

LAMPIRAN

1. Perhitungan Emisi Auxiliary dengan BBM Konvensional Engine pada Setiap Pelabuhan : ➤ Pelabuhan Belawan

Class Kapal	Fuel Type	Tahun																													
		2020						2021						2022						2023						2024					
		Auxiliary engine																													
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox
Solid Bulk	BFO	15091	16902	1931619	1449	362	10865	17299	19375	2214296	1661	415	12455	18474	20691	2364659	1773	443	13301	19502	21843	2496290	1872	468	14042	18217	20403	2331812	1749	437	13116
Liquid Bulk	BFO	40227	45054	5149006	3862	965	28963	44467	49803	5691769	4269	1067	32016	44022	49304	5634769	4226	1057	31696	47205	52870	6042292	4532	1133	33988	45975	51492	5884834	4414	1103	33102
General Cargo	MDO	26217	17827	1677875	1573	419	3146	27126	18446	1736075	1628	434	3255	36329	24704	2325087	2180	581	4360	28779	19570	1841876	1727	460	3454	29163	19831	1866431	1750	467	3500
Container	MSD	3732	4180	477673	358	90	2687	88882	99548	11376915	8533	2133	63995	5799	6495	742321	557	139	4176	6790	7604	869056	652	163	4888	106168	118908	13589526	10192	2548	76441
Ro-Ro Cargo	MDO	7982	5428	510853	479	128	958	13149	8942	841561	789	210	1578	14052	9555	899327	843	225	1686	19950	13566	1276814	1197	319	2394	18152	12343	1161740	1089	290	2178
Passanger	MSD	10304	11540	1318875	989	247	7419	11272	12624	1442765	1082	271	8116	12481	13979	1597627	1198	300	8987	14418	16148	1845449	1384	346	10381	15408	17257	1972199	1479	370	11094
Tugs dan Pandu	HSD	39389	28524	2178441	7473	5979	9510	34283	24826	1896034	6504	5204	8277	35776	25907	1978613	6787	5430	8638	36448	26394	2015805	6915	5532	8800	43355	31396	2397810	8225	6580	10467
Other Ship	MDO	1513	1029	96807	91	24	182	2174	1478	139124	130	35	261	7063	4803	452034	424	113	848	1998	1358	127842	120	32	240	11509	7826	736596	691	184	1381
Total Manoevring		144453	130483	13341148	16273	8214	63729	238652	235042	25338539	24595	9769	129954	173997	155439	15994438	17989	8288	73690	175090	159353	16515425	18398	8454	78186	287948	279457	29940948	29588	11980	151279
Auxiliary engine																															
Solid Bulk	BFO	43610	239856	7752937	5815	1454	43610	49992	274958	8887517	6666	1666	49992	53387	293629	9491030	7118	1780	53387	56359	309974	10019354	7515	1879	56359	52645	289550	9359189	7019	1755	52645
Liquid Bulk	BFO	116249	639372	20666557	15500	3875	116249	128503	706769	22845045	17134	4283	128503	127216	699691	22616266	16962	4241	127216	136417	750294	24251941	18189	4547	136417	132862	730742	23619951	17715	4429	132862
General Cargo	MDO	109714	598442	15958453	14961	3990	29922	113520	619200	16511998	15480	4128	30960	152035	829281	22114163	20732	5529	41464	120438	656936	17518290	16423	4380	32847	122044	665694	17751836	16642	4438	33285
Container	MSD	20920	115057	3719023	2789	697	20920	498248	2740364	88577413	66433	16608	498248	32510	178803	5779500	4335	1084	32510	38060	209330	6766224	5075	1269	38060	595148	3273316	105804163	79353	19838	595148
Ro-Ro Cargo	MDO	35033	191091	5095757	4777	1274	9555	57713	314796	8394573	7870	2099	15740	61674	336404	8970787	8410	2243	16820	87561	477608	12736217	11940	3184	23880	79670	434563	11588354	10864	2897	21728
Passanger	MSD	80245	437702	11672045	10943	2918	21885	87783	478818	12768470	11970	3192	23941	97206	530213	14139003	13255	3535	26511	112284	612459	16332228	15311	4083	30623	119996	654524	17453962	16363	4363	32726
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Ship	MDO	6330	34528	920742	863	230	1726	9097	49621	1323226	1241	331	2481	29558	161225	4299346	4031	1075	8061	8359	45597	1215921	1140	304	2280	48165	262719	7005848	6568	1751	13136
Total Hotelling		288472	1579233	46049860	38954	10106	170707	661400	3629167	111515769	88755	22615	524906	387510	2120473	61187066	52390	13639	214179	391636	2143538	62188123	52915	13752	224326	805372	4417776	134808311	108167	27630	617072
Total Emisi		432925	1709716	59391008	55227	18321	234436	900052	3864209	136854309	113351	32385	654859	561507	2275912	77181505	70379	21927	287869	566725	2302892	78703547	71313	22206	302512	1093319	4697233	164749259	137755	39610	768351

➤ Pelabuhan Tanjung Priok

Class Kapal	Fuel Type	Tahun																																		
		2020							2021							2022							2023							2024						
		Auxiliary engine																																		
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox					
Solid Bulk	BFO	19593	21944	2507897	1881	470	14107	15912	17821	2036689	1528	382	11456	18139	20316	2321798	1741	435	13060	19790	22164	2533065	1900	475	14248	24957	27952	3194524	2396	599	17969					
Liquid Bulk	BFO	60826	68125	7785769	5839	1460	43795	26708	29912	3418564	2564	641	19229	28421	31832	3637943	2728	682	20463	28421	31832	3637943	2728	682	20463	50100	56112	6412761	4810	1202	36072					
General Cargo	MDO	121117	82360	7751509	7267	1938	14534	132245	89926	8463662	7935	2116	15869	153910	104659	9850269	9235	2463	18469	153910	104659	9850269	9235	2463	18469	130727	88894	8366500	7844	2092	15687					
Container	MSD	408182	457164	52247305	39185	9796	293891	356343	399104	45611918	34209	8552	256567	378339	423739	48427352	36321	9080	272404	378339	423739	48427352	36321	9080	272404	410934	460246	52599536	39450	9862	295872					
Ro-Ro Cargo	MDO	122075	83011	7812816	7325	1953	14649	159552	108496	10211356	9573	2553	19146	338160	229949	21642268	20290	5411	40579	338160	229949	21642268	20290	5411	40579	107708	73242	6893342	6463	1723	12925					
Passanger	MSD	72953	81707	9337931	7003	1751	52526	33380	37385	4272606	3204	801	24033	29778	33352	3811619	2859	715	21440	29778	33352	3811619	2859	715	21440	54185	60687	6935673	5202	1300	39013					
Tugs dan Pandu	HSD	144891	104922	8013794	27482	21986	34976	122883	88985	6796546	23308	18647	29664	134177	97164	7421245	25450	20360	32390	134177	97164	7421245	25450	20360	32390	173121	125364	9575226	32836	26269	41790					
Other Ship	MDO	94393	64187	6041145	5664	1510	11327	45032	30622	2882047	2702	721	5404	98271	66824	6289365	5896	1572	11793	98271	66824	6289365	5896	1572	11793	179533	122082	11490090	10772	2873	21544					
High Speed Ferry	HSD	5464	3716	349713	328	87	656	7541	5128	482598	452	121	905	179378	121977	11480221	10763	2870	21525	48593	33043	3109953	2916	777	5831	2788	1896	178401	167	45	335					
Total Manoevring		1049494	967136	101847879	101974	40952	480461	899595	807379	84175986	85475	34533	382274	1358576	1129813	114882079	115282	43588	452124	1229441	1042727	106723079	107593	41535	437618	1134052	1016475	105646053	109938	45965	481207					
		Auxiliary engine																																		
Solid Bulk	BFO	124872	832482	22199531	20812	5550	41624	123946	676068	18028470	16902	4507	33803	141296	770708	20552209	19268	5138	38535	154153	840837	22422318	21021	5606	42042	194407	1060404	28277450	26510	7069	53020					
Liquid Bulk	BFO	387666	2584443	68918478	64611	17230	129222	208042	1134773	30260622	28369	7565	56739	221392	1207595	32202535	30190	8051	60380	239699	1307452	34865381	32686	8716	65373	390258	2128680	56764808	53217	14191	106434					
General Cargo	MDO	454248	2044115	66072389	49554	12389	371657	405802	2231913	72142639	54107	13527	405802	472285	2597569	83961818	62971	15743	472285	443392	2438655	78825224	59119	14780	443392	443392	2438655	78825224	59119	14780	443392					
Container	MSD	2742983	15086409	487641509	365731	91433	2742983	2394626	13170441	425711233	319283	79821	2394626	2542436	13983398	451988616	338991	84748	2542436	2737043	15053738	486585466	364939	91235	2737043	2761476	15188116	490929003	368197	92049	2761476					
Ro-Ro Cargo	MDO	526565	2872170	76591213	71804	19148	143609	688220	3753929	100104765	93848	25026	187696	1458636	7956194	212165184	198905	53041	397810	449341	2450952	65358729	61274	16340	122548	464594	2534151	67577354	63354	16894	126708					
Passanger	MSD	514926	2832091	91542338	68657	17164	514926	235606	1295834	41885547	31414	7854	235606	210186	1156022	37366366	28025	7006	210186	246811	1357461	43877529	32908	8227	246811	382457	2103513	67992335	50994	12749	382457					
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Other Ship	MDO	354018	1931009	51493569	48275	12873	96550	168891	921226	24566024	23031	6142	46061	368564	2010350	53609346	50259	13402	100518	405951	2214278	59047422	55357	14762	110714	673333	3672725	97939342	91818	24485	183636					
High Speed Ferry	HSD	13158	46523	1503765	1128	282	8459	18158	64201	2075172	1556	389	11673	431943	1527228	49364950	37024	9256	277678	117012	413721	13372798	10030	2507	75222	6712	23733	767125	575	144	4315					
Total Hotelling		3582906	19760470	606173955	483401	123248	2834321	2970304	16273869	500342130	397958	101381	2360405	4092717	21846345	658847717	535943	137470	2869879	3355382	18253966	563048406	446134	113521	2690201	3721641	20404985	622350848	499649	127653	2843006					
Total Emisi		4632400	20727605	708021834	585375	164200	3314782	3869899	17081249	584518116	483432	135914	2742679	5451293	22976158	773729796	651225	181058	3322003	4584823	19296693	669771485	553727	155056	3127819	4855693	21421459	727996901	609587	173618	3324213					

➤ Pelabuhan Tanjung Perak

Class Kapal	Fuel Type	Tahun																																		
		2020							2021							2022							2023							2024						
		Auxiliary engine																																		
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox					
Solid Bulk	BFO	28263	31655	3617677	2713	678	20349	32179	36040	4118882	3089	772	23169	3238	3627	414488	311	78	2331	30472	34129	3900473	2925	731	21940	33789	37843	4324947	3244	811	24328					
Liquid Bulk	BFO	20856	23359	2669547	2002	501	15016	31390	35157	4017923	3013	753	22601	23045	25811	2949811	2212	553	16593	23302	26098	2982680	2237	559	16778	30317	33956	3880638	2910	728	21829					
General Cargo	MDO	131035	89104	8386246	7862	2097	15724	150914	102621	9658476	9055	2415	18110	156450	106386	10012803	9387	2503	18774	147683	100424	9451704	8861	2363	17722	103113	70117	6599234	6187	1650	12374					
Container	MSD	309817	346995	39656552	29742	7436	223068	282563	316471	36168058	27126	6782	203445	271842	304462	34795714	26097	6524	195726	307559	344466	39967563	29526	7381	221443	337790	378325	43237151	32428	8107	243209					
Ro-Ro Cargo	MDO	220922	150227	14139018	13255	3535	26511	334719	227609	21422035	20083	5356	40166	392165	266672	25098568	23530	6275	47060	519935	353556	33275842	31196	8319	62392	355346	241636	22742175	21321	5686	42642					
Passanger	MSD	82599	92511	10572632	7929	1982	59471	49656	55615	6355975	4767	1192	35752	48868	54732	6255099	4691	1173	35185	64950	72744	8313549	6235	1559	46764	102631	114946	13136741	9853	2463	73894					
Tugs dan Pandu	HSD	133722	96834	7396030	25363	20291	32280	127852	92583	7071388	24250	19401	30863	133462	96574	7395770	25104	20032	32020	141517	102479	7827204	26842	21474	34161	156675	113455	8665599	29717	23774	37820					
Other Ship	MDO	57340	38991	3669745	3440	917	6881	26396	17949	1689330	1584	422	3167	56920	38706	3642902	3415	911	6830	44601	30329	2854474	2676	714	5352	83553	56816	5347387	5013	1337	10026					
High Speed Ferry	HSD	955	649	61094	57	15	115	1260	857	80644	76	20	151	3553	2416	227377	213	57	426	3990	2713	255384	239	64	479	1130	768	72291	68	18	136					
Total Manoevring		985508	870323	90168539	92366	37452	399415	1036929	884902	90582711	93043	37112	377425	1089543	899386	90792533	94961	38105	354946	1284010	1066938	108228873	110737	43164	427031	1204344	1047862	108006163	110740	44573	466257					
Auxiliary engine																																				
Solid Bulk	BFO	168431	926369	29943232	22457	5614	168431	191766	1054711	34091673	25569	6392	191766	19298	106137	3430684	2573	643	19298	181597	998784	32283918	24213	6053	181597	201360	1107477	35797252	26848	6712	201360					
Liquid Bulk	BFO	124288	683584	22095632	16572	4143	124288	187065	1028859	33256039	24942	6236	187065	137336	755350	24415362	18312	4578	137336	138867	763767	24687409	18516	4629	138867	180674	993704	32119740	24090	6022	180674					
General Cargo	MDO	466391	2543953	67838736	63599	16960	127198	537145	2929882	78130176	73247	19533	146494	556850	3037366	80996422	75934	20249	151868	525646	2867157	76457530	71679	19114	143358	367009	2001866	53383086	50047	13346	100093					
Container	MSD	1926497	10595735	342488401	256866	64217	1926497	1757028	9663653	312360498	234270	58568	1757028	1690360	9296980	300508441	225381	56345	1690360	1912458	10518521	339992591	254994	63749	1912458	2100441	11552426	373411759	280059	70015	2100441					
Ro-Ro Cargo	MDO	813787	4438836	118368958	110971	29592	221942	1232969	6725283	179340881	168132	44835	336264	1444575	7879502	210120067	196988	52530	393975	1915227	10446695	278578527	261167	69645	522335	1308951	7139731	190392826	178493	47598	356987					
Passanger	MSD	497879	2738337	88511903	66384	16596	497879	299311	1646213	53210918	39908	9977	299311	294561	1620086	52366404	39275	9819	294561	391496	2153229	69599329	52199	13050	391496	618627	3402448	109978103	82484	20621	618627					
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Other Ship	MDO	204089	1113211	29685618	27830	7421	55661	93950	512455	13665469	12811	3416	25623	202596	1105068	29468477	27627	7367	55253	158748	865900	23090658	21647	5773	43295	297389	1622120	43256543	40553	10814	81106					
High Speed Ferry	HSD	1806	9851	262703	246	66	493	2384	13004	346769	325	87	650	6722	36665	977721	917	244	1833	7550	41181	1098149	1030	275	2059	2137	11657	310852	291	78	583					
Total Hotelling		2942218	16134912	489436628	395448	101226	2185671	3011132	16501841	493081696	405443	104330	2060941	3046609	16686007	491598505	410904	106243	1921140	3662112	20058663	592051678	493812	127601	2334825	3553610	19482001	587055112	478005	122644	2547909					
Total Emisi		3927725	17005236	579605167	487814	138678	2585086	4048061	17386743	583664406	498487	141442	2438366	4136152	17585394	582391038	505864	144348	2276086	4946122	21125601	700280551	604550	170765	2761856	4757955	20529863	695061275	588745	167217	3014166					

➤ Pelabuhan Tanjung Pinang

Class Kapal	Fuel Type	Tahun																													
		2020						2021						2022						2023						2024					
		Auxiliary engine																													
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox
Liquid Bulk	BFO	145	163	18579	14	3	105	145	163	18579	14	3	105	145	163	18579	14	3	105	160	180	20522	15	4	115	130	146	16696	13	3	94
General Cargo	MDO	3206	2180	205169	192	51	385	3065	2084	196139	184	49	368	2874	1954	183948	172	46	345	2740	1863	175375	164	44	329	2622	1783	167777	157	42	315
Passanger	MSD	2218	2484	283890	213	53	1597	1786	2000	228599	171	43	1286	2505	2805	320593	240	60	1803	2190	2453	280328	210	53	1577	2990	3349	382747	287	72	2153
Tugs dan Pandu	HSD	15409	11159	852138	2925	2340	3722	3898	2824	215462	742	594	943	3454	2502	190878	657	526	836	3682	2667	203485	701	561	891	119225	86336	6594197	22614	18092	28780
Other Ship	MDO	9035	6144	578226	542	145	1084	870	592	55704	52	14	104	927	631	59344	56	15	111	247	168	15787	15	4	30	475	323	30424	29	8	57
High Speed Ferry	HSD	779	530	49870	47	12	94	822	559	52637	49	13	99	905	615	57893	54	14	109	1582	1076	101224	95	25	190	500	340	31998	30	8	60
Total Manoevrng		30792	22659	1987872	3933	2605	6985	10587	8222	767121	1212	716	2904	10810	8670	831234	1194	665	3308	10601	8406	796721	1200	691	3131	125942	92277	7223839	23129	18224	31459
		Auxiliary engine																													
Liquid Bulk	BFO	781	4296	138876	104	26	758	758	4167	134696	101	25	758	758	4167	134696	101	25	758	837	4603	148784	112	28	837	681	3745	121048	91	23	681
General Cargo	MDO	9854	53750	1433333	1344	358	2629	9214	50261	1340281	1257	335	2513	8642	47137	1256980	1178	314	2357	8239	44940	1198396	1123	300	2247	7882	42993	1146474	1075	287	2150
Passanger	MSD	14188	78036	2522378	1892	473	13528	10893	59911	1936523	1452	363	10893	15277	84021	2715826	2037	509	15277	13358	73468	2374729	1781	445	13358	18238	100310	3242347	2432	608	18238
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Ship	MDO	27772	148170	3951208	3704	988	7409	2617	14274	380647	357	95	714	2788	15207	405516	380	101	760	742	4045	107878	101	27	202	1429	7796	207898	195	52	390
High Speed Ferry	HSD	1474	8042	214442	201	54	402	1556	8488	226340	212	57	424	1711	9335	248938	233	62	467	2992	16322	435265	408	109	816	946	5160	137593	129	34	258
Total Hotelling		37849	204606	5782167	5071	1329	17307	17527	95971	2812941	2365	613	10711	20423	111907	3333369	2751	709	13733	18317	100365	2985537	2468	636	12222	20423	112003	3398752	2745	703	15202
Total Emisi		68641	227265	7770038	9004	3934	24293	28114	104192	3580062	3578	1329	13616	31232	120576	4164603	3945	1374	17041	28918	108771	3782258	3668	1326	15353	146365	204279	10622591	25874	1977	46661

➤ **Pelabuhan Makassar**

Class Kapal	Fuel Type	Tahun																													
		2020						2021						2022						2023						2024					
		Auxiliary engine																													
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox
Solid Bulk	BFO	5256	5886	672732	505	126	3784	5699	6383	729502	547	137	4103	5740	6429	734731	551	138	4133	5567	6235	712574	534	134	4008	7797	8733	998058	749	187	5614
Liquid Bulk	BFO	14263	15975	1825702	1369	342	10270	13785	15439	1764428	1323	331	9925	1617	1811	206942	155	39	1164	14206	15911	1818419	1364	341	10229	15725	17612	2012764	1510	377	11322
General Cargo	MDO	27734	18859	1774965	1664	444	3328	32165	21872	2058549	1930	515	3860	37164	25271	2378493	2230	595	4460	45014	30610	2880904	2701	720	5402	42687	29027	2731941	2561	683	5122
Container	MSD	71009	79530	9089163	6817	1704	51127	61292	68647	7845324	5884	1471	44130	71009	79530	9089163	6817	1704	51127	62004	69445	7936571	5952	1488	44643	59526	66670	7619378	5715	1429	42859
Ro-Ro Cargo	MDO	453106	308112	28998758	27186	7250	54373	391099	265947	25030319	23466	6258	46932	353422	240327	22618983	21205	5655	42411	395648	269040	25321442	23739	6330	47478	379835	258288	24309444	22790	6077	45580
Passanger	MSD	73632	82468	9424876	7069	1767	53015	90135	100952	11537333	8653	2163	64897	93153	104332	11923607	8943	2236	67070	105545	118210	13509761	10132	2533	75992	4713	5278	603255	452	113	3393
Tugs dan Pandu	HSD	42614	30859	2356836	8084	6468	10288	40733	29497	2252825	7728	6183	9834	42534	30801	2352423	8069	6456	10269	45589	33013	2521363	8648	6919	11006	57259	41464	3166864	10862	8690	13823
Other Ship	MDO	23558	16020	1507739	1414	377	2827	23192	15771	1484288	1392	371	2783	16467	11198	1053916	988	263	1976	17407	11837	1114056	1044	279	2089	23846	16215	1526153	1431	382	2862
High Speed Ferry	HSD	505	343	32303	30	8	61	1508	1026	96520	90	24	181	2023	1376	129484	121	32	243	949	646	60763	57	15	114	870581	591995	55717185	52235	13929	104470
Total Manoevring		711676	558052	55683076	54138	18486	189072	659608	525533	52799088	51013	17452	186646	623129	501075	50487743	49080	17118	182852	691930	554947	55875854	54172	18759	200961	1461969	1035282	98685043	98304	31867	235045
		Auxiliary engine																													
Solid Bulk	BFO	157473	866103	27995253	20996	5249	157473	179290	986096	31873813	23905	5976	179290	18042	99232	3207498	2406	601	18042	169783	933807	30183663	22638	5659	169783	188260	1035430	33468434	25101	6275	188260
Liquid Bulk	BFO	116202	639113	20658183	15494	3873	116202	174896	961926	31092542	23319	5830	174896	128402	706210	22827002	17120	4280	128402	129833	714079	23081351	17311	4328	129833	168920	929058	30030165	22523	5631	168920
General Cargo	MDO	420061	2291242	61099789	57281	15275	114562	483786	2638834	70368900	65971	17592	131942	501534	2735641	72950420	68391	18238	136782	473429	2582340	68862411	64559	17216	129117	330551	1803005	48080131	45075	12020	90150
Container	MSD	1855521	10205366	329870407	247403	61851	1855521	1692295	9307624	300852480	225639	56410	1692295	1628084	8954460	289437078	217078	54269	1628084	1841999	10130996	327466548	245600	61400	1841999	2023056	11126811	359654483	269741	67435	2023056
Ro-Ro Cargo	MDO	770169	4200920	112024527	105023	28006	210046	1166883	6364816	169728430	159120	42432	318241	1367148	7457171	198857888	186429	49714	372859	1812574	9886765	263647059	247169	65912	494338	1238793	6757050	180188004	168926	45047	337853
Passanger	MSD	471194	2591566	83767774	62826	15706	471194	283269	1557978	50358878	37769	9442	283269	278773	1533251	49559629	37170	9292	278773	370513	2037819	65868890	49402	12350	370513	585469	3220081	104083412	78063	19516	585469
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Ship	MDO	183815	1002627	26736715	25066	6684	50131	84617	461549	12307973	11539	3077	23077	182470	995293	26541145	24882	6635	49765	142979	779883	20796884	19497	5199	38994	267847	1460983	38959535	36525	9740	73049
High Speed Ferry	HSD	1806	9851	262703	246	66	493	2384	13004	346769	325	87	650	6722	36665	977721	917	244	1833	7550	41181	1098149	1030	275	2059	2137	11657	310852	291	78	583
Total Hotelling		2783369	15264751	463690745	374034	95697	2082936	2847194	15604278	466850848	383312	98592	1962562	2877822	15762545	465050867	388075	100293	1830177	3464061	18974809	560703469	467043	120637	2223645	3363523	18440852	556342511	452371	116019	2427138
Total Emisi		3495045	15822803	519373821	428172	114184	2272007	3506802	16129811	519649936	434325	116044	2149208	3500952	16263620	515538609	437154	117410	2013029	4155991	19529756	616579323	521216	139396	2424606	4825492	19476134	655027554	550675	147886	2662183

2. Perhitungan Emisi Auxiliary dengan BBM B40 Engine pada Setiap Pelabuhan :

➤ Pelabuhan Belawan

Class Kapal	Fuel Type	Tahun																													
		2020						2021						2022						2023						2024					
		Auxiliary engine																													
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox
Solid Bulk	BFO	3622	0	1382315	0	85	2173	4152	0	1584606	0	97	2491	4434	0	1692209	0	103	2660	4681	0	1786407	0	109	2808	4372	0	1668703	0	102	2623
Liquid Bulk	BFO	9654	0	3684757	0	225	5793	10672	0	4073172	0	249	6403	10565	0	4032382	0	247	6339	11329	0	4324016	0	264	6798	11034	0	4211334	0	257	6620
General Cargo	MDO	3146	0	1200729	0	73	1888	3255	0	1242378	0	76	1953	4360	0	1663891	0	102	2616	3454	0	1318093	0	81	2072	3500	0	1335665	0	82	2100
Container	MSD	896	0	341835	0	21	537	21332	0	8141605	0	498	12799	1392	0	531224	0	32	835	1629	0	621918	0	38	978	25480	0	9725004	0	595	15288
Ro-Ro Cargo	MDO	958	0	365579	0	22	575	1578	0	602242	0	37	947	1686	0	643581	0	39	1012	2394	0	913720	0	56	1436	2178	0	831370	0	51	1307
Passanger	MSD	2473	0	943820	0	58	1484	2705	0	1032479	0	63	1623	2996	0	1143302	0	70	1797	3460	0	1320650	0	81	2076	3698	0	1411355	0	86	2219
Tugs dan Pandu	HSD	9510	0	1560492	0	5530	7880	8277	0	1358195	0	4814	6859	8638	0	1417349	0	5023	7157	8800	0	1443991	0	5118	7292	10467	0	1717634	0	6087	8673
Other Ship	MDO	182	0	69278	0	4	109	261	0	99561	0	6	157	848	0	323487	0	20	509	240	0	91487	0	6	144	1381	0	527127	0	32	829
Total Manoevring		30440	0	9548805	0	6019	20438	52232	0	18134238	0	5839	33232	34917	0	11447424	0	5637	22925	35987	0	11820281	0	5752	23604	62110	0	21428192	0	7292	39659
Auxiliary engine																															
Solid Bulk	BFO	14537	0	5548196	0	339	8722	16664	0	6360130	0	389	9998	17796	0	6792018	0	415	10677	18786	0	7170100	0	438	11272	17548	0	6697669	0	409	10529
Liquid Bulk	BFO	38750	0	14789505	0	904	23250	42834	0	16348485	0	999	25701	42405	0	16184765	0	989	25443	45472	0	17355295	0	1061	27283	44287	0	16903027	0	1033	26572
General Cargo	MDO	29922	0	11420268	0	698	17953	30960	0	11816399	0	722	18576	41464	0	15825448	0	967	24878	32847	0	12536526	0	766	19708	33285	0	12703658	0	777	19971
Container	MSD	6973	0	2661426	0	163	4184	166083	0	63388211	0	3875	99650	10837	0	4135955	0	253	6502	12687	0	4842079	0	296	7612	198383	0	75716104	0	4629	119030
Ro-Ro Cargo	MDO	9555	0	3646651	0	223	5733	15740	0	6007366	0	367	9444	16820	0	6419719	0	392	10092	23880	0	9114355	0	557	14328	21728	0	8292916	0	507	13037
Passanger	MSD	21885	0	8352807	0	511	13131	23941	0	9137437	0	559	14365	26511	0	10118224	0	619	15906	30623	0	11687751	0	715	18374	32726	0	12490491	0	764	19636
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Other Ship	MDO	1726	0	658906	0	40	1036	2481	0	946933	0	58	1489	8061	0	3076720	0	188	4837	2280	0	870144	0	53	1368	13136	0	5013560	0	307	7882
Total Hotelling		86343	0	32954431	0	2015	51806	209092	0	79803472	0	4879	125455	114726	0	43786994	0	2677	68835	116603	0	44503375	0	2721	69962	252766	0	96472198	0	5898	151659
Total Emisi		116783	0	42503236	0	8033	72244	261324	0	97937710	0	10718	158687	149643	0	55234418	0	8313	91761	152589	0	56323656	0	8473	93566	314876	0	117900390	0	13190	191319

➤ **Pelabuhan Tanjung Priok**

Class Kapal	Fuel Type	Tahun																													
		2020						2021						2022						2023						2024					
		Auxiliary engine																													
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox
Solid Bulk	BFO	4702	0	1794714	0	110	2821	3819	0	1457506	0	89	2291	4353	0	1661536	0	102	2612	4749	0	1812725	0	111	2850	5990	0	2286081	0	140	3594
Liquid Bulk	BFO	14598	0	5571691	0	341	8759	6410	0	2446410	0	150	3846	6821	0	2603403	0	159	4093	6821	0	2603403	0	159	4093	12024	0	4589132	0	281	7214
General Cargo	MDO	14534	0	5547174	0	339	8720	15869	0	6056808	0	370	9522	18469	0	7049099	0	431	11082	18469	0	7049099	0	431	11082	15687	0	5987277	0	366	9412
Container	MSD	97964	0	37389477	0	2286	58778	85522	0	32641029	0	1996	51313	90801	0	34655824	0	2119	54481	90801	0	34655824	0	2119	54481	98624	0	37641543	0	2301	59174
Ro-Ro Cargo	MDO	14649	0	5591047	0	342	8789	19146	0	7307501	0	447	11488	40579	0	15487748	0	947	24348	40579	0	15487748	0	947	24348	12925	0	4933048	0	302	7755
Passanger	MSD	17509	0	6682457	0	409	10505	8011	0	3057584	0	187	4807	7147	0	2727690	0	167	4288	7147	0	2727690	0	167	4288	13004	0	4963341	0	303	7803
Tugs dan Pandu	HSD	34976	0	5740555	0	20337	28980	29664	0	4868599	0	17248	24579	32390	0	5316092	0	18834	26838	32390	0	5316092	0	18834	26838	41790	0	6859062	0	24299	34626
Other Ship	MDO	11327	0	4323194	0	264	6796	5404	0	2062465	0	126	3242	11793	0	4500827	0	275	7076	11793	0	4500827	0	275	7076	21544	0	8222596	0	503	12926
High Speed Ferry	HSD	656	0	250263	0	15	393	905	0	345359	0	21	543	21525	0	8215533	0	502	12915	5831	0	2225560	0	136	3499	335	0	127668	0	8	201
Total Manoevring		210915	0	72890572	0	24442	134544	174750	0	60243260	0	20634	111631	233879	0	82217752	0	23535	147731	218581	0	76378967	0	23178	138552	221923	0	75609748	0	28502	142706
Auxiliary engine																															
Solid Bulk	BFO	41624	0	15886540	0	971	24974	33803	0	12901624	0	789	20282	38535	0	14707674	0	899	23121	42042	0	16045971	0	981	25225	53020	0	20236050	0	1237	31812
Liquid Bulk	BFO	129222	0	49319786	0	3015	77533	56739	0	21655258	0	1324	34043	60380	0	23044939	0	1409	36228	65373	0	24950538	0	1525	39224	106434	0	40622316	0	2483	63860
General Cargo	MDO	123886	0	47283053	0	2891	74331	135267	0	51627076	0	3156	81160	157428	0	60085176	0	3673	94457	147797	0	56409301	0	3449	88678	147797	0	56409301	0	3449	88678
Container	MSD	914328	0	348968455	0	21334	548597	798209	0	304649601	0	18625	478925	847479	0	323454353	0	19775	508487	912348	0	348212724	0	21288	547409	920492	0	351321068	0	21478	552295
Ro-Ro Cargo	MDO	143609	0	54810587	0	3351	86165	187696	0	71637472	0	4380	112618	397810	0	151830709	0	9282	238686	122548	0	46772340	0	2859	73529	126708	0	48360044	0	2957	76025
Passanger	MSD	171642	0	65509985	0	4005	102985	78535	0	29974345	0	1832	47121	70062	0	26740306	0	1635	42037	82270	0	31399856	0	1920	49362	127486	0	48657014	0	2975	76491
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Ship	MDO	96550	0	36850086	0	2253	57930	46061	0	17580061	0	1075	27637	100518	0	38364188	0	2345	60311	110714	0	42255811	0	2583	66428	183636	0	70087842	0	4285	110182
High Speed Ferry	HSD	2820	0	1076132	0	66	1692	3891	0	1485045	0	91	2335	92559	0	35326792	0	2160	55536	25074	0	9569909	0	585	15044	1438	0	548974	0	34	863
Total Hotelling		1136576	0	433793236	0	26520	681946	938141	0	358057337	0	21890	562885	1235339	0	471487897	0	28825	741204	1055716	0	402931516	0	24633	633429	1166908	0	445369826	0	27228	700145
Total Emisi		1347491	0	506683809	0	50962	816489	1112891	0	418300597	0	42524	674516	1469218	0	553705649	0	52360	888935	1274296	0	479310483	0	47811	771982	1388831	0	520979574	0	55730	842851

➤ Pelabuhan Tanjung Perak

Class Kapal	Fuel Type	Tahun																													
		2020						2021						2022						2023						2024					
		Auxiliary engine																													
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox
Solid Bulk	BFO	6783	0	2588900	0	158	4070	7723	0	2947575	0	180	4634	777	0	296618	0	18	466	7313	0	2791276	0	171	4388	8109	0	3095040	0	189	4866
Liquid Bulk	BFO	5005	0	1910394	0	117	3003	7534	0	2875326	0	176	4520	5531	0	2110959	0	129	3319	5593	0	2134480	0	130	3356	7276	0	2777081	0	170	4366
General Cargo	MDO	15724	0	6001407	0	367	9435	18110	0	6911847	0	423	10866	18774	0	7165412	0	438	11264	17722	0	6763875	0	414	10633	12374	0	4722577	0	289	7424
Container	MSD	74356	0	28379220	0	1735	44614	67815	0	25882766	0	1582	40689	65242	0	24900683	0	1522	39145	73814	0	28172412	0	1722	44289	81070	0	30941586	0	1892	48642
Ro-Ro Cargo	MDO	26511	0	10118235	0	619	15906	40166	0	15330144	0	937	24100	47060	0	17961163	0	1098	28236	62392	0	23813025	0	1456	37435	42642	0	16274869	0	995	25585
Passanger	MSD	19824	0	7566040	0	463	11894	11917	0	4548495	0	278	7150	11728	0	4476305	0	274	7037	15588	0	5949384	0	364	9353	24631	0	9400980	0	575	14779
Tugs dan Pandu	HSD	32280	0	5298030	0	18770	26747	30863	0	5065478	0	17946	25573	32020	0	5297770	18187	18510	26487	34161	19522	5606895	19522	19864	28306	37820	21613	6207465	21613	21991	31337
Other Ship	MDO	6881	0	2626161	0	161	4128	3167	0	1208926	0	74	1900	6830	0	2606952	0	159	4098	5352	0	2042733	0	125	3211	10026	0	3826724	0	234	6016
High Speed Ferry	HSD	115	0	43720	0	3	69	151	0	57711	0	4	91	426	0	162717	0	10	256	479	0	182759	0	11	287	136	0	51733	0	3	81
Total Manoevring		187478	0	64532106	0	22391	119866	187447	0	64828268	0	21599	119523	188389	0	64978579	18187	22159	120309	222415	19522	77456839	19522	24256	141258	224084	21613	77298056	21613	26337	143095
Auxiliary engine																															
Solid Bulk	BFO	56144	0	21428126	0	1310	33686	63922	0	24396853	0	1492	38353	6433	0	2455083	0	150	3860	60532	0	23103179	0	1412	36319	67120	0	25617408	0	1566	40272
Liquid Bulk	BFO	41429	0	15812186	0	967	24858	62355	0	23798853	0	1455	37413	45779	0	17472244	0	1068	27467	46289	0	17666927	0	1080	27773	60225	0	22985689	0	1405	36135
General Cargo	MDO	127198	0	48547096	0	2968	76319	146494	0	55911907	0	3418	87896	151868	0	57963064	0	3544	91121	143358	0	54714920	0	3345	86015	100093	0	38202271	0	2336	60056
Container	MSD	642166	0	245093262	0	14984	385299	585676	0	223532981	0	13666	351406	563453	0	215051353	0	13147	338072	637486	0	243307198	0	14875	382492	700147	0	267222790	0	16337	420088
Ro-Ro Cargo	MDO	221942	0	84707785	0	5179	133165	336264	0	128340818	0	7846	201758	393975	0	150367173	0	9193	236385	522335	0	199357759	0	12188	313401	356987	0	136249866	0	8330	214192
Passanger	MSD	165960	0	63341331	0	3872	99576	99770	0	38079063	0	2328	59862	98187	0	37474708	0	2291	58912	130499	0	49807020	0	3045	78299	206209	0	78703080	0	4812	123725
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Ship	MDO	55661	0	21243770	0	1299	33396	25623	0	9779352	0	598	15374	55253	0	21088379	0	1289	33152	43295	0	16524252	0	1010	25977	81106	0	30955463	0	1892	48664
High Speed Ferry	HSD	493	0	187997	0	11	296	650	0	248156	0	15	390	1833	0	699682	0	43	1100	2059	0	785863	0	48	1235	583	0	222453	0	14	350
Total Hotelling		917694	0	350253087	0	21413	550616	924528	0	352861588	0	21572	554717	921747	0	351800180	0	21507	553048	1110097	0	423686982	0	25902	666058	1100728	0	420111315	0	25684	660437
Total Emisi		1105172	0	414785193	0	43804	670482	1111975	0	417689856	0	43172	674240	1110136	0	416778758	18187	43666	673357	1332511	19522	501143821	19522	50158	807316	1324812	21613	497409371	21613	52021	803532

➤ **Pelabuhan Tanjung Pinang**

Class Kapal	Fuel Type	Tahun																																		
		2020							2021							2022							2023							2024						
		Auxiliary engine																																		
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox					
Liquid Bulk	BFO	35	0	13295	0	1	21	35	0	13295	0	1	21	35	0	13295	0	1	21	38	0	14686	0	1	23	31	0	11948	0	1	19					
General Cargo	MDO	385	0	146824	0	9	231	368	0	140362	0	9	221	345	0	131638	0	8	207	329	0	125503	0	8	197	315	0	120065	0	7	189					
Passanger	MSD	532	0	203159	0	12	319	429	0	163591	0	10	257	601	0	229424	0	14	361	526	0	200609	0	12	315	718	0	273903	0	17	431					
Tugs dan Pandu	HSD	3722	2128	610416	2128	2165	3084	943	540	154344	540	550	782	836	479	136733	479	487	693	891	510	145764	510	519	739	28780	16447	4723649	16447	16735	23847					
Other Ship	MDO	1084	0	413793	0	25	651	104	0	39863	0	2	63	111	0	42468	0	3	67	30	0	11298	0	1	18	57	0	21772	0	1	34					
High Speed Ferry	HSD	94	0	35688	0	2	56	99	0	37669	0	2	59	109	0	41429	0	3	65	190	0	72439	0	4	114	60	0	22899	0	1	36					
Total Manoevring		5851	2128	1423176	2128	2215	4362	1977	540	549124	540	574	1403	2036	479	594988	479	515	1413	2003	510	570299	510	545	1406	29961	16447	5174237	16447	16763	24556					
Auxiliary engine																																				
Liquid Bulk	BFO	260	0	99383	0	6	152	253	0	96392	0	6	152	253	0	96392	0	6	152	279	0	106474	0	7	167	227	0	86625	0	5	136					
General Cargo	MDO	2687	0	1025729	0	63	1577	2513	0	959139	0	59	1508	2357	0	899526	0	55	1414	2247	0	857602	0	52	1348	2150	0	820445	0	50	1290					
Passanger	MSD	4729	0	1805077	0	110	2706	3631	0	1385824	0	85	2179	5092	0	1943513	0	119	3055	4453	0	1699416	0	104	2672	6079	0	2320304	0	142	3648					
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Other Ship	MDO	7574	0	2827583	0	173	4445	714	0	272400	0	17	428	760	0	290197	0	18	456	202	0	77200	0	5	121	390	0	148777	0	9	234					
High Speed Ferry	HSD	402	0	153460	0	9	241	424	0	161975	0	10	255	467	0	178146	0	11	280	816	0	311486	0	19	490	258	0	98465	0	6	155					
Total Hotelling		10958	0	4137863	0	253	6384	5274	0	2013011	0	123	3165	6250	0	2385442	0	146	3750	5598	0	2136525	0	131	3359	6373	0	2432232	0	149	3824					
Total Emisi		16809	2128	5561039	2128	2468	10746	7252	540	2562135	540	697	4567	8287	479	2980430	479	661	5163	7601	510	2706823	510	676	4765	36334	16447	7606469	16447	1977	28379					

➤ **Pelabuhan Makassar**

Class Kapal	Fuel Type	Tahun																													
		2020						2021						2022						2023						2024					
		Auxiliary engine																													
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox
Solid Bulk	BFO	1261	0	481424	0	29	757	1368	0	522050	0	32	821	1378	0	525792	0	32	827	1336	0	509936	0	31	802	1871	0	714235	0	44	1123
Liquid Bulk	BFO	3423	0	1306518	0	80	2054	3308	0	1262669	0	77	1985	388	0	148093	0	9	233	3410	0	1301306	0	80	2046	3774	0	1440384	0	88	2264
General Cargo	MDO	3328	0	1270210	0	78	1997	3860	0	1473149	0	90	2316	4460	0	1702109	0	104	2676	5402	0	2061647	0	126	3241	5122	0	1955045	0	120	3073
Container	MSD	17042	0	6504432	0	398	10225	14710	0	5614310	0	343	8826	17042	0	6504432	0	398	10225	14881	0	5679609	0	347	8929	14286	0	5452617	0	333	8572
Ro-Ro Cargo	MDO	54373	0	20752236	0	1269	32624	46932	0	17912322	0	1095	28159	42411	0	16186710	0	990	25446	47478	0	18120657	0	1108	28487	45580	0	17396446	0	1064	27348
Passanger	MSD	17672	0	6744677	0	412	10603	21632	0	8256404	0	505	12979	22357	0	8532831	0	522	13414	25331	0	9667923	0	591	15198	1131	0	431705	0	26	679
Tugs dan Pandu	HSD	10288	5880	1688283	5880	5983	8525	9834	5621	1613776	5621	5719	8149	10269	5869	1685122	5869	5972	8509	11006	6291	1806139	6291	6401	9120	13823	7900	2268534	7900	8038	11454
Other Ship	MDO	2827	0	1078976	0	66	1696	2783	0	1062193	0	65	1670	1976	0	754209	0	46	1186	2089	0	797246	0	49	1253	2862	0	1092153	0	67	1717
High Speed Ferry	HSD	61	0	23117	0	1	36	181	0	69072	0	4	109	243	0	92662	0	6	146	114	0	43484	0	3	68	104470	0	39872611	0	2438	62682
Total Manoevring		110275	5880	39849873	5880	8316	68517	104609	5621	37785946	5621	7931	65013	100523	5869	36131960	5869	8078	62661	111046	6291	39987947	6291	8735	69144	192920	7900	70623730	7900	12217	118912
Auxiliary engine																															
Solid Bulk	BFO	52491	0	20034103	0	1225	31495	59763	0	22809697	0	1394	35858	6014	0	2295366	0	140	3608	56594	0	21600184	0	1321	33957	62753	0	23950848	0	1464	37652
Liquid Bulk	BFO	38734	0	14783512	0	904	23240	58299	0	22250600	0	1360	34979	42801	0	16335574	0	999	25680	43278	0	16517592	0	1010	25967	56307	0	21490337	0	1314	33784
General Cargo	MDO	114562	0	43724536	0	2673	68737	131942	0	50357744	0	3079	79165	136782	0	52205144	0	3192	82069	129117	0	49279663	0	3013	77470	90150	0	34407344	0	2104	54090
Container	MSD	618507	0	236063510	0	14432	371104	564098	0	215297556	0	13162	338459	542695	0	207128409	0	12663	325617	614000	0	234343249	0	14327	368400	674352	0	257377740	0	15735	404611
Ro-Ro Cargo	MDO	210046	0	80167552	0	4901	126028	318241	0	121461908	0	7426	190944	372859	0	142307676	0	8700	223715	494338	0	188672427	0	11535	296603	337853	0	128947040	0	7883	202712
Passanger	MSD	157065	0	59946313	0	3665	94239	94423	0	36038072	0	2203	56654	92924	0	35466109	0	2168	55755	123504	0	47137424	0	2882	74103	195156	0	74484692	0	4554	117094
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Other Ship	MDO	50131	0	19133462	0	1170	30079	23077	0	8807893	0	538	13846	49765	0	18993507	0	1161	29859	38994	0	14882770	0	910	23396	73049	0	27880417	0	1704	43829
High Speed Ferry	HSD	493	0	187997	0	11	296	650	0	248156	0	15	390	1833	0	699682	0	43	1100	2059	0	785863	0	48	1235	583	0	222453	0	14	350
Total Hotelling		869420	0	331828690	0	20286	521652	875345	0	334090138	0	20425	525207	871970	0	332802026	0	20346	523182	1051319	0	401253420	0	24531	630791	1043142	0	398132610	0	24340	625885
Total Emisi		979695	5880	371678563	5880	28603	590169	979954	5621	371876084	5621	28355	590221	972493	5869	368933986	5869	28424	585844	1162365	6291	441241367	6291	33266	699935	1236062	7900	468756340	7900	36557	744797

3. Perhitungan Emisi Auxiliary dengan BBM LNG Engine pada Setiap Pelabuhan :

➤ Pelabuhan Belawan

Class Kapal	Fuel Type	Tahun																													
		2020						2021						2022						2023						2024					
		Auxiliary engine																													
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox
Solid Bulk	BFO	1207	0	33864	0	0	0	1384	0	38819	0	0	0	1478	0	41455	0	0	0	1560	0	43763	0	0	0	1457	0	40880	0	0	0
Liquid Bulk	BFO	3218	0	90269	0	1	1	3557	0	99784	0	1	1	3522	0	98785	0	1	1	3776	0	105929	0	1	1	3678	0	103168	0	1	1
General Cargo	MDO	1049	0	29415	0	0	0	1085	0	30436	0	0	0	1453	0	40762	0	0	0	1151	0	32290	0	0	0	1167	0	32721	0	0	0
Container	MSD	299	0	8374	0	0	0	7111	0	199452	0	2	2	464	0	13014	0	0	0	543	0	15236	0	0	0	8493	0	238241	0	2	2
Ro-Ro Cargo	MDO	319	0	8956	0	0	0	526	0	14754	0	0	0	562	0	15766	0	0	0	798	0	22384	0	0	0	726	0	20367	0	0	0
Passanger	MSD	824	0	23122	0	0	0	902	0	25293	0	0	0	999	0	28008	0	0	0	1153	0	32353	0	0	0	1233	0	34575	0	0	0
Tugs dan Pandu	HSD	6793	0	43531	0	5436	5436	5913	0	37888	0	4731	4731	6171	0	39538	0	4937	4937	6286	0	40281	0	5030	5030	7477	0	47914	0	5983	5983
Other Ship	MDO	61	0	1697	0	0	0	87	0	2439	0	0	0	283	0	7925	0	0	0	80	0	2241	0	0	0	460	0	12913	0	0	0
Total Manoevring		13770	0	239227	0	5437	5437	20565	0	448864	0	4735	4735	14930	0	285253	0	4940	4940	15349	0	294478	0	5032	5032	24692	0	530780	0	5987	5987
Auxiliary engine																															
Solid Bulk	BFO	4846	0	135919	0	1	1	5555	0	155809	0	1	1	5932	0	166390	0	1	1	6262	0	175652	0	2	2	5849	0	164078	0	1	1
Liquid Bulk	BFO	12917	0	362311	0	3	3	14278	0	400502	0	4	4	14135	0	396491	0	4	4	15157	0	425167	0	4	4	14762	0	414087	0	4	4
General Cargo	MDO	9974	0	279772	0	2	2	10320	0	289476	0	3	3	13821	0	387689	0	3	3	10949	0	307118	0	3	3	11095	0	311212	0	3	3
Container	MSD	2324	0	65199	0	1	1	55361	0	1552873	0	14	14	3612	0	101322	0	1	1	4229	0	118620	0	1	1	66128	0	1854879	0	17	17
Ro-Ro Cargo	MDO	3185	0	89335	0	1	1	5247	0	147167	0	1	1	5607	0	157269	0	1	1	7960	0	223282	0	2	2	7243	0	203158	0	2	2
Passanger	MSD	7295	0	204626	0	2	2	7980	0	223847	0	2	2	8837	0	247874	0	2	2	10208	0	286324	0	3	3	10909	0	305990	0	3	3
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Other Ship	MDO	575	0	16142	0	0	0	827	0	23198	0	0	0	2687	0	75373	0	1	1	760	0	21317	0	0	0	4379	0	122821	0	1	1
Total Hotelling		28781	0	807312	0	7	7	69697	0	1955011	0	17	17	38242	0	1072686	0	10	10	38868	0	1090236	0	10	10	84255	0	2363358	0	21	21
Total Emisi		42551	0	1046539	0	5445	5445	90262	0	2403875	0	4752	4752	53172	0	1357939	0	4949	4949	54216	0	1384713	0	5042	5042	108947	0	2894138	0	6008	6008

➤ Pelabuhan Tanjung Priok

Class Kapal	Fuel Type	Tahun																																		
		2020							2021							2022							2023							2024						
		Auxiliary engine																																		
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox					
Solid Bulk	BFO	1567	0	43967	0	0	0	1273	0	35706	0	0	0	1451	0	40704	0	0	0	1583	0	44408	0	0	0	1997	0	56004	0	0	0					
Liquid Bulk	BFO	4866	0	136494	0	1	1	2137	0	59932	0	1	1	2274	0	63778	0	1	1	2274	0	63778	0	1	1	4008	0	112424	0	1	1					
General Cargo	MDO	4845	0	135894	0	1	1	5290	0	148379	0	1	1	6156	0	172688	0	2	2	6156	0	172688	0	2	2	5229	0	146675	0	1	1					
Container	MSD	32655	0	915961	0	8	8	28507	0	799634	0	7	7	30267	0	848992	0	8	8	30267	0	848992	0	8	8	32875	0	922136	0	8	8					
Ro-Ro Cargo	MDO	4883	0	136968	0	1	1	6382	0	179018	0	2	2	13526	0	379416	0	3	3	13526	0	379416	0	3	3	4308	0	120849	0	1	1					
Passanger	MSD	5836	0	163706	0	1	1	2670	0	74904	0	1	1	2382	0	66822	0	1	1	2382	0	66822	0	1	1	4335	0	121591	0	1	1					
Tugs dan Pandu	HSD	24983	0	160129	0	19989	19989	21189	0	135807	0	16953	16953	23136	0	148289	0	18511	18511	23136	0	148289	0	18511	18511	29851	0	191328	0	23883	23883					
Other Ship	MDO	3776	0	105909	0	1	1	1801	0	50526	0	0	0	3931	0	110260	0	1	1	3931	0	110260	0	1	1	7181	0	201436	0	2	2					
High Speed Ferry	HSD	219	0	6131	0	0	0	302	0	8461	0	0	0	7175	0	201263	0	2	2	1944	0	54521	0	0	0	112	0	3128	0	0	0					
Total Manoevring		83630	0	1805158	0	20003	20003	69551	0	1492365	0	16965	16965	90299	0	2032212	0	18528	18528	85200	0	1889174	0	18526	18526	89895	0	1875570	0	23898	23898					
Auxiliary engine																																				
Solid Bulk	BFO	13875	0	389186	0	3	3	11268	0	316062	0	3	3	12845	0	360306	0	3	3	14014	0	393091	0	4	4	17673	0	495739	0	4	4					
Liquid Bulk	BFO	43074	0	1208227	0	11	11	18913	0	530507	0	5	5	20127	0	564551	0	5	5	21791	0	611234	0	5	5	35478	0	995158	0	9	9					
General Cargo	MDO	41295	0	1158332	0	10	10	45089	0	1264751	0	11	11	52476	0	1471956	0	13	13	49266	0	1381905	0	12	12	49266	0	1381905	0	12	12					
Container	MSD	304776	0	8548965	0	76	76	266070	0	7463250	0	67	67	282493	0	7923925	0	71	71	304116	0	8530451	0	76	76	306831	0	8606599	0	77	77					
Ro-Ro Cargo	MDO	47870	0	1342740	0	12	12	62565	0	1754962	0	16	16	132603	0	3719521	0	33	33	40849	0	1145820	0	10	10	42236	0	1184715	0	11	11					
Passanger	MSD	57214	0	1604852	0	14	14	26178	0	734306	0	7	7	23354	0	655079	0	6	6	27423	0	769228	0	7	7	42495	0	1191991	0	11	11					
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Other Ship	MDO	32183	0	902747	0	8	8	15354	0	430673	0	4	4	33506	0	939839	0	8	8	36905	0	1035175	0	9	9	61212	0	1716999	0	15	15					
High Speed Ferry	HSD	940	0	26363	0	0	0	1297	0	36380	0	0	0	30853	0	865429	0	8	8	8358	0	234442	0	2	2	479	0	13449	0	0	0					
Total Hotelling		378859	0	10626987	0	95	95	312714	0	8771623	0	78	78	411780	0	11550424	0	103	103	351905	0	9870942	0	88	88	388969	0	10910588	0	97	97					
Total Emisi		462488	0	12432145	0	20098	20098	382265	0	10263988	0	17043	17043	502079	0	13582636	0	18631	18631	437105	0	11760117	0	18614	18614	478864	0	12786158	0	23995	23995					

➤ Pelabuhan Tanjung Perak

Class Kapal	Fuel Type	Tahun																													
		2020						2021						2022						2023						2024					
		Auxiliary engine																													
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox
Solid Bulk	BFO	2261	0	63422	0	1	1	2574	0	72209	0	1	1	259	0	7266	0	0	0	2438	0	68380	0	1	1	2703	0	75822	0	1	1
Liquid Bulk	BFO	1668	0	46800	0	0	0	2511	0	70439	0	1	1	1844	0	51714	0	0	0	1864	0	52290	0	0	0	2425	0	68032	0	1	1
General Cargo	MDO	5241	0	147021	0	1	1	6037	0	169325	0	2	2	6258	0	175537	0	2	2	5907	0	165700	0	1	1	4125	0	115693	0	1	1
Container	MSD	24785	0	695229	0	6	6	22605	0	634071	0	6	6	21747	0	610012	0	5	5	24605	0	690163	0	6	6	27023	0	758001	0	7	7
Ro-Ro Cargo	MDO	8837	0	247875	0	2	2	13389	0	375555	0	3	3	15687	0	440009	0	4	4	20797	0	583367	0	5	5	14214	0	398699	0	4	4
Passanger	MSD	6608	0	185351	0	2	2	3972	0	111428	0	1	1	3909	0	109660	0	1	1	5196	0	145747	0	1	1	8210	0	230303	0	2	2
Tugs dan Pandu	HSD	23058	0	147785	0	18448	18448	22046	0	141298	0	17638	17638	22798	0	147526	0	18189	18189	24402	0	156400	0	19523	19523	27015	0	173153	0	21614	21614
Other Ship	MDO	2294	0	64335	0	1	1	1056	0	29616	0	0	0	2277	0	63865	0	1	1	1784	0	50043	0	0	0	3342	0	93746	0	1	1
High Speed Ferry	HSD	38	0	1071	0	0	0	50	0	1414	0	0	0	142	0	3986	0	0	0	160	0	4477	0	0	0	45	0	1267	0	0	0
Total Manoevring		74791	0	1598891	0	18461	18461	74240	0	1605356	0	17651	17651	74921	0	1609575	0	18202	18202	87153	0	1916567	0	19539	19539	89103	0	1914717	0	21630	21630
		Auxiliary engine																													
Solid Bulk	BFO	18715	0	524942	0	5	5	21307	0	597670	0	5	5	2144	0	60144	0	1	1	20177	0	565977	0	5	5	22373	0	627571	0	6	6
Liquid Bulk	BFO	13810	0	387364	0	3	3	20785	0	583020	0	5	5	15260	0	428032	0	4	4	15430	0	432801	0	4	4	20075	0	563099	0	5	5
General Cargo	MDO	42399	0	1189298	0	11	11	48831	0	1369720	0	12	12	50623	0	1419969	0	13	13	47786	0	1340396	0	12	12	33364	0	935872	0	8	8
Container	MSD	214055	0	6004250	0	54	54	195225	0	5476070	0	49	49	187818	0	5268289	0	47	47	212495	0	5960495	0	53	53	233382	0	6546375	0	58	58
Ro-Ro Cargo	MDO	73981	0	2075156	0	18	18	112088	0	3144070	0	28	28	131325	0	3683667	0	33	33	174112	0	4883830	0	44	44	118996	0	3337824	0	30	30
Passanger	MSD	55320	0	1551724	0	14	14	33257	0	932854	0	8	8	32729	0	918049	0	8	8	43500	0	1220163	0	11	11	68736	0	1928054	0	17	17
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Other Ship	MDO	18554	0	520426	0	5	5	8541	0	239573	0	2	2	18418	0	516619	0	5	5	14432	0	404808	0	4	4	27035	0	758341	0	7	7
High Speed Ferry	HSD	164	0	4606	0	0	0	217	0	6079	0	0	0	611	0	17141	0	0	0	686	0	19252	0	0	0	194	0	5450	0	0	0
Total Hotelling		305898	0	8580436	0	76	76	308176	0	8644338	0	77	77	307249	0	8618336	0	77	77	370032	0	10379406	0	93	93	366909	0	10291810	0	92	92
Total Emisi		380688	0	10179326	0	18537	18537	382416	0	10249695	0	17728	17728	382170	0	10227911	0	18278	18278	457185	0	12295973	0	19631	19631	456013	0	12206527	0	21721	21721

➤ Pelabuhan Tanjung Pinang

Class Kapal	Fuel Type	Tahun																													
		2020						2021						2022						2023						2024					
		Auxiliary engine																													
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox
Liquid Bulk	BFO	12	0	326	0	0	0	12	0	326	0	0	0	12	0	326	0	0	0	13	0	360	0	0	0	10	0	293	0	0	0
General Cargo	MDO	128	0	3597	0	0	0	123	0	3439	0	0	0	115	0	3225	0	0	0	110	0	3075	0	0	0	105	0	2941	0	0	0
Passanger	MSD	177	0	4977	0	0	0	143	0	4008	0	0	0	200	0	5620	0	0	0	175	0	4914	0	0	0	239	0	6710	0	0	0
Tugs dan Pandu	HSD	2659	0	17030	0	2128	2128	674	0	4308	0	540	540	598	0	3817	0	479	479	637	0	4069	0	510	510	20558	0	131763	0	16448	16448
Other Ship	MDO	361	0	10137	0	0	0	35	0	977	0	0	0	37	0	1040	0	0	0	10	0	277	0	0	0	19	0	533	0	0	0
High Speed Ferry	HSD	31	0	874	0	0	0	33	0	923	0	0	0	36	0	1015	0	0	0	63	0	1775	0	0	0	20	0	561	0	0	0
Total Manoevring		3369	0	36940	0	2128	2128	1019	0	13979	0	540	540	998	0	15043	0	479	479	1008	0	14469	0	510	510	20952	0	142802	0	16448	16448
Auxiliary engine																															
Liquid Bulk	BFO	87	0	2435	0	0	0	84	0	2361	0	0	0	84	0	2361	0	0	0	93	0	2608	0	0	0	76	0	2122	0	0	0
General Cargo	MDO	896	0	25128	0	0	0	838	0	23497	0	0	0	786	0	22036	0	0	0	749	0	21009	0	0	0	717	0	20099	0	0	0
Passanger	MSD	1576	0	44220	0	0	0	1210	0	33950	0	0	0	1697	0	47612	0	0	0	1484	0	41632	0	0	0	2026	0	56842	0	1	1
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Other Ship	MDO	2525	0	69270	0	1	1	238	0	6673	0	0	0	253	0	7109	0	0	0	67	0	1891	0	0	0	130	0	3645	0	0	0
High Speed Ferry	HSD	134	0	3759	0	0	0	141	0	3968	0	0	0	156	0	4364	0	0	0	272	0	7631	0	0	0	86	0	2412	0	0	0
Total Hotelling		3653	0	101369	0	1	1	1758	0	49314	0	0	0	2083	0	58438	0	1	1	1866	0	52340	0	0	0	2124	0	59584	0	1	1
Total Emisi		7021	0	138309	0	2129	2129	2777	0	63294	0	541	541	3081	0	73481	0	479	479	2874	0	66809	0	511	511	23076	0	202386	0	1977	16449

➤ **Pelabuhan Makassar**

Class Kapal	Fuel Type	Tahun																																		
		2020							2021							2022							2023							2024						
		Auxiliary engine																																		
		Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox	Nox	CO	CO2	VOC	PM	Sox					
Solid Bulk	BFO	420	0	11794	0	0	0	456	0	12789	0	0	0	459	0	12881	0	0	0	445	0	12492	0	0	0	624	0	17497	0	0	0					
Liquid Bulk	BFO	1141	0	32007	0	0	0	1103	0	30933	0	0	0	129	0	3628	0	0	0	1137	0	31879	0	0	0	1258	0	35286	0	0	0					
General Cargo	MDO	1109	0	31117	0	0	0	1287	0	36089	0	0	0	1487	0	41698	0	0	0	1801	0	50506	0	0	0	1707	0	47894	0	0	0					
Container	MSD	5681	0	159344	0	1	1	4903	0	137538	0	1	1	5681	0	159344	0	1	1	4960	0	139138	0	1	1	4762	0	133577	0	1	1					
Ro-Ro Cargo	MDO	18124	0	508384	0	5	5	15644	0	438813	0	4	4	14137	0	396539	0	4	4	15826	0	443917	0	4	4	15193	0	426175	0	4	4					
Passanger	MSD	5891	0	165230	0	1	1	7211	0	202264	0	2	2	7452	0	209036	0	2	2	8444	0	236843	0	2	2	377	0	10576	0	0	0					
Tugs dan Pandu	HSD	7350	0	47095	0	5881	5881	7025	0	45017	0	5621	5621	7336	0	47007	0	5870	5870	7862	0	50383	0	6291	6291	9875	0	63281	0	7901	7901					
Other Ship	MDO	942	0	26433	0	0	0	928	0	26021	0	0	0	659	0	18476	0	0	0	696	0	19531	0	0	0	954	0	26755	0	0	0					
High Speed Ferry	HSD	20	0	566	0	0	0	60	0	1692	0	0	0	81	0	2270	0	0	0	38	0	1065	0	0	0	34823	0	976792	0	9	9					
Total Manoevring		40678	0	981971	0	5889	5889	38617	0	931156	0	5629	5629	37420	0	890880	0	5877	5877	41209	0	985754	0	6299	6299	69573	0	1737834	0	7916	7916					
Auxiliary engine																																				
Solid Bulk	BFO	17497	0	490792	0	4	4	19921	0	558788	0	5	5	2005	0	56231	0	1	1	18865	0	529157	0	5	5	20918	0	586743	0	5	5					
Liquid Bulk	BFO	12911	0	362164	0	3	3	19433	0	545091	0	5	5	14267	0	400186	0	4	4	14426	0	404645	0	4	4	18769	0	526466	0	5	5					
General Cargo	MDO	38187	0	1071156	0	10	10	43981	0	1233655	0	11	11	45594	0	1278912	0	11	11	43039	0	1207244	0	11	11	30050	0	842905	0	8	8					
Container	MSD	206169	0	5783041	0	52	52	188033	0	5274320	0	47	47	180898	0	5074194	0	45	45	204667	0	5740898	0	51	51	224784	0	6305193	0	56	56					
Ro-Ro Cargo	MDO	70015	0	1963930	0	18	18	106080	0	2975552	0	27	27	124286	0	3486227	0	31	31	164779	0	4622063	0	41	41	112618	0	3158921	0	28	28					
Passanger	MSD	52355	0	1468554	0	13	13	31474	0	882854	0	8	8	30975	0	868842	0	8	8	41168	0	1154764	0	10	10	65052	0	1824712	0	16	16					
Tugs dan Pandu	HSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Other Ship	MDO	16710	0	468728	0	4	4	7692	0	215774	0	2	2	16588	0	465299	0	4	4	12998	0	364595	0	3	3	24350	0	683009	0	6	6					
High Speed Ferry	HSD	164	0	4606	0	0	0	217	0	6079	0	0	0	611	0	17141	0	0	0	686	0	19252	0	0	0	194	0	5450	0	0	0					
Total Hotelling		289807	0	8129078	0	72	72	291782	0	8184479	0	73	73	290657	0	8152923	0	73	73	350440	0	9829833	0	88	88	347714	0	9753380	0	87	87					
Total Emisi		330485	0	9111049	0	5961	5961	330399	0	9115635	0	5702	5702	328077	0	9043803	0	5950	5950	391649	0	10815586	0	6387	6387	417288	0	11491214	0	8003	8003					

4. Perbandingan dari Penggunaan Kapal Tunda Konvensional, LNG dan Listrik pada setiap Pelabuhan :

Pelabuhan Belawan			
Tahun	Konvensional	LNG	Electric tugboats
2020	2211576	2211576	2211576
2021	1924874	1924874	1924874
2022	2008709	2008709	2008709
2023	2046466	2046466	2046466
2024	2434283	2434283	2434283
2025	12070682	10139373	2190854
2030	22129584	13277751	377209
2040	42247388	8449478	131
2050	62365192	1689896	0

Pelabuhan Tj Priok			
Tahun	Konvensional	LNG	Electric tugboats
2020	8135697	8135697	8135697
2021	6899932	6899932	6899932
2022	7534134	7534134	7534134
2023	7534134	7534134	7534134
2024	9720881	9720881	9720881
2025	43224249	36308370	8748793
2030	79244457	47546674	1350758
2040	151284873	30256975	468
2050	223325289	6051395	0

Pelabuhan Tj Perak			
Tahun	Konvensional	LNG	Electric tugboats
2020	7508535	7508535	7508535
2021	7178955	7178955	7178955
2022	7508535	7508535	7508535
2023	7946269	7946269	7946269
2024	8797417	8797417	8797417
2025	42713560	35879391	7917675
2030	78308194	46984916	1334799
2040	149497462	29899492	462
2050	220686729	5979898	0

Pelabuhan Tj Pinang			
Tahun	Konvensional	LNG	Electric tugboats
2020	865098	865098	865098
2021	218737	218737	218737
2022	193779	193779	193779
2023	206578	206578	206578
2024	669449	669449	669449
2025	3068516	2577554	602505
2030	5625613	3375368	95891
2040	10739807	2147961	33
2050	15854001	429592	0

Pelabuhan Makassar			
Tahun	Konvensional	LNG	Electric tugboats
2020	2392685	2392685	2392685
2021	2287092	2287092	2287092
2022	2388206	2388206	2388206
2023	2559715	2559715	2559715
2024	3215035	3215035	3215035
2025	13110491	11012813	2893532
2030	24035901	14421540	409703
2040	45886719	9177344	142
2050	67737538	1835469	0

5. Perbandingan dari Penggunaan *Shore Connection/Non Shore Connection* pada setiap Pelabuhan :

Pelabuhan Belawan		
Tahun	<i>Non Shore Connection</i>	<i>Shore Connection</i>
2020	46519145	46519145
2021	112724690	112724690
2022	61802394	61802394
2023	62817836	62817836
2024	136258385	136258385
2025	348660989	68129193
2030	639211812	2129037
2040	1220313460	0
2050	1801415107	0

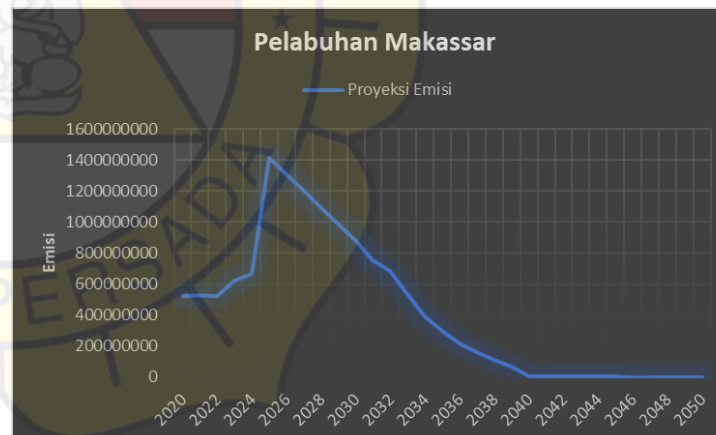
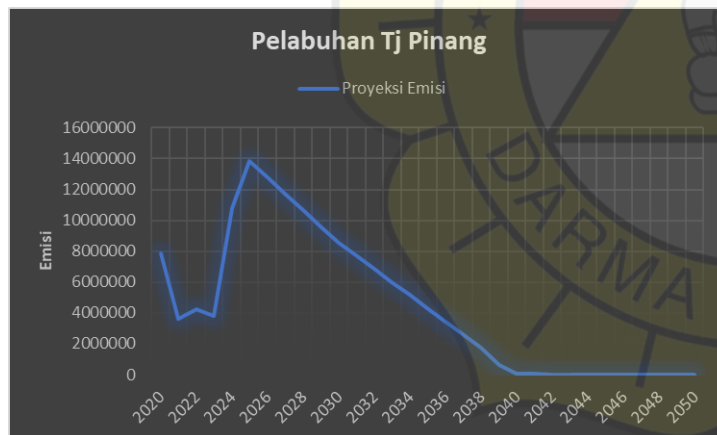
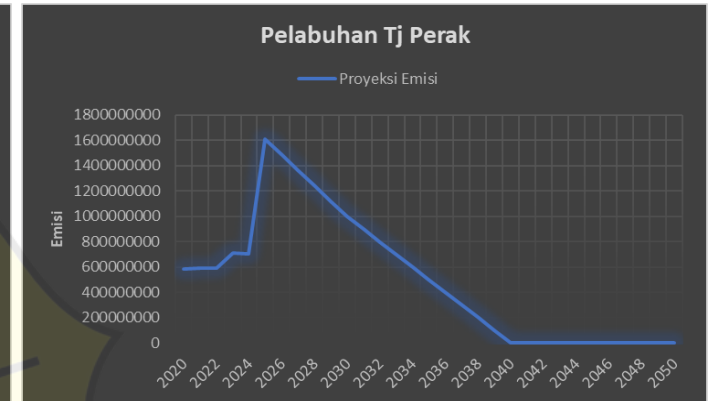
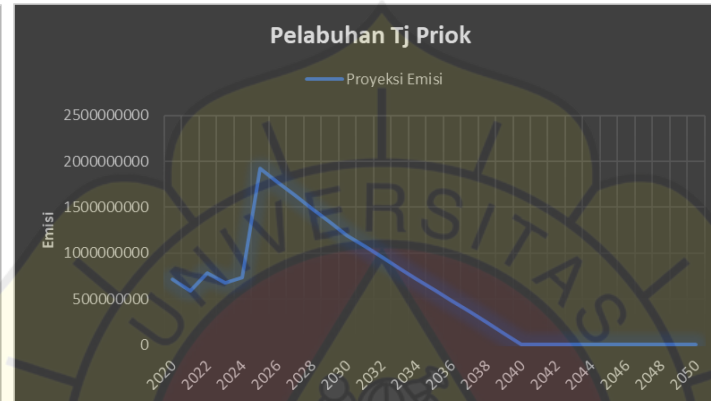
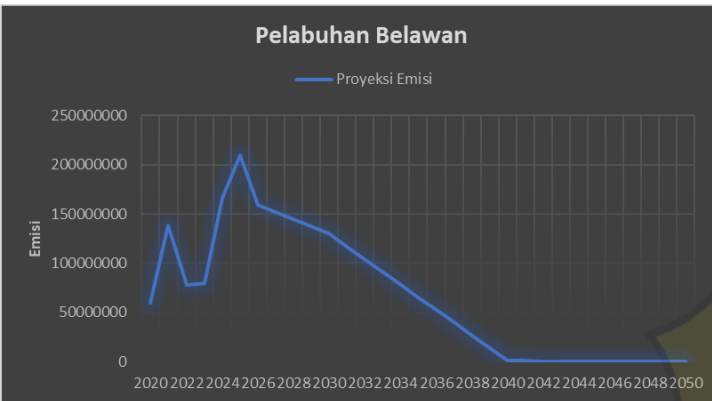
Pelabuhan Tj Priok		
Tahun	<i>Non Shore Connection</i>	<i>Shore Connection</i>
2020	612714429	612714429
2021	505774220	505774220
2022	665947783	665947783
2023	569207510	569207510
2024	629043148	629043148
2025	3463915635	314521574
2030	6350511997	9828799
2040	12123704721	0
2050	17896897445	0

Pelabuhan Tj Perak		
Tahun	<i>Non Shore Connection</i>	<i>Shore Connection</i>
2020	494665743	494665743
2021	498258099	498258099
2022	496672496	496672496
2023	598176216	598176216
2024	593279275	593279275
2025	2860687978	296639638
2030	5244594626	9269989
2040	10012407923	0
2050	14780221220	0

Pelabuhan Tj Pinang		
Tahun	<i>Non Shore Connection</i>	<i>Shore Connection</i>
2020	5838652	5838652
2021	2841792	2841792
2022	3368233	3368233
2023	3016712	3016712
2024	3435080	3435080
2025	27759231	1717540
2030	50891924	53673
2040	97157309	0
2050	143422694	0

Pelabuhan Makassar		
Tahun	<i>Non Shore Connection</i>	<i>Shore Connection</i>
2020	2211576	2211576
2021	1924874	1924874
2022	2008709	2008709
2023	2046466	2046466
2024	2434283	2434283
2025	12070682	1217141
2030	22129584	38036
2040	42247388	0
2050	62365192	0

6. Proyeksi Emisi pada setiap Pelabuhan (Pertahun) :



7. Data Banyak Kapal di setiap Pelabuhan :

Pelabuhan	Jumlah kapal				
	Tahun				
	2020	2021	2022	2023	2024
Belawan	3454	3006	3137	3196	3802
Tanjung Priok	12711	10780	11771	12117	15188
Tanjung Perak	11731	11216	11566	12415	13745
Tanjung Pinang	1350	340	301	321	10459
Makassar	3737	3572	3730	3998	5022

