588) kW	2039	20	138	111	70
BTK, 1721, 544 kW	2027	8	15	4	0
BTO, 81200, 544 kW	2036	17	8	5	3
OTA-800, 758, 588 kW	2032	13	69	39	7
BT, R-131, 600 kW	2025	6	2	1	0
OTA-900, 758B, 662 kW	2034	15	40	18	6
OT-800, 758, 800 kW	2028	9	10	4	0
Ozernoi, CH-800, CH-1100, 3801C, 800 (1100) kW	2024	5	6	0	0
Totally for the group			835	568	297

1100 kW pusher tug of R-153 project of “OT-1500” type with MEB 004ROB05 river-sea oil barge



1766 kW pusher tug of “OT-2400” type



Tugs, bunkering vessels, icebreakers of “classic” series – prognosis up to 2030

Type	Number of vessels in operation on 2019, un.	Forecast number of vessels on 2025, un.	Forecast number of vessels on 2030, un.
River and river-sea icebreakers	20	12	6
Sea icebreakers (part of the series)	17	7	1
Bunkering vessels	69	45	17
River auxiliary fleet (buoy laying and sounding vessels), part of the series	101	82	54
River port tugs	252	184	105
Sea port tugs	290	143	63
River pusher tugs up to 400 kW	858	574	297
River pusher tugs 440-800 kW	835	568	297
River pusher tugs 900-1800 kW	202	135	58
Totally	2644	1750	898

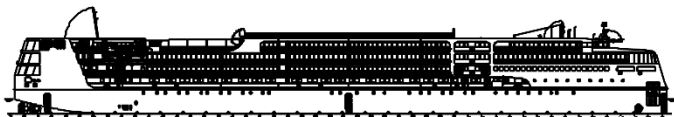
MEB lineup of river and river-sea cruise passenger vessels.

3 vessel built, 2 are under construction

PV500VB



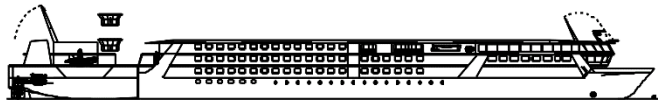
PV300VD



PV300



PV250



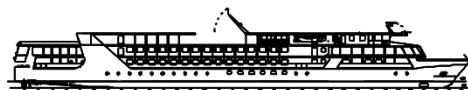
PV200D



PV200BB



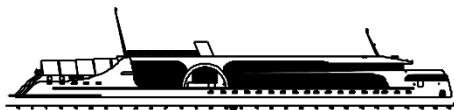
PV150



PV06



PV09



PV08



PV01



0 20 40 60 80 100 120 140 160 180 200 m



PV08 “Alexander Grin” converted cruise passenger vessel (conversion from Q-065 project)

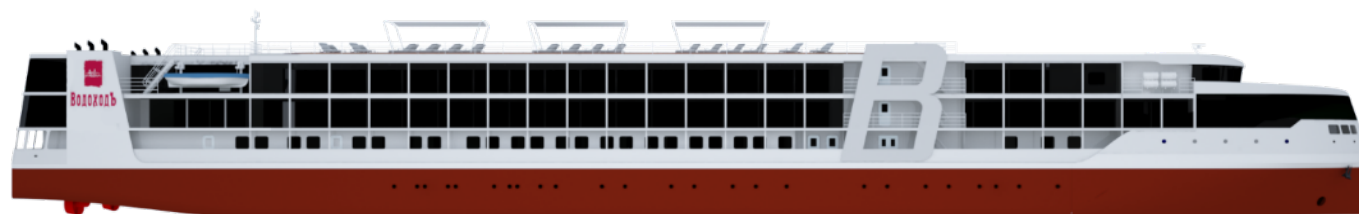
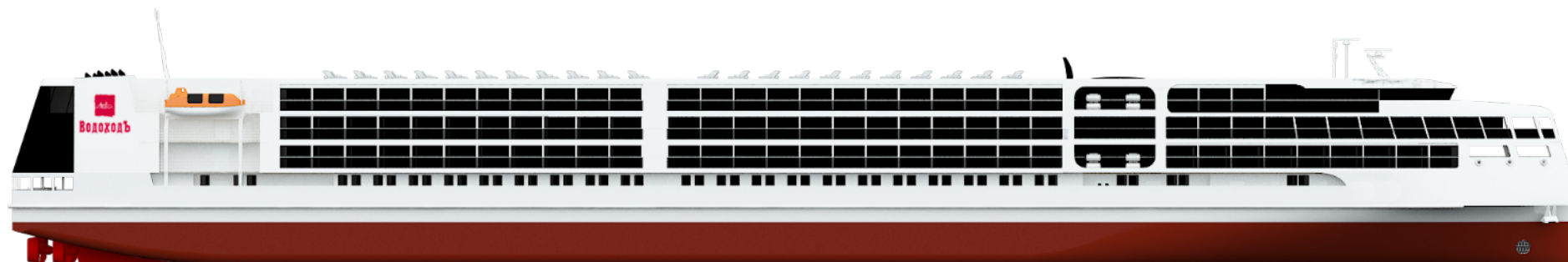
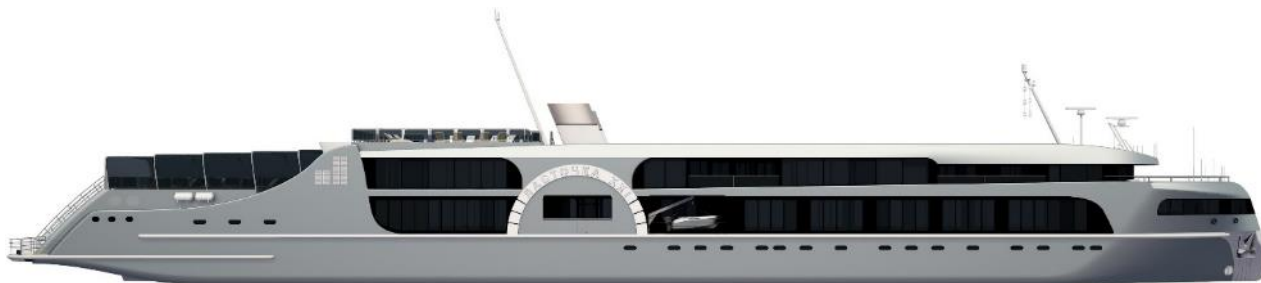
50



PV17 “Viking Sineus” modernized river-sea cruise passenger vessel (modernization of 301 project)



MEB lineup of river-sea cruise passenger vessels of new generation



The first river-sea passenger vessel of new generation of MEB PV09 project. In operation since 2017

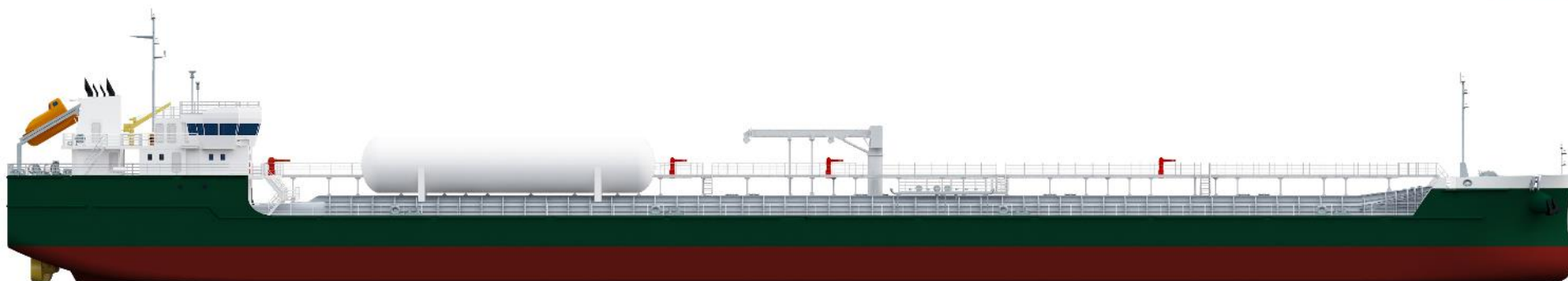
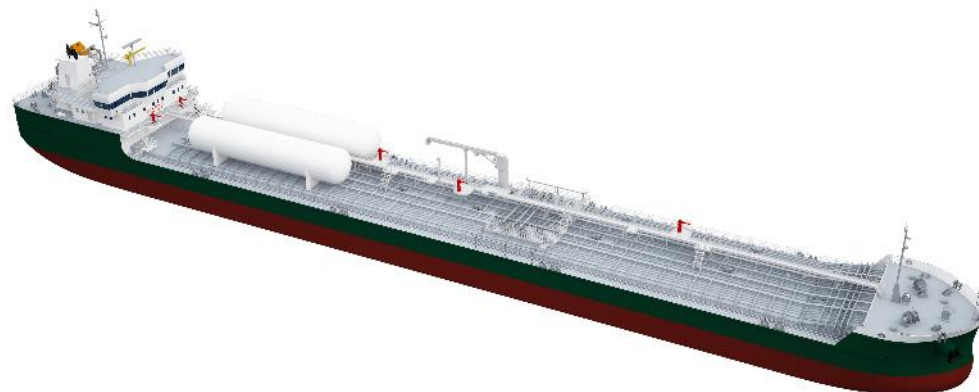
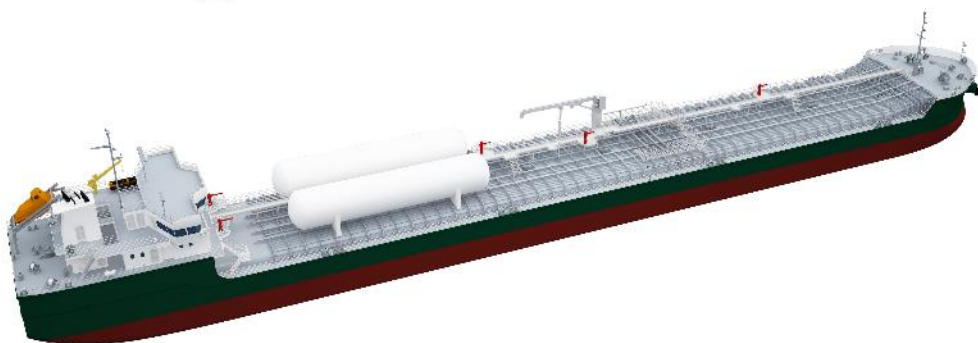


MEB PV300 diesel river-sea cruise passenger vessel for 329 passengers – launched on September 11, 2019

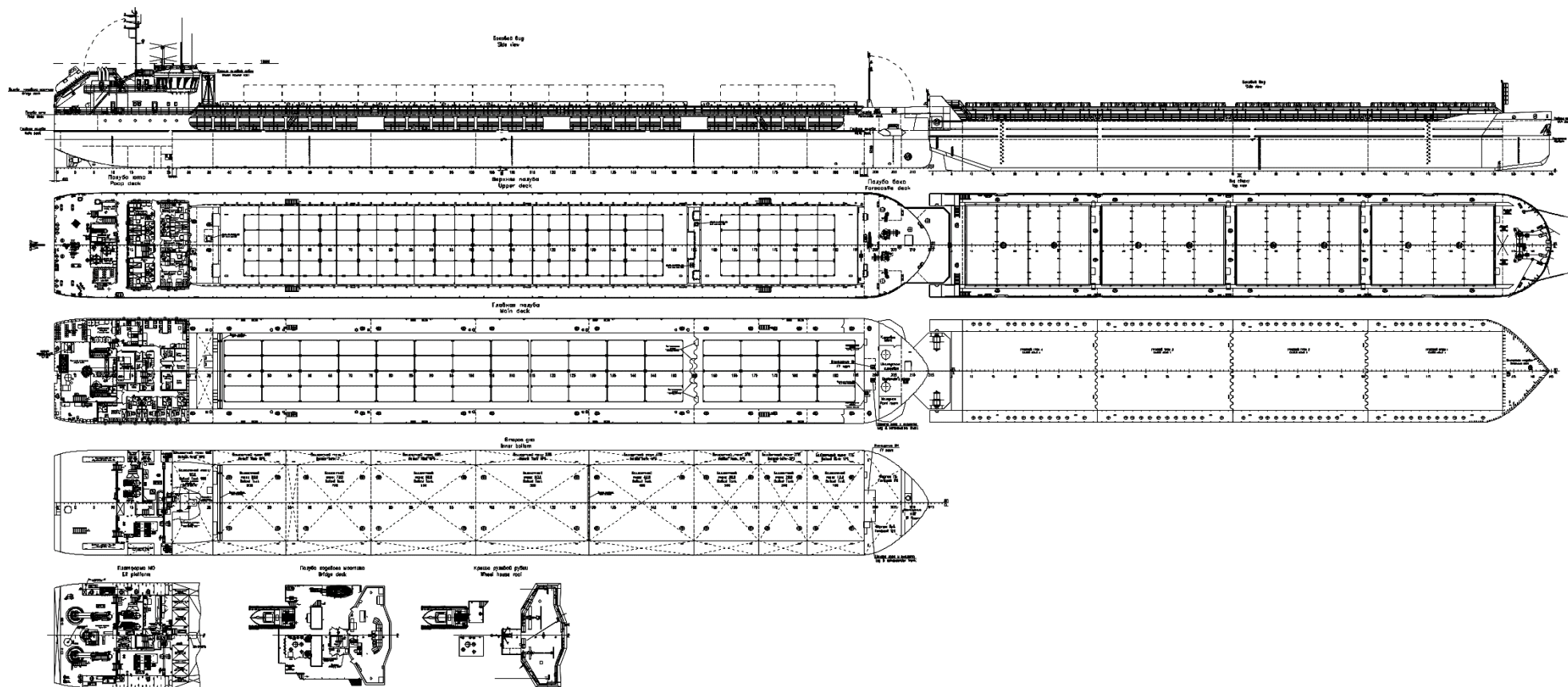


MEB PV300VD diesel-electric river-sea cruise passenger vessel for 310 passengers – launched on May 24, 2019





General arrangement of MEB RSD59 river-sea dry-cargo vessel with towing barge RDB59



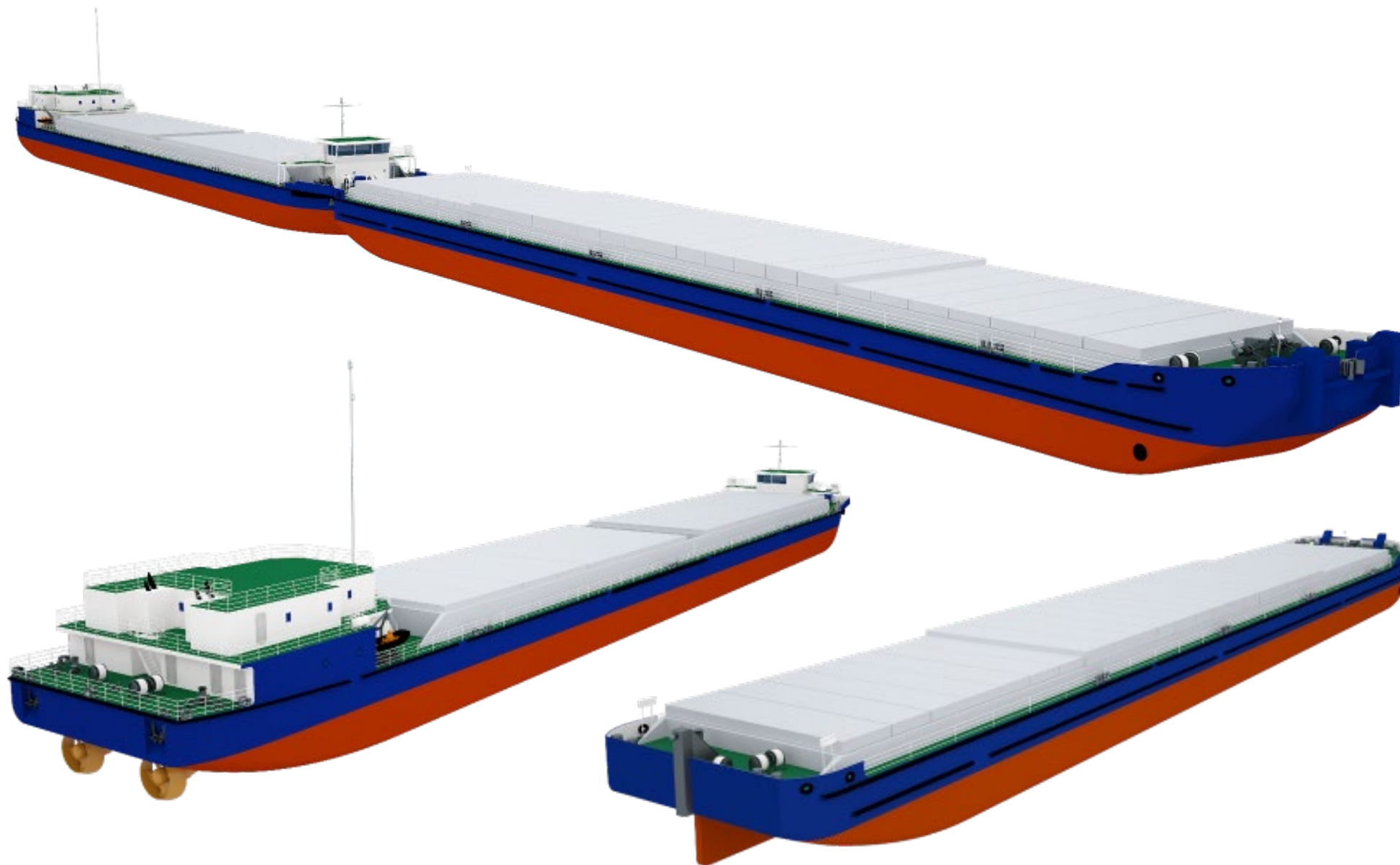
Model trials of river-sea integrated (self-propelled vessel- pusher plus barge) vessel in experimental tank

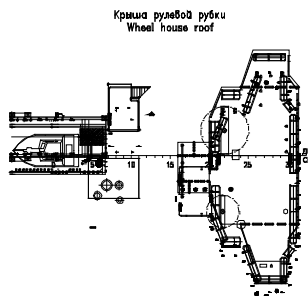
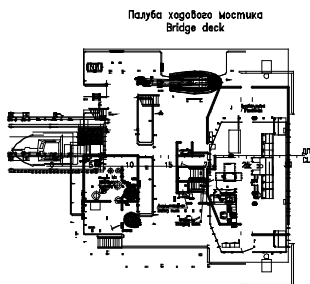
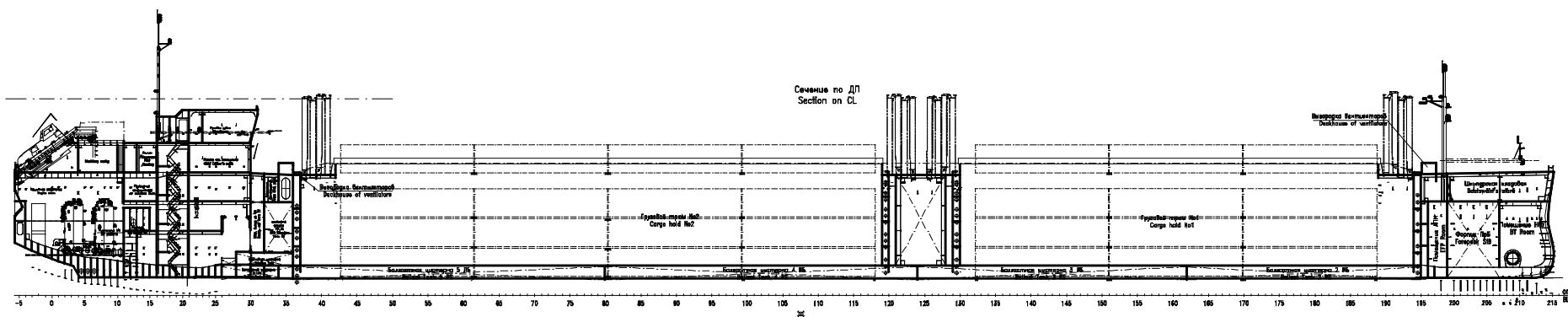
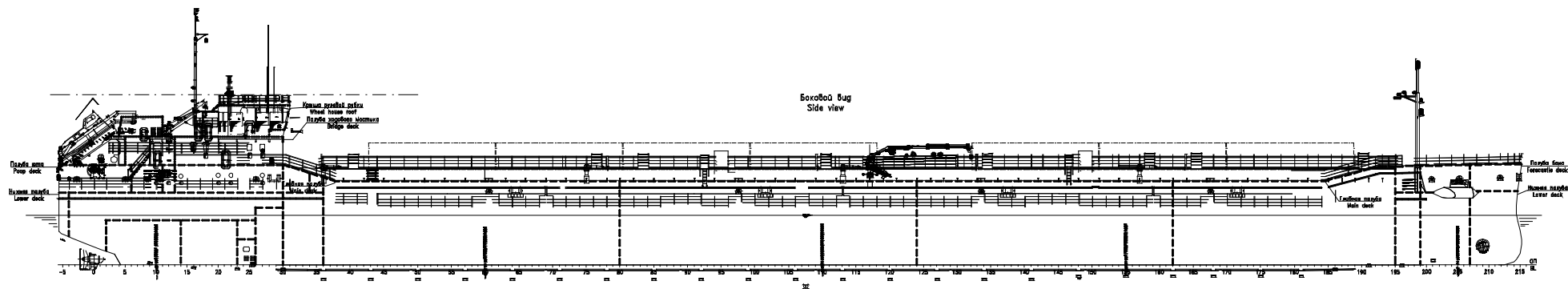


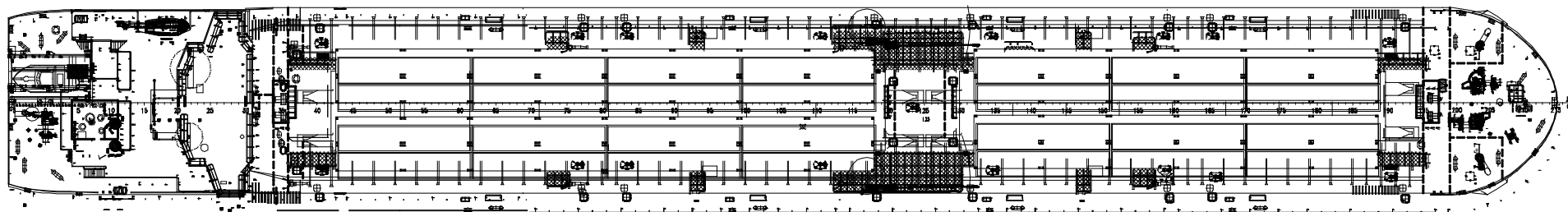


RSD67 + RDB67 river-sea dry-cargo integrated vessel with low air draught to pass Dnipro two-stage railroad bridge without drawing

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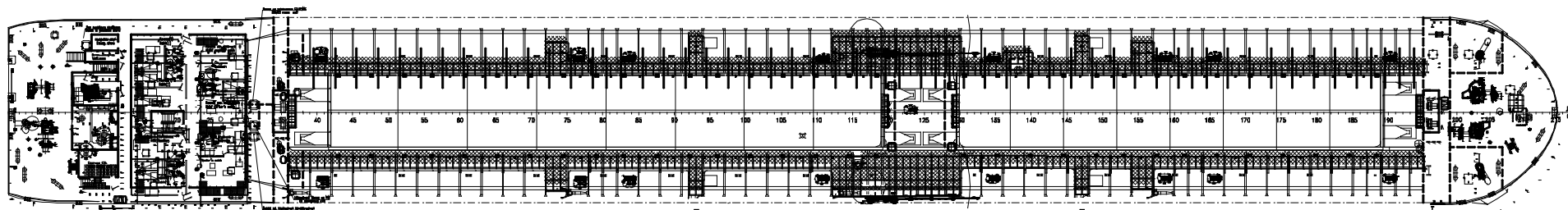




Палуба юта
Poop deck

Палуба трюка / Trunk deck

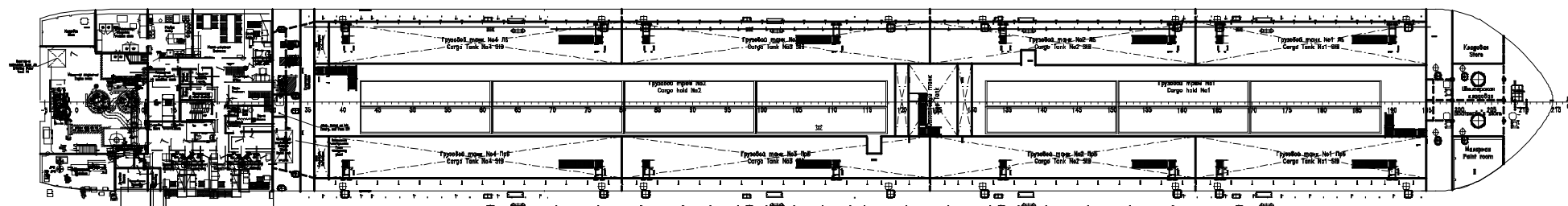
Палуба бока
Forecastle deck



Нижняя палуба
Lower deck

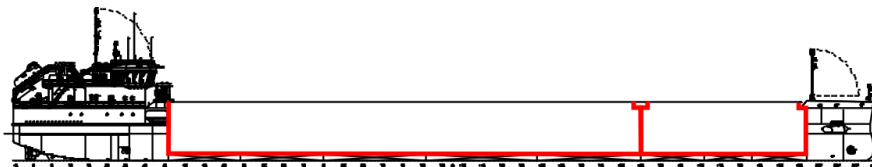
Главная палуба / Main deck

Нижняя палуба
Lower deck

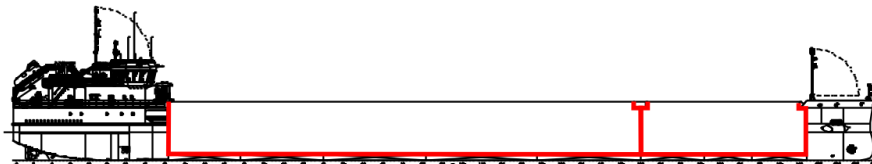


Comparison of views of new “superfull” river-sea dry-cargo vessels

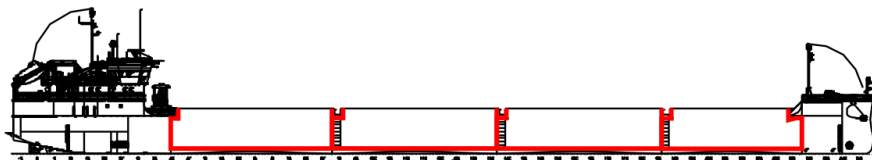
RSD59



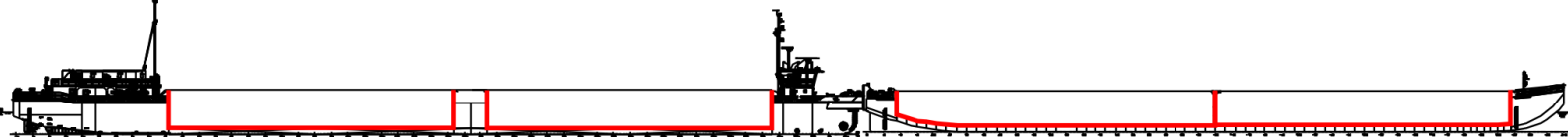
RSD59C



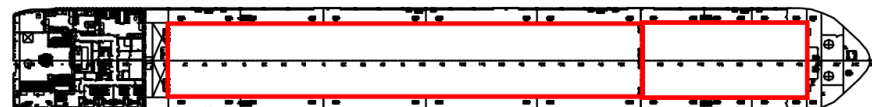
RSD62



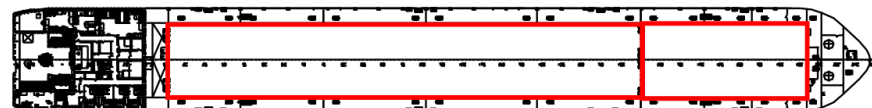
RSD67+RDB67



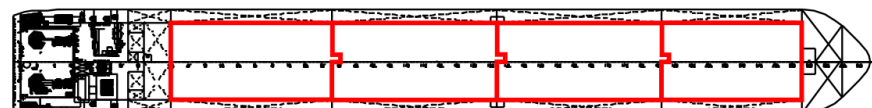
RSD59



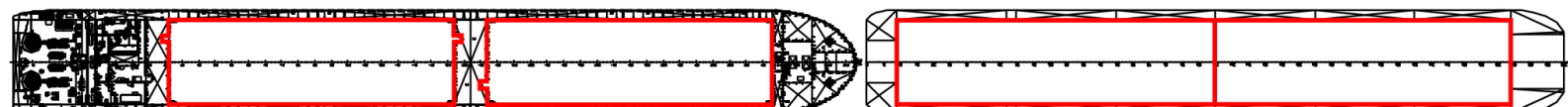
RSD59C



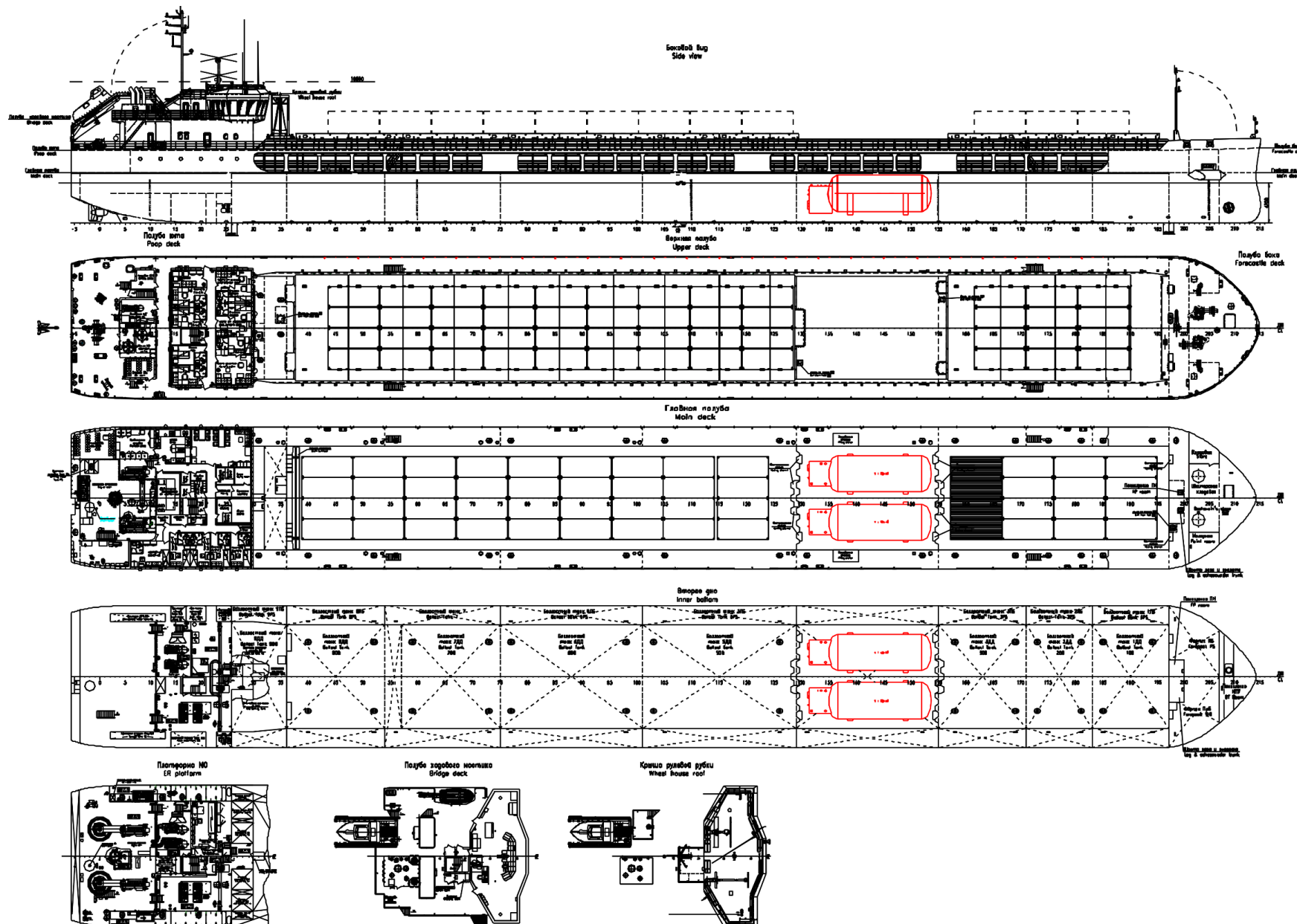
RSD62



RSD67+RDB67

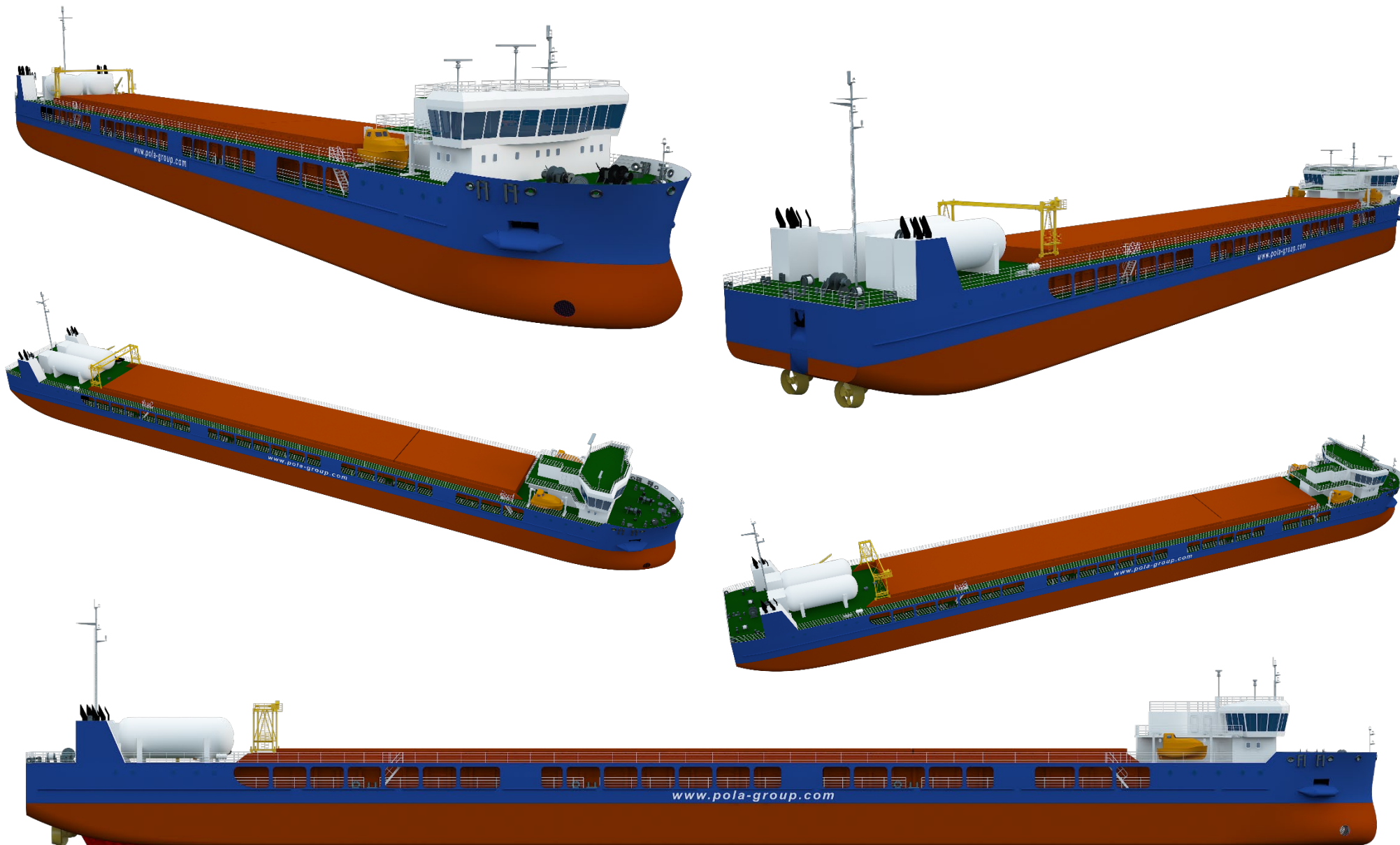


General arrangement of MEB RSD59 river-sea dry-cargo vessel. Variant with usage of LNG fuel



General view of LNG-fuelled river-sea dry-cargo vessel of MEB RSD59NG project

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Main problems of river-sea vessels' fleet:

- Moral and technical aging;
- Competition with other types of transport, especially railway.

Perspectives of river-sea vessels' fleet:

- Building of the most effective “Volga-Don max”, including LNG fuelled ones (if there will be LNG bunkering stations in native ports);
- Building of river-sea pusher tugs, barges for operation on raid transshipment complexes;
- Development of river-sea cruises and building of river-sea cruise passenger vessels as universal ones which can be operated both on river “major” lines and at sea routes in accordance with assigned class of sailing area.