Shipping MBM note

Global CO_2 levy as the green driver for shipping

In Denmark, levies are the driver of green transition in many areas. A levy is the most cost-efficient way to stimulate green transition next to transferable quotas. The basic idea is to put a price on emissions (here calculated as CO_2-equivalents) and thereby incentivize reduced emissions. The polluter decides if it is best to reduce emissions or pay the levy - and the polluter decides how to reduce emissions.

Levies work if they are significant enough to motivate changes e.g. energy savings and/or switch to zero carbon fuel. Furthermore, levies need to be transparent prospectively to stimulate investments in green transition e.g. production of zero carbon fuels and development of new engines etc. In addition, levies should be adjusted over time in parallel to technological development. Finally, levy revenues can reduce green transition costs by reimbursing the revenue as financial subsidies to zero carbon fuels.

Business case without a levy

Green ammonia/methanol will probably cost around 1,500 $ per ton fuel oil energy equivalent (FO-eq).
The current price of VLSFO is around 500 $ per ton and HFO around 400 $ per ton (March 2021).
Price gap: 1,000 $ for VLSFO per ton FO-eq and 1,100 $ for HFO per ton FO-eq.
Result: There is no financial driver for green shipping fuels due to the price gap and other sectors will buy green hydrogen, ammonia and methanol (chemical industry, aviation, trucks etc.) when produced.

A levy-reimbursement system can close the price gap

Introduce a basic levy of 60 $ per ton CO_2-eq (GWP-20 well to wake) in 2025 (equals around 300 $ per ton VLSFO/HFO[1]) and subsequently increase the levy by 18 $ per ton CO_2-eq per year reaching 150 $ in 2030 and 240 $ in 2035 (750 $ and 1,200 $ per ton VLSFO/HFO in 2030 and 2035, respectively). A similar levy should be introduced on natural gas, distillate fuels etc. The revenue should be reimbursed as support for green methanol/ammonia (table 1). This could theoretically result in full decarbonisation of shipping towards 2040 (table 2 and figure 1) i.e. aligned with the Paris-agreement (1.5 °C goal).

Business case with a levy in 2030

Assuming green ammonia/methanol will cost 1,500 $ per ton FO-eq and that the price of VLSFO and HFO will drop to 100 $ per ton due to reduced demand. Levy cost for VLSFO/HFO: 750 $ per ton FO-eq.
Reimbursement: 825 $ per ton FO-eq cf. table 1.
Result: Zero carbon fuels will be attractive since the price of VLSFO/HFO will be 850 $ (100 + 750) per ton and the reimbursement reduces the price of green ammonia/methanol to 675 $ (1,500 - 825) per ton FO-eq. Furthermore, huge fuel savings will be gained since many savings have reduction costs far below these fuel prices. Price increase for the end consumer will be negligible (around 1 %).

[1] With 5 ton CO2-eq (GWP-20 *well to wake*) per ton VLSFO/HFO: https://theicct.org/publications/well-to-wake-co2-mar2021 or 100 $ per ton CO2-eq (GWP-100 *tank to wake*) and subsequently increase the levy by 30 $ per ton CO2-eq per year.

Table 1: Levy, reimbursement and resulting fuel prices towards 2040 driven by MBM

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
VLSFO ($/t) market price	500	400	300	200	100	100	100	100	100	100	100	100	100	100	100	100
HFO ($/t) market price	400	300	200	100	100	100	100	100	100	100	100	100	100	100	100	100
Levy in $ per ton CO2-eq (well to wake GWP-20)	60	78	96	114	132	150	168	186	204	222	240	258	276	294	312	330
Levy in $ per ton VLSFO/HFO (well to wake GWP-20)*	300	390	480	570	660	750	840	930	1020	1110	1200	1290	1380	1470	1560	1650
VLSFO ($/t) price with levy	**800**	**790**	**780**	**770**	**760**	**850**	**940**	**1030**	**1120**	**1210**	**1300**	**1390**	**1480**	**1570**	**1660**	**1750**
HFO ($/t) price with levy**	**700**	**690**	**680**	**670**	**760**	**850**	**940**	**1030**	**1120**	**1210**	**1300**	**1390**	**1480**	**1570**	**1660**	**1750**
Green metanol/NH3 ($/t FO-eq) market price	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Green metanol/NH3 ($/t FO-eq) reimbursement	825	825	825	825	825	825	725	625	525	425	325	225	125	0	0	0
Green metanol/NH3 ($/t FO-eq) net	**675**	**675**	**675**	**675**	**675**	**675**	**775**	**875**	**975**	**1075**	**1175**	**1275**	**1375**	**1500**	**1500**	**1500**

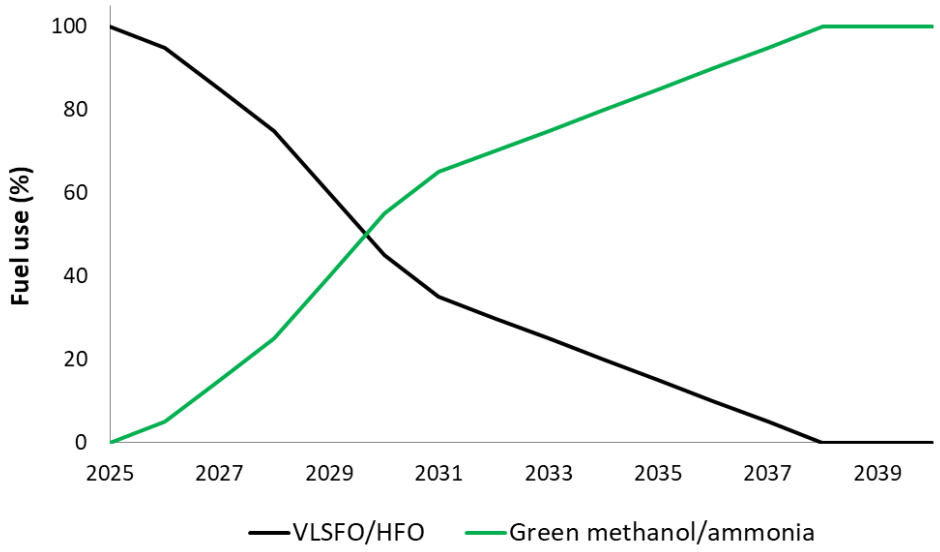
FO-eq: Fuel oil energy equivalent. *Using 5 ton CO2-eq (GWP-20 well to wake) per ton VLSFO/HFO[2]. **On top of this come scrubber costs.

Table 2: Possible course for full decarbonisation in 2038 driven by MBM per 100 t FO-eq

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Use of VLSFO/HFO (t)	**100**	**95**	**85**	**75**	**60**	**45**	**35**	**30**	**25**	**20**	**15**	**10**	**5**	**0**	**0**	**0**
CO2-levy revenue ($)	30000	37050	40800	42750	39600	33750	29400	27900	25500	22200	18000	12900	6900	0	0	0
Use of green methanol/NH3 (t FO-eq)	**0**	**5**	**15**	**25**	**40**	**55**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**	**100**	**100**
Total reimbursement ($)	0	4125	12375	20625	33000	45375	47125	43750	39375	34000	27625	20250	11875	0	0	0
Administrative costs, 7.5 % of revenue ($)	2250	2779	3060	3206	2970	2531	2205	2093	1913	1665	1350	968	518	0	0	0
Reimbursement account balance, accumulated ($)	27750	57896	83261	102180	105810	91654	71724	53781	37994	24529	13554	5236	0*	0	0	0

FO-eq: Fuel oil energy equivalent. *Rounded to 0 $ (calculated as minus 256 $ ≈ 0 $)

Figure 1: Possible course for full decarbonisation in 2038 driven by MBM



A similar principle should be used for natural gas, distillate fuels etc. providing same decarbonisation. In reality the levy and reimbursement should, of course, be adjusted in relation to the actual development in the price of VLSFO/HFO and green methanol/ammonia as well as other key factors. Thereby the decarbonisation curve of shipping would look different from figure 1 which should only be seen as a possibility based upon as quick back-of-the-envelope calculation to illustrate the key principle.

Further information

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[2]https://theicct.org/publications/well-to-wake-co2-mar2021