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Economic Impact of Eliminating the Fuel Tax Exemption in the EU Fishing Fleet

Natacha Carvalho and Jordi Guillen *

Joint Research Centre, European Commission, 21027 Ispra, Italy; natacha.carvalho@ec.europa.eu
* Correspondence: jordi.guillen@ec.europa.eu; Tel.: +39-033278-6402

Abstract: The EU-27 fishing fleet consumed 2.02 billion liters of fuel to catch 4.48 million tons of fish, valued at €6.7 billion in 2018. The profitability of the EU fishing fleet shows an increasing trend, partly due to the improvements in the energy efficiency and recovery of fish stocks in the North-east Atlantic. Fuel is one of the main expenses fishing fleets have, and therefore, their economic performance remains highly dependent on the fuel price, even if they benefit from a fuel tax exemption. The adoption of the European Green Deal, the revision of the Energy Taxation Directive (ETD), the ongoing World Trade Organization (WTO) negotiation to prohibit harmful fisheries subsidies, and general public opinion are putting pressure to eliminate this tax exemption. This analysis investigates the impacts of the potential elimination of the fuel tax exemption across the different EU fishing fleets and it is discussed to what extent the small-scale, large-scale and distant-water fleets could be affected. This analysis is useful to inform policy-makers and stakeholders on the consequences of the potential elimination of the fuel tax exemption, as well as to discuss potential measures to mitigate the socioeconomic impacts arising from this eventual change in the current regulatory framework.

Keywords: subsidy; small-scale fleet; European Green Deal; Energy Taxation Directive (ETD); World Trade Organization (WTO)

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1. Introduction

The European Green Deal adopted by the European Commission on 11 December 2019 is a new growth strategy that aims to transform the European Union (EU) into a modern, resource-efficient and competitive economy. To do so, the European Commission sets a target of greenhouse gas emission reductions for 2030 of at least 50% and towards 55% compared with 1990 levels, and no net emissions of greenhouse gases for 2050 [1].

To achieve these greenhouse gas emission reductions, what is required are an effective carbon pricing and the removal of fossil fuel subsidies [1]. Hence, the Energy Taxation Directive (ETD) is being reviewed since it does not adequately promote greenhouse gas emission reductions, energy efficiency, and alternative fuels (e.g., hydrogen, synthetic fuels, e-fuels, advanced biofuels, electricity) [2].

The ETD lays down the EU rules for the taxation of energy products used as motor fuel, heating fuel, and electricity [3]. Thus, the revision of the ETD will affect different economic sectors, such as agriculture, maritime transport, fishing, etc. In particular, article 14.1 of the ETD establishes a tax exemption, also known as de-taxation, on "energy products supplied for use as fuel for the purposes of navigation within Community waters (including fishing), other than private pleasure craft, and electricity produced on board a craft". Therefore, the ETD provides a payment exemption of excises and other duties of the fuel consumed for the EU fishing fleet in EU territorial waters. The ongoing revision of the Energy Taxation Directive may consider the eventual elimination of this fuel tax exemption for the EU fishing fleet.

The United Nations Convention on the Law of the Sea (UNCLOS) defines the territorial waters, i.e., where countries have national sovereignty including fiscal one, as the sea within

the 12 nautical miles from the coast [4]. Hence, countries do not have fiscal jurisdiction beyond these 12 nautical miles, and so they cannot impose any taxation on the fuel that is consumed there.

At the same time, fuel subsidies are one of the main topics in the ongoing World Trade Organization (WTO) negotiation to prohibit harmful fisheries subsidies. Fuel subsidies are not only one of the most common fisheries subsidies [5], but they are also estimated to be the largest globally [6]. Fuel tax exemptions are considered a subsidy under Article 1 of the Agreement of Subsidies and Countervailing Measures (ASCM) of the WTO [7]: "For the purpose of this Agreement, a subsidy shall be deemed to exist if: (a) (1) there is a financial contribution by a government or any public body within the territory of a Member (referred to in this Agreement as "government"), i.e., where: (i) . . . ; (ii) government revenue that is otherwise due is foregone or not collected (e.g., fiscal incentives such as tax credits); . . . ". The elimination of fuel subsidies is one of the main objectives of international organizations. For example, the UN's Sustainable Development Goal 14 (SDG 14) states: "by 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, . . . ", while the G-7 countries have committed to eliminate inefficient fossil fuel subsidies by 2025 [8].

However, fuel tax exemptions are a common practice in fisheries, and most fishing nations benefit from similar tax exemption schemes to those currently in place for the EU fleets (e.g., refund of the CO_2 tax in Norway, direct support schemes in Mexico). Indeed, the Organisation for Economic Co-operation and Development (OECD) estimated fisheries fuel subsidies for its members to be at about $2 billion [9]. As Martini [9] points out, the total value of fuel tax-concessions (subsidies) is underestimated as not all countries reported the relevant data; there are sub-national tax concessions that have not been reported, and some missing fuel consumption data.

Due to tax exemptions, fishers pay a lower price for fuel than the general public. Tax exemptions at early stages of the value chain are commonly justified to avoid cost increases that may result in consumers paying more for the final products and these products being less competitive in international markets, where there are often large differences in taxation levels for energy and fossil fuels between countries [10]. However, this occurs at the expense of consuming more fuel and so emitting more greenhouse gas emission than if fuel prices included taxes. In 2018, the EU-27 fishing fleet consumed 2.02 billion liters of fuel, being responsible for emitting roughly 5.35 million tons of CO_2 [11]. Fuel cost remains one of the main expenses fishing fleets have to bear. In 2018, fuel represented on average 17% of all operational costs for the EU fishing fleet, only wages and salaries were higher with 32% of the total operational costs, followed by other variable costs (15%) and depreciation costs (12%) [11].

In this context, the potential elimination of the fuel tax exemption for the EU fishing fleets may imply an increase in operational costs and hence a reduction in the economic performance (i.e., profits). To assess the impacts of the potential elimination of the fuel tax exemption in terms of profitability and employment, it is analyzed the impacts across the different EU fishing fleets and it is discussed to what extent the small-scale fleets (SSF), the large-scale fleets (LSF) and the distant-water fleets (DWF) could be affected. In addition, it is discussed potential measures to mitigate the socioeconomic impacts arising from this eventual change in the current regulatory framework.

2. Materials and Methods

2.1. Methodology

To investigate the economic impact of the elimination of the fuel tax exemption for the EU fishing fleet, three different scenarios are estimated and compared.

- Scenario 1 (baseline): estimates the economic performance considering fuel prices actually paid by the fishing sector in 2018. The year 2018 is the latest year with complete income and costs data. This is the base case scenario (status quo).

- Scenario 2 (assessment considering 2018 fuel prices): estimates the economic performance considering 2018 income, costs and fuel prices without the fuel tax exemption (i.e., fuel price with excise duty but without value-added taxes (VAT), since the VAT paid on fuel prices can be supported by the fishing sector's VAT on the sale of their landings).
- Scenario 3 (assessment considering 2020 fuel prices): estimates the economic performance considering the 2018 income and costs, with 2020 fuel prices without the fuel tax exemption to estimate fuel cost. This is done because fuel prices in 2020 have been significantly lower than in previous years. The average fuel price in May 2020 is used.

Then it is necessary to estimate the current fuel consumption and economic performance of the fleet (scenario 1), as well as the resulting one (scenarios 2 and 3). We use the operating profit and the operating profit margin as the most adequate profitability measures for this study.

Fuel price is initially (for scenario 1, baseline) obtained by dividing the fuel cost by the fuel consumption per fleet segment. A fleet segment is the combination of a particular fishing technique category and a vessel length category [11].

$$\text{Fuel Price} = \text{Fuel cost}/\text{Fuel consumption} \quad (1)$$

Income considers the value of landings, income from other activities and income from leasing out quota. For this analysis, no subsidies are considered in the operating profit calculation.

$$\text{Income} = \text{Gross value of landings} + \text{Other income} + \text{Income from leasing out quota} \quad (2)$$

Operating profit at fleet segment level is obtained by subtracting the operational costs to the income:

$$\begin{aligned}\text{Operating profit} = \text{Income} - \text{Personnel cost} - \text{Value of unpaid labor} - \text{Fuel} - \\ \text{Other variable costs} - \text{Other non-variable costs} - \text{Repair \& maintenance} \\ \text{costs} - \text{Lease/rental payments for quota} - \text{Consumption of fixed capital}\end{aligned} \quad (3)$$

While the operating profit margin is the ratio of operating profit by income:

$$\text{Operating profit margin} = \text{Operating profit}/\text{Income} \quad (4)$$

For scenarios 2 and 3, which consider the elimination of the tax-exemption, fuel cost is obtained by multiplying the fuel consumption by the fuel price assumed in each scenario.

$$\text{Fuel cost} = \text{Fuel Price} \times \text{Fuel consumption} \quad (5)$$

It does not seem possible that EU fishers will be able to pass on the fuel cost increases to increases in the price of the fish they catch. This is because EU fishers do not have market power in front of their buyers (e.g., supermarket chains), and because of the high level of fish imports (more than 50% of the fish consumed in the EU is imported [12]). Therefore, the estimation of income and operating profit (Equations (2) and (3)) remain the same for scenarios 2 and 3, with the fuel costs changing in the operating profit estimation (Equation (3)).

2.2. Data

The data on the economic performance and fuel consumption of the EU fishing fleet used in this study have been assembled from the 2020 Annual Economic Report of the EU fishing fleet (AER) [11]. The AER reported separately by fleet segment and at overall country-level transversal (capacity, landings and effort) and economic (income, costs, employment, capital value and investment) variables.

In this study, data at fleet segment level only for those fleet segments that have reported all relevant variables for 2018 were analyzed. This concerns data for 363 fleet segments, which in 2018 represented a total of 58,122 active fishing vessels, 131,227 fishers, 1.96 billion liters of fuel consumed, and €6.86 billion in income. Hence, about 97–98% of the EU fishing fleet reported in Table 1 is covered, which could be considered almost full coverage.

Table 1. Summary of the main European Union (EU) fishing fleet data by fishing scale.

Scale	Vessels	Jobs	Weight of Landings (Thousand Tons)	Value of Landings (Million €)	Fuel Consumption (Million Liters)
SSF	44,703	67,760	230	1022	150
LSF	14,047	61,000	3533	4681	1497
DWF	250	6186	716	996	370
Total	59,000	134,946	4478	6699	2018

The Weekly Oil Bulletin [13] provides information on value-added taxes (VAT), excise duties, and other indirect taxes for petroleum products in EU countries. Table 2 summarizes the latest excise duties and VAT on gas oil, which is the main fuel used by the EU fishing sector, by EU Member State. An excise is a tax on the quantity rather than on the value of the good.

Table 2. Excise duties and value-added taxes (VAT) on gas oil by country.

Country	VAT (%)	Indirect Tax (EUR)
Belgium	21	0.600
Bulgaria	20	0.330
Croatia	25	0.404
Cyprus	19	0.411
Denmark	25	0.431
Estonia	20	0.493
Finland	24	0.456
France	20	0.609
Germany	19	0.470
Greece	24	0.417
Ireland	23	0.515
Italy	22	0.617
Latvia	21	0.426
Lithuania	21	0.372
Malta	18	0.472
Netherlands	21	0.512
Poland	23	0.323
Portugal	23	0.513
Romania	19	0.336
Slovenia	22	0.495
Spain	21	0.379
Sweden	25	0.435

In the analysis, the impact of the elimination of fuel tax exemptions is estimated for all the fishing fleets, irrespective of the area where they operate. However, depending on how the potential elimination of fuel tax exemptions would be implemented, different fleets may be affected.

Table 3 and Figure 1 provide the fuel prices by EU Member State. The fuel price in scenario 1 is obtained from dividing the fuel cost by the fuel consumption reported in [11]; the 2018 and 2020 fuel prices are obtained from the Weekly Oil Bulletin; from them are calculated the fuel prices without the fuel tax exemption (scenario 2 and 3).

Table 3. Fuel prices by country and scenario.

Country	2018 Fuel Prices with Tax Exemption (Scenario 1)	2018 Fuel Price with Full Taxes	2018 Fuel Price with Excise and without VAT (Scenario 2)	2020 Fuel Price with Full Taxes	2020 Fuel Price with Excise and without VAT (Scenario 3)
Belgium	0.50	1.42	1.17	1.18	0.98
Bulgaria	0.50	1.11	0.93	0.84	0.70
Croatia	0.64	1.31	1.05	1.00	0.80
Cyprus	0.77	1.31	1.10	1.01	0.85
Denmark	0.54	1.37	1.10	1.10	0.88
Estonia	0.61	1.31	1.09	1.00	0.83
Finland	0.57	1.40	1.13	1.18	0.95
France	0.55	1.44	1.20	1.17	0.97
Germany	0.47	1.28	1.08	1.04	0.88
Greece	0.79	1.39	1.12	1.10	0.88
Ireland	0.39	1.34	1.09	1.14	0.93
Italy	0.59	1.49	1.22	1.27	1.04
Latvia	0.63	1.19	0.98	0.91	0.76
Lithuania	0.42	1.15	0.95	0.90	0.75
Malta	0.63	1.20	1.02	1.28	1.08
Netherlands	0.40	1.34	1.11	1.20	0.99
Poland	0.47	1.15	0.93	0.88	0.72
Portugal	0.66	1.35	1.10	1.13	0.92
Romania	0.92	1.22	1.03	0.91	0.77
Slovenia	0.97	1.28	1.05	1.00	0.82
Spain	0.46	1.21	1.00	0.98	0.81
Sweden	0.56	1.51	1.21	1.23	0.99

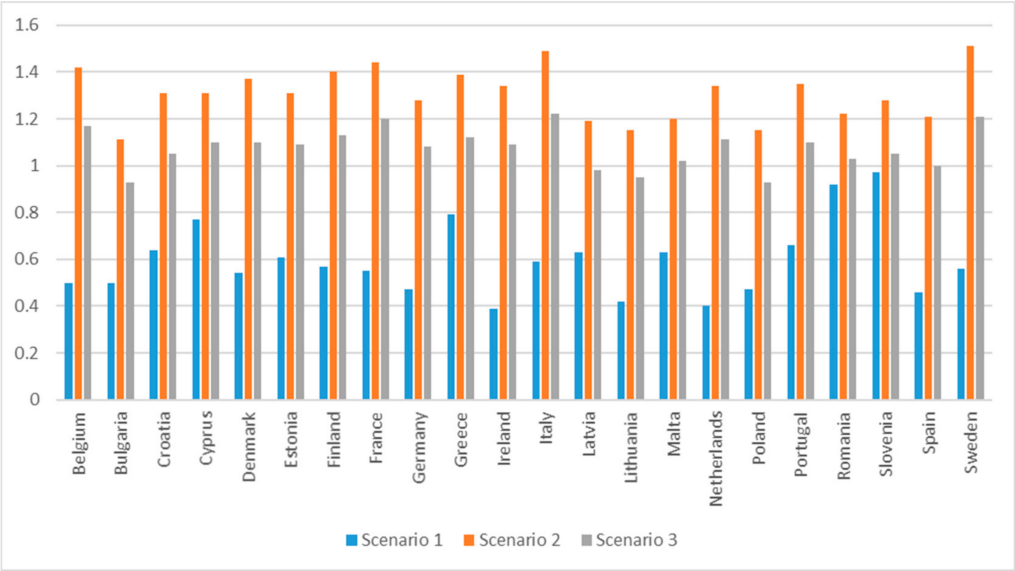

Figure 1. Fuel prices by country and scenario (€ per liter).

3. Results

Results in Table 4 show that, in 2018, the EU fishing fleet registered €804 million in operating profit, which corresponds to an 11.7% profit margin (baseline, scenario 1). If the fuel tax exemption is eliminated, considering 2018 income and costs, operating profit would decrease to €-332 million, corresponding to a −4.8% profit margin (fuel prices before the COVID-19 outbreak—scenario 2).

Table 4. Impact of the elimination of fuel tax exemptions by fishing scale.

Scale	Vessels	Jobs	Income	Scenario 1: Baseline		Scenario 2: 2018 Fuel Price		Scenario 3 2020 Fuel Price	
				Fuel Price	Op. Profit Margin %	Fuel Price	Op. Profit Margin %	Fuel Price	Op. Profit Margin %
SSF	43,976	66,184	1.11	0.75	11.8	1.08	6.6	0.88	9.4
LSF	13,981	60,365	4.82	0.58	13.0	1.08	−5.4	0.88	0.4
DWF	165	4678	0.93	0.53	4.9	1.09	−15.5	0.90	−8.6
TOTAL	58,122	131,227	6.86	0.65	11.7	1.08	−4.8	0.88	0.6

Instead, if we consider the elimination of the fuel tax exemption with 2020 fuel prices (low fuel prices during the COVID-19 outbreak), and all other income and costs as in 2018, then operating profit would be €43.7 million, which is equal to a 0.6% profit margin (scenario 3).

The small-scale fleet (SSF) is the fleet less impacted by the fuel price increases due to the elimination of the fuel tax exemption. This is partly because the small-scale fleet is the one initially paying more for the fuel: €0.75/liter compared to the €0.58/liter of the large-scale fleet (LSF) and the €0.53/liter of the distance-water fleet (DWF). Small-scale coastal fleet is defined as the fishing vessels of an overall length of less than 12 m and not using towed gear [11].

Indeed, the small-scale fleet had €131 million in operating profit in 2018, corresponding to an 11.8% profit margin (scenario 1). If the fuel tax exemption would be eliminated, considering 2018 income and costs, operating profit would decrease to €73 million, which is equal to a 6.6% profit margin (scenario 2). Instead, if we consider the elimination of the fuel tax exemption and the low 2020 fuel prices, and all other income and costs as in 2018, then operating profit would be €104 million, which is equal to a 9.4% profit margin (scenario 3).

The large-scale fleet had a 13% profit margin in 2018. If the fuel tax exemption would be eliminated, the profit margin would decrease to −5.4% considering 2018 fuel prices, and 0.4% considering 2020 fuel prices, while the distant-water fleet had a 4.9% profit margin in 2018. If the fuel tax exemption would be eliminated, the profit margin would decrease to −15.5% considering 2018 fuel prices, and −8.6% considering 2020 fuel prices.

Table 5 summarizes the number of fleet segments, vessels and employment (jobs) that (i) remain obtaining profits, (ii) move from profits to losses, and (iii) remain obtaining losses when the fuel tax exemption is eliminated (going from scenario 1 to scenario 2).

Table 5. Impact of the elimination of fuel tax exemptions by fishing scale (scenario 1 to 2).

Scale	Total			Profits in Both Scenarios			Profits to Losses			Losses in Both Scenarios		
	Segments	Vessels	Jobs	Segments	Vessels	Jobs	Segments	Vessels	Jobs	Segments	Vessels	Jobs
SSF	117	43,976	66,184	70	23,525	39,392	9	1976	3678	38	18,475	23,114
LSF	237	13,981	60,365	105	7127	27,850	80	5338	26,335	52	1516	6180
DWF	9	165	4678	2	45	1131	1	26	1368	6	94	2179
TOTAL	363	58,122	131,227	177	30,697	68,373	90	7340	31,381	96	20,085	31,473

About 60% of the small-scale fleet segments remain obtaining profits, while 8% of the segments go from profits to losses, the rest remain obtaining losses. About 44% of the large-scale fleet segments remain obtaining profits, while 34% of the segments go from profits to losses. About 22% of the distance-water fleet segments remain obtaining profits, while 11% of the segments go from profits to losses. These results are more worrying when it is considered that almost half of the vessels and the fishers will be in fleet segments having losses if the tax exemptions are eliminated.

Table 6 shows the impact on the operating profits and operating profits margin of the elimination of fuel tax exemptions by fishing scale, sea basin (MBS: Mediterranean and Black Seas; NAO: North Atlantic Ocean; and OFR: Other Fishing Regions) and country.

Table 6. Impact of the elimination of fuel tax exemptions by fishing activity, sea basin and country.

						Scenario 1			Scenario 2			Scenario 3		
Scale	**Country**	**Sea Basin**	**Specific Area**	**Vessels**	**Jobs**	**Fuel Price**	**O. Profit**	**O. Profit Margin**	**Fuel Price**	**O. Profit**	**O. Profit Margin**	**Fuel Price**	**O. Profit**	**O. Profit Margin**
SSF	Bulgaria	MBS		1100	1508	0.61	2,018,988	62.7	0.93	1,883,295	58.5	0.70	1,982,008	61.5
	Croatia	MBS		5166	5427	0.33	6,324,441	27.5	1.05	2,056,427	8.9	0.80	3,524,979	15.3
	Cyprus	MBS		730	1057	0.77	581,178	16.9	1.10	251,207	7.3	0.85	508,524	14.8
	Denmark	NAO		894	290	0.72	−2,480,682	−9.9	1.10	−3,272,802	−13.0	0.88	−2,813,032	−11.2
	Estonia	NAO		1199	1106	1.17	−708,989	−11.6	1.09	−666,495	−10.9	0.83	−520,610	−8.5
	Finland	NAO		1268	1072	0.78	−1,337,398	−15.5	1.13	−1,614,524	−18.7	0.95	−1,471,707	−17.0
	France	MBS		1113	1397	0.66	17,756,621	19.5	1.20	13,790,583	15.2	0.97	15,476,767	17.0
	France	NAO		1339	2447	0.58	17,115,525	10.2	1.20	6,280,916	3.7	0.97	10,259,392	6.1
	France	OFR	French Guiana	107	306	0.95	1,519,350	19.9	1.20	1,388,862	18.2	0.97	1,510,106	19.8
	France	OFR	Guadeloupe	752	1330	0.89	841,113	3.7	1.20	−62,800	−0.3	0.97	597,704	2.6
	Germany	NAO		708	878	0.65	−3,155,590	−44.0	1.08	−3,352,360	−46.8	0.88	−3,261,189	−45.5
	Greece	MBS		11,936	16,042	1.15	−4,414,355	−2.1	1.12	−3,475,239	−1.6	0.88	4,329,445	2.0
	Ireland	NAO		869	843	0.39	19,217,261	36.3	1.09	12,630,780	24	0.93	14,125,087	26.7
	Italy	MBS		7327	12,333	0.68	33,972,222	18.4	1.22	18,401,863	10.0	1.04	23,610,620	12.8
	Latvia	NAO		194	296	0.63	497,791	18.8	0.98	331,936	12.5	0.76	438,704	16.5
	Lithuania	NAO		66	139	0.78	48,674	6.2	0.95	26,470	3	0.75	53,216	6.8
	Malta	MBS		665	902	0.70	−636,611	−11.2	1.02	−1,119,300	−20	1.08	−1,224,022	−21.5
	Netherlands	NAO		175	327	0.83	1,976,509	35.1	1.11	1,834,245	33	0.99	1,893,559	33.6
	Poland	NAO		617	1738	0.67	−1,620,557	−12.9	0.93	−2,094,618	−17	0.72	−1,707,647	−13.6
	Portugal	NAO		2418	5388	1.15	23,017,592	31.8	1.10	23,312,512	32	0.92	24,295,655	33.5
	Portugal	NAO	Madeira	53	175	0.50	413,832	20.6	1.10	194,911	10	0.92	261,524	13.0
	Portugal	NAO	Azores	437	1450	1.16	4,330,487	22.1	1.10	4,447,001	23	0.92	4,798,866	24.5
	Romania	MBS		113	310	0.93	561,648	30.5	1.03	532,754	29	0.77	612,688	33.3
	Slovenia	MBS		65	81	1.30	1,290,554	75.1	1.05	1,301,572	76	0.82	1,311,921	76.4
	Spain	MBS		1075	2098	0.38	1,325,561	3.3	1.00	−2,726,797	−7	0.81	−1,501,593	−3.7
	Spain	NAO	Canary islands	475	809	0.38	−2,121,889	−21.3	1.00	−3,158,329	−32	0.81	−2,840,316	−28.5
	Spain	NAO		2455	5609	0.62	18,515,790	17.1	1.00	12,697,715	12	0.81	15,573,312	14.3
	Sweden	NAO		660	827	0.55	−3,879,609	−27.1	1.21	−6,522,263	−45.6	0.99	−5,631,054	−39.4
	TOTAL SCF			**43,976**	**66,184**	**0.75**	**130,969,456**	**11.8**	**1.08**	**73,297,520**	**6.6**	**0.88**	**104,192,908**	**9.4**

Table 6. *Cont.*

						Scenario 1			Scenario 2			Scenario 3		
Scale	**Country**	**Sea Basin**	**Specific Area**	**Vessels**	**Jobs**	**Fuel Price**	**O. Profit**	**O. Profit Margin**	**Fuel Price**	**O. Profit**	**O. Profit Margin**	**Fuel Price**	**O. Profit**	**O. Profit Margin**
LSF	Belgium	NAO		66	339	0.50	3,621,599	4.1	1.17	−21,975,901	−25.1	0.98	−14,520,099	−16.6
	Bulgaria	MBS		105	272	0.48	2,274,216	46.6	0.93	1,218,760	25.0	0.70	1,756,760	36.0
	Croatia	MBS		897	2393	0.73	7,747,769	11.8	1.05	1,558,896	2.4	0.80	6,398,524	9.7
	Cyprus	MBS		38	189	0.77	−631,828	−20.0	1.10	−870,044	−27.6	0.85	−684,279	−21.7
	Denmark	NAO		362	999	0.53	98,070,248	20.8	1.10	40,232,370	8.5	0.88	62,466,572	13.2
	Estonia	NAO		26	137	0.50	3,033,826	30.5	1.09	1,407,302	14.1	0.83	2,118,808	21.3
	Finland	NAO		52	125	0.56	2,512,570	8.7	1.13	−2,717,485	−9.4	0.95	−1,089,302	−3.8
	France	MBS		137	577	0.62	14,265,212	19.6	1.20	6,015,435	8.3	0.97	9,247,651	12.7
	France	NAO		1351	5224	0.55	28,910,558	3.7	1.20	−104,680,306	−13.3	0.97	−57,809,428	−7.4
	France	OFR	Guadeloupe	16	79	0.89	95,341	15.4	1.20	74,951	12.1	0.97	89,953	14.5
	Germany	NAO		263	779	0.48	29,890,308	18.1	1.08	7,202,055	4.4	0.88	14,825,254	9.0
	Greece	MBS		875	4881	0.58	85,692,965	36.2	1.12	54,964,590	23.2	0.88	68,310,891	28.9
	Ireland	NAO		500	2085	0.39	17,797,268	6.6	1.09	−51,155,259	−19.0	0.93	−35,491,652	−13.2
	Italy	MBS		3805	13,426	0.58	129,825,005	17	1.22	−81,200,613	−10	1.04	−21,120,499	−3
	Latvia	NAO		51	335	0.63	5,061,330	24.8	0.98	3,356,731	16.4	0.76	4,454,059	21.8
	Lithuania	NAO		19	113	0.50	−91,888	−1.6	0.95	−1,237,532	−21.0	0.75	−717,876	−12.2
	Malta	MBS		63	242	0.59	1,302,525	12.4	1.02	324,578	3.1	1.08	170,787	1.6
	Netherlands	NAO		347	1660	0.47	56,094,772	12.6	1.11	−47,012,484	−10.6	0.99	−28,699,106	−6.4
	Poland	NAO		160	845	0.52	7,142,496	19	0.93	847,787	2	0.72	4,130,229	11
	Portugal	MBS		1	12	0.63	102,183	16	1.10	4,553	1	0.92	42,446	7
	Portugal	NAO	International waters	9	288	0.54	15,165,813	28.0	1.10	7,820,072	14.4	0.92	10,221,614	18.8
	Portugal	NAO		628	5557	0.61	14,091,545	7.5	1.10	−10,272,323	−5.5	0.92	−1,218,403	−0.7
	Portugal	NAO	Madeira	34	359	0.56	2,759,928	19.8	1.10	1,409,015	10.1	0.92	1,866,647	13.4
	Portugal	NAO	Azores	96	992	0.68	2,994,208	13.1	1.10	943,787	4.1	0.92	1,836,607	8.0
	Romania	MBS		23	95	0.92	1,004,730	43.3	1.03	949,323	40.9	0.77	1,084,794	46.8
	Slovenia	MBS		11	22	0.88	−12,051	−2.7	1.05	−41,129	−9.2	0.82	−740	−0.2
	Spain	MBS		1017	5490	0.51	31,292,266	10.6	1.00	−15,080,805	−5.1	0.81	2,647,721	0.9
	Spain	NAO	Canary islands	71	454	0.53	−1,880,699	−12.7	1.00	−3,517,558	−23.7	0.81	−2,865,919	−19.3
	Spain	NAO	Moroccan waters	8	32	0.36	−118,404	−13.7	1.00	−269,488	−31.2	0.81	−225,157	−26.1
	Spain	NAO		2,723	11,793	0.46	56,186,314	9.1	1.00	−34,770,397	−5.7	0.81	−2,829,809	−0.5
	Sweden	NAO		227	572	0.56	13,309,528	12.7	1.20	−14,771,951	−14.1	0.98	−5,024,418	−4.8
	TOTAL LSF			**13,981**	**60,365**	**0.58**	**627,509,652**	**13.0**	**1.08**	**−261,243,071**	**−5.4**	**0.88**	**19,372,630**	**0.4**

Table 6. *Cont.*

						Scenario 1			Scenario 2			Scenario 3		
Scale	**Country**	**Sea Basin**	**Specific Area**	**Vessels**	**Jobs**	**Fuel Price**	**O. Profit**	**O. Profit Margin**	**Fuel Price**	**O. Profit**	**O. Profit Margin**	**Fuel Price**	**O. Profit**	**O. Profit Margin**
DWF	France	OFR		22	543	0.49	−7,197,165	−3.6	1.20	−52,415,925	−26.0	0.97	−37,788,933	−18.7
	Italy	OFR		7	84	0.52	−853,366	−14.3	1.22	−2,401,317	−40.3	1.04	−1,998,137	−33.5
	Lithuania	OFR		6	202	0.42	−7,322,498	−12.4	0.95	−24,805,798	−42.1	0.75	−18,135,000	−30.8
	Portugal	OFR		19	321	0.79	−2,069,788	−9.0	1.10	−4,545,917	−19.9	0.92	−3,065,897	−13.4
	Spain	OFR		111	3528	0.43	62,647,727	9.8	1.00	−59,486,502	−9.3	0.81	−18,849,552	−2.9
	TOTAL DWF			**165**	**4678**	**0.53**	**45,204,909**	**4.9**	**1.09**	**−143,655,459**	**−15.5**	**0.90**	**−79,837,519**	**−8.6**
TOTAL				**58,122**	**131,227**	**0.65**	**803,684,017**	**11.7**	**1.08**	**−331,601,010**	**−4.8**	**0.88**	**43,728,019**	**0.6**

Figures 2–4 show the main small-scale, large-scale and distance-water fleet segments impacted by the elimination of the fuel tax exemption in terms of cost increase (profit reduction) per vessel comparing scenarios 1 and 2.

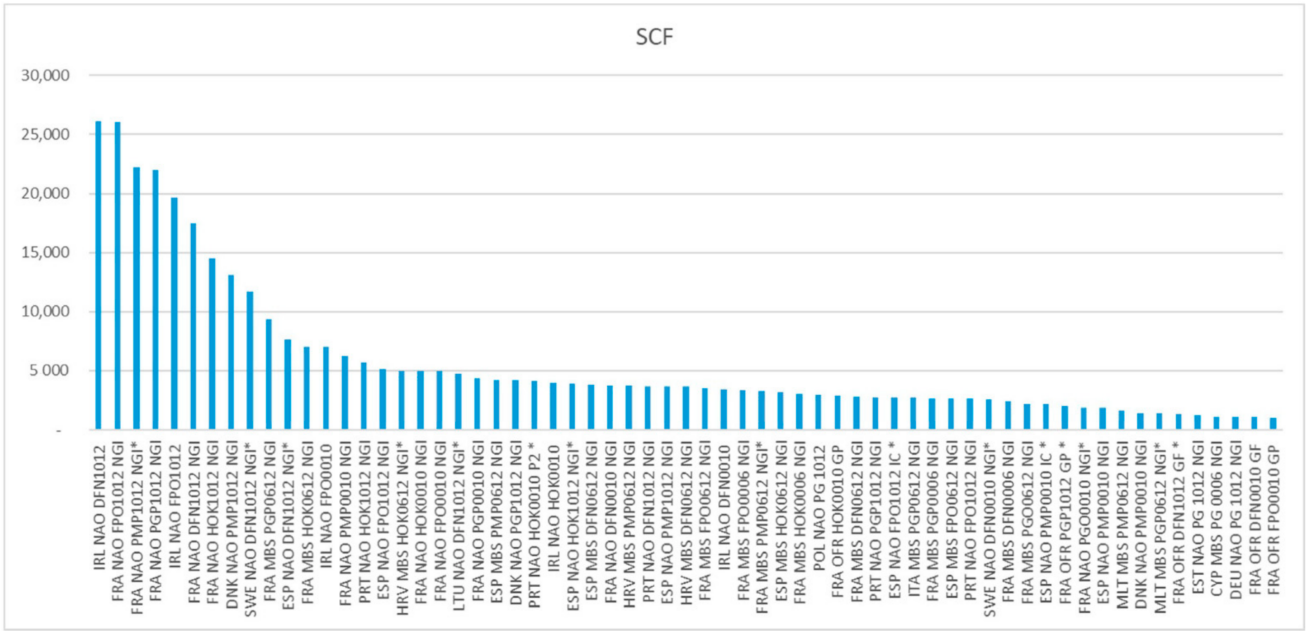

Figure 2. Small-scale fleets most affected (more than €1000 per vessel) by the elimination of the fuel tax exemption in terms of cost increase (profit reduction) per vessel comparing scenarios 1 and 2.

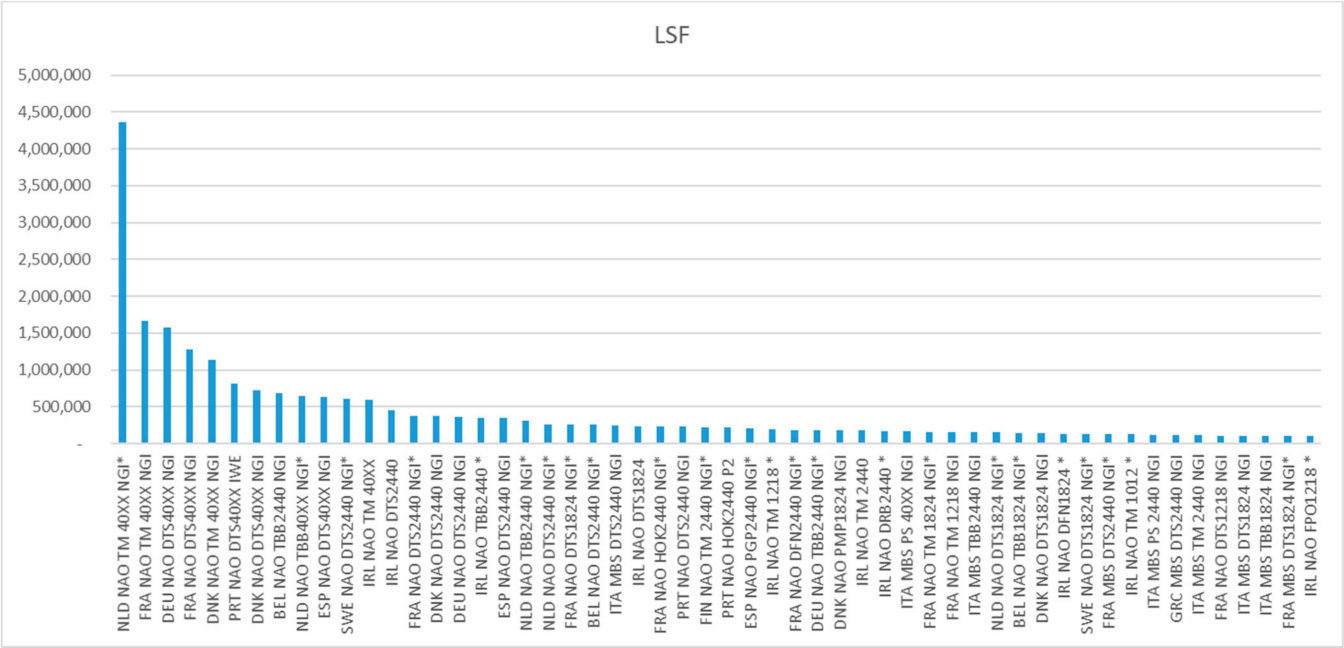

Figure 3. Large-scale fleets most affected (more than €100,000 per vessel) by the elimination of the fuel tax exemption in terms of cost increase (profit reduction) per vessel comparing scenarios 1 and 2.

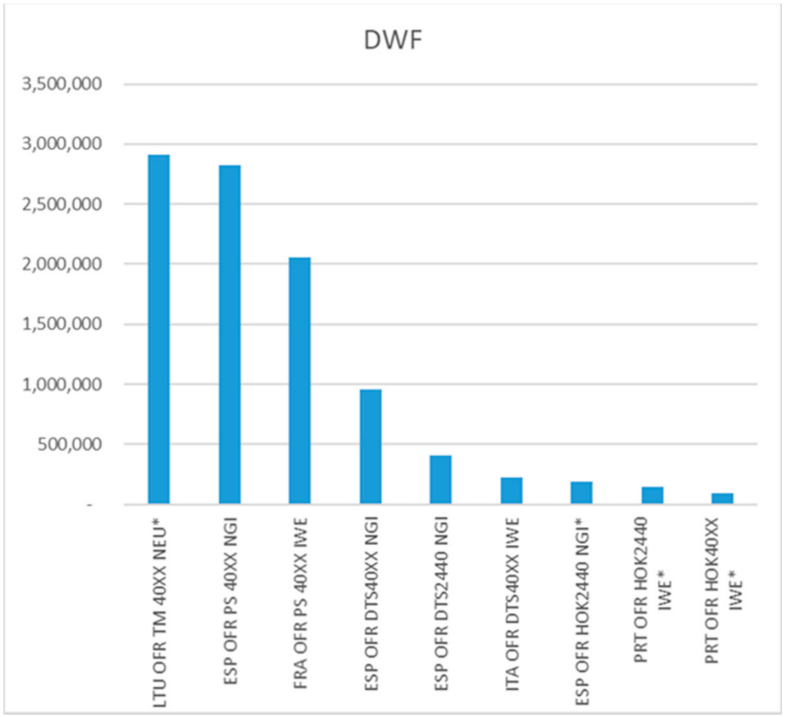

Figure 4. Distance-water fleets affected by the elimination of the fuel tax exemption in terms of cost increase (profit reduction) per vessel comparing scenarios 1 and 2.

The fleets more affected are, as expected, the fleets with the higher fuel consumptions. The elimination of the fuel tax exemption leads to an increase in the fuel costs, and thus a decrease in the economic performance. When analyzing the profit reduction per vessel comparing scenarios 1 and 2 (Figures 2–4), it can be observed that the most affected fleets are the large-scale and distant-water fleets, in particular, large trawlers (TM: pelagic trawlers; DTS: demersal trawlers and/or seiners; and TBB: beam trawlers) and tuna purse seiners.

4. Concluding Remarks

This study investigated the economic impacts of the potential elimination of the fuel tax exemption for the EU-27 fishing fleet. In 2018, the EU-27 fishing fleet landed 4.48 million tons of fish, valued at €6.7 billion [11]. To do so, it consumed 2.02 billion liters of fuel, emitting about 5.2 million tons of CO2. The EU-27 fishing fleet generated slightly more than €0.8 billion in operating profit.

By comparing the difference in fuel costs between scenario 2 and the baseline scenario 1, it can be estimated that this so-called foregone revenue for the administrations in terms of fuel taxes not collected due to the tax exemption amounted to €1.14 billion in 2018. Thus, showing that if the fuel tax exemption would be eliminated, the EU-27 fishing fleet would have losses of €0.3 billion in the operating profit, considering fuel prices go back to 2018 levels. Instead, if fuel prices remain at the current historical lows of 2020, the EU-27 fishing fleet would be slightly above 0 in operating profit. However, the impacts of this potential elimination of the fuel tax exemption vary significantly across the different EU fishing fleets.

The small-scale fleet represents 76% of the EU fishing vessels, 50% of the employment, 5% of the landings in weight and 15% in value, and 7% of the fuel consumed [11]. In 2018, it obtained about €131 million in operating profit (scenario 1), while without the tax exemption it would have obtained about €73 million in operating profit (scenario 2). About 60% of the SSF would remain obtaining profits, while 8% would go from profits to losses without the tax exemption. In general terms, these impacts are relatively moderate because the SSF has a relatively low fuel consumption and low proportion of fuel cost in the overall cost structure due to its fewer fuel-intensive fishing gears and short fishing trips.

The large-scale fleet represents 24% of the EU fishing vessels, 45% of the employment, 79% of the landings in weight and 70% in value, and 74% of the fuel consumed [11]. In 2018, it obtained about €628 million in operating profit (scenario 1), while without the tax exemption it would have obtained about €261 million in operating losses (scenario 2). About 44% of the LSF would remain obtaining profits, while 34% would go from profits to losses without the tax exemption.

The distant-water fleet represents less than 0.5% of the EU fishing vessels, 5% of the employment, 16% of the landings in weight and 15% in value, and 18% of the fuel consumed [11]. In 2018, it obtained about €45 million in operating profit (scenario 1), while without the tax exemption it would have obtained about €144 million in operating losses (scenario 2). About 22% of the DWF would go from profits to losses without the tax exemption, but 67% of the fleets were already having losses in scenario 1.

Therefore, the foregone revenue not collected due to the tax exemption amounts to about €1.14 billion annually corresponding to €58 million from the SSF, €889 million from the LSF, and €189 million from the DWF. This is in line with Borrello et al.'s [14] estimation that fuel tax exemptions for the EU fishing fleet amounted to around €1.05 billion on average per year over the period 2002–2011.

However, this analysis initially includes all the EU fishing fleets. It is yet to be seen if the elimination of the fuel tax exemption would be limited to the EU fleets fishing in territorial waters (i.e., less than 12 nautical miles from the coast) which mostly corresponds to the SSF, or if the elimination of the tax exemption would address all EU fishing fleets irrespective of the area where they deploy their fishing activity.

The revision of the Energy Taxation Directive (ETD) could lead to the elimination of the current fuel tax exemption, in line with the adoption of the European Green Deal. However, this would only affect the SSF that is fishing in the EU territorial waters, which is only responsible for 7% of the fuel consumed by the EU fishing fleet.

Countries do not have fiscal sovereignty beyond the 12 nautical miles, as established in international law (i.e., UNCLOS). Therefore, the elimination of the current fuel tax exemption, a priori, would not affect the LSF and the DWF. Any efforts from EU countries to impose fuel taxes on the fuel consumed by these fleets could break international law and incentivize further refills in third countries and bunkering in high seas, which is a relatively dangerous activity, also from an ecological perspective. This implies that it would be very difficult that EU countries could receive from the LSF and DWF any of the €1.08 billion not paid in taxes due to the fuel tax exemption because they operate outside EU territorial waters.

Hence, the taxes not paid by the LSF and DWF cannot be considered foregone revenues for the EU countries, as countries do not have fiscal sovereignty in the waters where these fleets operate. Accordingly, the fuel tax exemptions of the LSF and DWF should not fit in the WTO [7] definition of fuel subsidy as "government revenue that is otherwise due is foregone or not collected (e.g., fiscal incentives such as tax credits)". EU countries can only be held accountable for subsidizing EU fishing fleets through fuel tax exemptions in their territorial waters for the SSF amounting to €58 million.

Sumaila et al. [15] consider that the World Trade Organization (WTO) is in a unique position to prohibit harmful fisheries subsidies, in particular fuel subsidies. They justify it, arguing that the WTO is the only global multilateral organization that can enforce its agreements and level the trade "playing field" for all countries of the world. However, we consider that it is not enough. As our results show, countries have limited capacity to eliminate fuel tax exemptions, even in the WTO framework, since they do not have the capacity to set taxes where international law does not provide them with fiscal jurisdiction. Moreover, such a measure would only have an impact on the SSF, worsening the "playing field" of the SSF in comparison to the LSF and DWF, thus having a small impact on the reduction of fuel consumption, but a high social impact, since the SSF supports 50% of the employment and only consumes 7% of the fuel (about 0.36 million tons of CO_2).

Previously, when there have been significant fuel price increases, the fishing activity and thus the fuel consumption have been reduced up to 20%, while putting in danger many livelihoods and coastal communities [16,17]. Thus, if the elimination of the current fuel tax exemption only affects the SSF, it could put in danger almost 68,000 direct jobs and whole coastal communities for the potential reduction of 0.07 million tons of CO_2, compared to the almost 3900 million tons of CO_2 emitted in the whole EU [18].

Moreover, fish products have proven to require relative low emissions for their consumption (including the extraction of raw materials, manufacturing, distribution, packaging, use and end-of-life management), and thus have a lower climate impact than meat in general and some dairy products (e.g., butter and cheese) [19–21]. The EU is very dependent on imports to meet the demand of its population, importing about 70% of the fish products it consumes [12,22]. If the consumption of fish products in the EU does not decrease, the EU will have to import more fish products, increasing its trade deficit and worsening their food and nutrition security. In addition, imported fish products often have a major environmental impact, since they require more emissions for their distribution as they come from distant fishing grounds. Thus, eliminating the current fuel tax exemption just for the SSF may have an important economic and social impact on EU coastal communities, with a relatively low improvement or even worsening the overall environmental impact.

Hence, it seems necessary that this change needs to be global and countries to be given fiscal jurisdiction beyond the 12 nautical miles, and to our knowledge, this can only happen with a revision of the United Nations Convention on the Law of the Sea (UNCLOS). In any case, the intervention of the WTO is fundamental to avoid the risk of an unlevelled playing field, e.g., in relation to countries with a different fuel tax exemption treatment and their fleets sharing the same fishing grounds or their products competing in the same markets.

Moreover, there are large differences in fuel taxation levels between countries. Low fuel taxation behaves similar to fuel tax exemptions, and thus to subsidies. Fleets with lower fuel taxation have lower operational costs and so can obtain more profits. However, low fuel taxations are generally not considered subsidies, even if there are some exceptions, e.g., in two of the Food and Agriculture Organization (FAO) subsidies group definitions [23] and the International Monetary Fund (IMF) [24]. Thus, it is important to have fuel taxation aligned globally, or at least regionally. Further work is necessary to determine the optimal fuel taxation level.

We recognize the importance of eliminating fuel tax exemptions and other fuel subsidies as soon as possible with the aim to increase greenhouse gas emission reductions, energy efficiency improvements, and recovery of fish stocks in line with the European Green Deal, the Common Fisheries Policy (CFP), and common awareness. However, the capacity of the EU fishing fleet to adapt to a scenario of a quick elimination of the fuel tax exemption and sharp fuel cost increases seems rather limited in the short term. The energy efficiency (i.e., the amount of fish that can be caught with a certain amount of fuel) of the fleet has improved on average by 3% annually in the last decades, in part due to the recovery of fish stocks [11,17]. Hence, on the other hand, it seems advisable to use support measures and a gradual implementation of the potential tax exemption elimination to attenuate the socioeconomic impacts across EU fleets and fishing communities.

The role of the European Maritime and Fisheries Fund (EMFF, period 2014–2020) in supporting the energy transition for the EU fishing fleet has been rather limited. EU countries have only allocated 1% of the total EMFF in the measures to support energy efficiency. Article 41.1 of the EMFF includes investments in equipment, in fishing gear, energy efficiency audits and schemes, studies to assess the contribution of alternative propulsion systems and hull designs to the energy efficiency of fishing vessels. Article 41.2 of the EMFF provides support for the replacement or modernization of main or ancillary engines under certain conditions.

It seems that the recently agreed European Maritime, Fisheries and Aquaculture Fund (EMFAF) (i.e., EMMF post 2020) would be the main financial mechanism to use in order

to improve energy efficiency in the EU fisheries sector and reduce the negative impacts of the potential elimination of the fuel tax exemption [25]. The proposed Just Transition fund will support the economic diversification and reconversion of the territories most affected towards climate neutrality and avoid regional disparities growing. The setting up of this fund requires funding from the country that will have to match each euro received from this fund, with €1.5 to €3 from their resources of the European Regional Development Fund (ERDF) and the European Social Fund Plus (ESF+) [26]. Therefore, this fund may not be so attractive for the EU fishing fleet.

To improve the low use of the EMFF, EMFAF should provide larger flexibility and higher aid intensity for countries to support any measure for energy transition as long as they do not increase fishing capacity. This flexibility will help to better address the specific needs of each fleet segment and country in terms of energy transition. For example, support could be granted for switching to lower-carbon fuels such as Liquefied Natural Gas (LNG) or Liquefied Petroleum Gas (LPG), developing hybrid-electrical propulsion or any other measures that would help to reduce the fuel costs and CO_2 emissions of a vessel. Further efficiency gains could be made by switching to alternative fishing methods and gears, which are also supported by the EMFF. The replacement of vessel engines remains subject to specific conditions, as in the current EMFF, to ensure that fishing capacity is not increased.

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