

## Has LNG a future as a substitute for marine fuel oil?

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The relative benefits of ship conversion from IFO 180 or 380 to LNG are in the table below. Figures show that the cost of converting a ship from IFO to LNG is substantial and that the cost differential between IFO and LNG is marginal and sometimes to the advantage of IFO, except in the U.S. where LNG goes for about a quarter of what it costs in Asia. In addition, and of even more importance, the minimum probable space required for the storage of LNG for a passage of 3 weeks will take up to 5% of total cargo capacity, close to deck, as opposed to concealed IFO fuel tanks close to bottom.

Costs associated with the extra skilled personnel required to manage an LNG cargo are not considered here, although they will have a significant impact on crew costs.

Ship type		Small	Feeder	Panamax	Post-Panamax	New Panamax	ULCV
TEU		800	2,000	4,500	8,000	12,500	18,000
DWT	<i>T</i>	12,000	28,200	58,500	97,000	143,000	195,000
Length	<i>m</i>	140	202	286	323	366	420
Beam	<i>m</i>	21.8	28	32.2	42.8	48.4	56.4
Draft	<i>m</i>	7.4	9.2	12	13	13.5	15
Speed	<i>knt</i>	17.5	21	24.5	25	25	25
Power	<i>kW</i>	6,700	17,700	40,100	60,000	74,000	91,500
Efficiency (main engine)	<i>42%</i>						
Rating	<i>90%</i>						
IFO per day	<i>MTPD</i>	29.5	78.0	176.8	264.5	326.2	403.3
LNG per day	<i>CMPTD</i>	58.8	155.3	351.9	526.5	649.3	802.9
Passage	<i>days</i>	15	15	21	21	21	21
IFO bunkers	<i>T</i>	443.0	1,170.4	3,712.1	5,554.3	6,850.3	8,470.3
	<i>CM</i>	492.2	1,300.4	4,124.6	6,171.4	7,611.4	9,411.4

LNG bunkers	<i>T</i>	372.1	983.1	3,118.2	4,665.6	5,754.2	7,115.0
	<i>CM</i>	881.8	2,329.6	7,389.0	11,055.9	13,635.6	16,860.3
LNG tank volume	<i>CM</i>	1,146.4	3,028.5	9,605.8	14,372.7	17,726.3	21,918.4
<b>LNG tank volume, in TEU</b>		<b>30</b>	<b>79</b>	<b>249</b>	<b>373</b>	<b>460</b>	<b>569</b>
<b>% of cargo capacity</b>		<b>3.7%</b>	<b>3.9%</b>	<b>5.5%</b>	<b>4.7%</b>	<b>3.7%</b>	<b>3.2%</b>
Cost of dual fuel conversion		\$1,675,000	\$4,425,000	\$10,025,000	\$15,000,000	\$18,500,000	\$22,875,000
Cost of LNG storage		\$465,171	\$1,228,886	\$3,897,720	\$5,832,000	\$7,192,800	\$8,893,800
Conversion cost		\$2,140,171	\$5,653,886	\$13,922,720	\$20,832,000	\$25,692,800	\$31,768,800
Amortization, years	<i>10</i>						
Interest rate	<i>8.50%</i>						
Conversion cost per year		\$304,974	\$805,679	\$1,983,988	\$2,968,560	\$3,661,224	\$4,527,054
Conversion cost per MT IFO eq.	<i>300</i>	\$34.42	\$34.42	\$37.41	\$37.41	\$37.41	\$37.41
Conversion cost per MMBTU		\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86
IFO cost, per ton	<i>\$640</i>						
IFO cost, per MMBTU	<i>\$16.05</i>						
LNG cost in Asia, per MMBTU	<i>\$13 to \$20</i>						

Additionally, when taking into consideration the cost of deadweight forgone to accommodate LNG bunkers, the total cost of conversion as a percentage of a newbuilt ship cost would be:

Ship type	Small	Feeder	Panamax	Post-Panamax	New Panamax	ULCV
TEU	800	2,000	4,500	8,000	12,500	18,000
Total cost of conversion/ship cost	16.5%	17.4%	20.3%	19.5%	18.4%	17.9%

Of course, IFO and LNG prices vary in time, but usually together, and it is more than unlikely that any real advantage could be found to convince ship owners to undertake the costly and cumbersome conversion to LNG power.

That is if the law does not leave them another choice. Otherwise LNG bunkers will just have been another wishful fantasy.