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# Economic Impact of High Fuel Prices on the EU Fishing Fleet

**Jordi Guillen [1,*], Natacha Carvalho [2], Griffin Carpenter [3], Antonio Borriello [1] and Angel Calvo Santos [4]**

[1] Joint Research Centre (JRC), European Commission, 21027 Ispra, Italy; antonio.borriello@ec.europa.eu
[2] European Environment Agency (EEA), 1050 Copenhagen, Denmark; natacha.carvalho@eea.europa.eu
[3] Independent Researcher, 1000 Brussels, Belgium; griffincarpenter@gmail.com
[4] DG for Maritime Affairs and Fisheries (DG MARE), European Commission, 1000 Brussels, Belgium; angel-andres.calvo-santos@ec.europa.eu
* Correspondence: jordi.guillen@ec.europa.eu

**Abstract:** Energy prices increased sharply because of the military invasion of Ukraine by Russia in February 2022, heavily impacting global economies. In 2022, the EU fishing sector paid on average about EUR 0.93 per liter of fuel; at the peak of the crisis in June, it paid EUR 1.2 per liter, around three times the normal average price. High fuel prices jeopardize the viability of the fishing sector, which is largely fuel-intensive and particularly vulnerable to fuel price increases. The European Commission responded with emergency measures, adopting a Temporary Framework for State aid rules and activating the crisis mechanism foreseen under the European Maritime, Fisheries and Aquaculture Fund (EMFAF). This communication aims to examine the economic impact of the high fuel prices and the financial support available to the EU fishing sector to assess the short-term and long-term sustainability of the EU fishing sector.

**Keywords:** fuel consumption; short- and long-term break-even fuel price; economic performance; financial support



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## 1. Introduction

Energy prices increased globally during 2021 to levels similar to 2018 and 2019. However, in February 2022, energy prices increased sharply as a result of the Russian invasion of Ukraine and the resulting economic sanctions.

Increased energy prices led to higher operating costs in many economic sectors, including the fishing sector. In 2022, the EU fishing sector paid on average about EUR 0.93 per liter of marine gasoil. At the peak of the crisis, in June 2022, the sector was paying EUR 1.2 per liter, which was more than three times early 2021 prices [1], as can be seen in Figure 1. Fuel prices only went consistently below EUR 1 per liter after November 2022 [1].

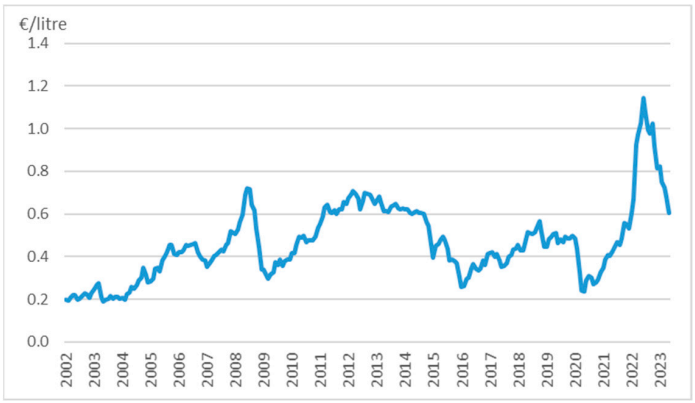


**Figure 1.** Average monthly fuel price evolution in EU fishing ports (EUR per liter), 2002–2023 (up to May 2023). Source: own calculation from EUMOFA data [1].

Fishing is an energy-intensive activity, with fuel costs constituting an important share of the operational costs. In 2021, fuel costs represented 21% of the operational costs in the EU fishing fleet [2]. Hence, the economic performance of the fishing sector is very sensitive to fuel prices [3–8].

High fuel prices are worsening the economic performance of the EU fishing sector [9,10] and fishing fleets worldwide [11–13]. This has led to some changes in fishing activity and reductions in fishing efforts—even the mooring of vessels that are unable to cover their operating costs. According to the EU fishing sector, the activity is only profitable with fuel prices up to EUR 0.60 per liter. According to Europêche [14]: "For months the sector has been facing a difficult economic situation enduring a steep increase in gas and electricity prices and logistic costs. Now, fuel prices are reaching an all-time high, exceeding EUR 1/liter in many EU countries. 60 cents per liter, was already the price limit for our vessels to remain profitable".

In response, on 23 March 2022, the European Commission adopted a temporary state aid framework to support the economy against the impacts of Russia's invasion and resulting economic sanctions. It allows Member States to grant fishery and aquaculture companies up to EUR 35,000 in liquidity support in the form of state guarantees and subsidized loans and to provide aid to compensate for high energy prices. On 25 March 2022, the European Commission triggered the European Maritime, Fisheries and Aquaculture Fund (EMFAF) Regulation crisis mechanism (Article 26 (2)) by declaring the occurrence of an exceptional event causing significant disruption to markets. This allows Member States to financially compensate operators for forgone income or additional costs. Member States can define the specific measures to be used [15,16]. On 20 July 2022, the European Commission first amended this temporary crisis framework to increase the maximum aid amount up to EUR 75,000 [17], while on 28 October 2022, a second amendment was created to increase the maximum aid amount up to EUR 300,000 and extend its duration by one year, until the end of 2023 [18].

This communication sets out to estimate the economic impact of the high fuel prices and whether the diverse financial supports available were enough to keep fishing activities as financially viable as before the high fuel prices.

## 2. Materials and Methods

To investigate the economic impact of the fuel price increases on the EU fishing fleet, income and cost data for 2021 were used with a 2022 average fuel price of EUR 0.93 per liter.

Different indicators are often used to inform on the economic performance of a sector or firm.

The Gross Value Added (GVA) represents the contribution of the sector to society in terms of profits and salaries. Therefore, it signals if the economic activity is desirable.

Gross profits are calculated by subtracting labor costs from the GVA and hence show the short-term private gains.

Operating profits are calculated by subtracting the consumption of fixed capital (i.e., depreciation) from the gross profit, and so by accounting for the cost of capital investments, it shows the long-term private gains.

Net profits are calculated by subtracting the opportunity cost of capital from the operating profit, and so it investigates whether the activity provides extraordinary profits above the "normal" remuneration of capital. The existence of high extraordinary (net) profits could be used to justify the extraction of part of this "resource rent", e.g., with taxes. Net profits can see further dilution from the in-the-money options, as elucidated in Goldsticker & Agrrawal [19].

Considering that current high fuel prices are variable and so temporal, this analysis focuses on the gross profits (Equation (1)) to assess the current short-term viability of the sector, while operating profits (Equation (2)) are estimated to provide a more long-term perspective.

$$\text{Gross profit} = \text{Income from landings} + \text{Other income} - \text{Personnel cost} - \text{Value of unpaid labor} - \text{Fuel costs} - \text{Other variable costs} - \text{Other non-variable costs} - \text{Repair \& maintenance costs} \quad (1)$$

$$\text{Operating profit} = \text{Income from landings} + \text{Other income} - \text{Personnel cost} - \text{Value of unpaid labor} - \text{Fuel costs} - \text{Other variable costs} - \text{Other non-variable costs} - \text{Repair \& maintenance costs} - \text{Depreciation of capital} \quad (2)$$

The variables are defined according to the methodology developed in the STECF's Annual Economic Report of the EU fishing fleet (AER) [2].

To extend the analyses reported in this communication, as well as to raise awareness amongst policy-makers and stakeholders, we have created an interactive dashboard to visualize the marginal impact of fuel prices on the economic performance of the EU fishing fleet. It allows users to estimate, at fleet segment and country levels, the impacts of changes in fuel prices, both as numeric and percentage. It is available at https://blue-economy-observatory.ec.europa.eu/fishing-fleet-fuel-analysis_en.

In the first approach, fuel cost (Equation (3)) is obtained by multiplying the fuel consumption per fleet segment by a fuel price of EUR 0.93 per liter. Hence, it is assumed that all fleet segments pay EUR 0.93 per liter for their fuel. However, as can be seen in Table 1, fleets pay different prices for their fuel. In the second approach, we assume a proportional increase in the fuel prices paid by the different fleets so that the resulting overall average fuel price is EUR 0.93 per liter. It is rather challenging to predict oil prices and, even more, the exact fuel price that each fleet segment is paying. Thus, the interactive active dashboard allows users to investigate the economic impacts of their expected fuel prices. Even if results are presented for both approaches, only the results using the first approach are discussed, given that trends are similar and to avoid repetitions.

**Table 1.** Main figures for the EU fishing fleet by vessel length in 2021. Source 2022 AER (2).

| Vessel Length | Less than 12 m Passive | Less than 12 m Active | 12–24 m | 24–40 m | More than 40 m | Overall EU Fleet |
|---|---|---|---|---|---|---|
| Number of vessels | 42,494 | 3413 | 7198 | 1798 | 304 | 55,207 |
| Employment in number | 62,610 | 7043 | 31,707 | 16,296 | 6781 | 124,438 |
| Employment in FTE | 32,784 | 3093 | 24,351 | 15,122 | 7020 | 82,370 |
| Landings value (million EUR ) | 906.7 | 164.0 | 1696.2 | 1513.2 | 1445.0 | 5725.1 |
| Landings weight (thousand tons) | 247.2 | 77.9 | 724.1 | 935.0 | 1510.7 | 3495.0 |
| Fuel consumption (million L) | 143.8 | 34.6 | 528.9 | 581.5 | 571.6 | 1860.3 |
| Fuel price (EUR/L) | 0.92 | 0.74 | 0.63 | 0.52 | 0.47 | 0.57 |
| Landings value per liter (EUR/L) | 6.31 | 4.74 | 3.21 | 2.60 | 2.53 | 3.08 |
| Landings weight per liter (kg/L) | 1.72 | 2.25 | 1.37 | 1.61 | 2.64 | 1.88 |

The estimated fuel costs replace the 2021 fuel costs to estimate the economic performance under higher fuel prices in 2022 while keeping all other variables constant with 2021 values.

$$\text{Fuel cost} = \text{Fuel price} \times \text{Fuel consumption} \quad (3)$$

We are aware that this is a simplistic approach and an important assumption, as the EU fishing fleet could react to high fuel prices by decreasing their fishing effort (e.g., mooring vessels at port) or changing fishing strategies (e.g., reducing the duration of the fishing trips or the target species), thus reducing fuel consumption and costs. However, the benefits of changing the fishing behavior are relatively limited (e.g., not all fishing can take place close to the ports and move closer with further fuel price increases) and could easily lead to reductions in the landings. On the other hand, we are interested in estimating the economic impact of the fuel price increases to assess whether the financial support was enough to compensate for it.

The break-even point is where total cost and total revenue are equal [20]. The short-term break-even fuel price, measured in EUR /liter, refers to the fuel price at which the gross profits become null. So, higher fuel prices than the short-term break-even fuel price would lead to gross losses. Meanwhile, the long-term break-even fuel price refers to the fuel price at which the operational profits become null. So, higher fuel prices than the long-term break-even fuel price would lead to operational losses, and the fishers would not be able to replace their capital assets.

$$\text{Short-term break-even fuel price} = (\text{Gross profit} - \text{Energy cost})/\text{Energy consumption} \quad (4)$$

$$\text{Long-term break-even fuel price} = (\text{Operational or net profit} - \text{Energy cost})/\text{Energy consumption} \quad (5)$$

*Data*

The data on the economic performance and fuel consumption of the EU fishing fleet used in this study have been assembled from the 2022 AER (2), which uses data submitted by Member States under the EU Data Collection Framework (DCF) regulation [21].

According to the 2022 AER, in 2020, the EU active fishing fleet numbered 56,111 vessels, directly employing 124,636 fishers. The fleet consumed 1.9 billion liters of fuel to land 3.9 million tons of seafood, with a reported value of EUR 5.8 billion. The GVA and gross profit (all excluding subsidies) were estimated at EUR 3.3 billion and EUR 1.16 billion, respectively.

According to the 2022 AER report, estimates for 2021 put GVA and gross profits of the EU fleet at EUR 3 billion and EUR 850 million, respectively, indicating a decrease of around EUR 300 million compared to 2020. This deterioration was largely due to higher fuel costs, as the average fuel price in 2021 was 0.57 EUR /liter, while in 2020, it was 0.40 EUR /liter. Table 1 provides the main figures for the EU fishing fleet in 2021 according to the AER 2022.

## 3. Results

Considering the average fuel price of EUR 0.93 per liter in 2022, all else (i.e., fishing activity, income, and other costs) being equal, the economic performance of the EU fishing fleet deteriorated significantly. The EU fishing fleet would have obtained a GVA of EUR 2.4 billion, a gross profit of EUR 183 million, and an operating loss of EUR 560 million. This was the lowest economic performance ever registered for the EU fishing fleet in at least the last two decades.

The economic impact of the fuel price increase on the fleet differed by vessel length and fishing gear used, as fuel consumption varied, e.g., larger vessels and active gears tend to consume more (see Table 2).

Table 2 shows that vessels less than 12 m using passive gears (i.e., the small-scale coastal fleet) experienced, on average, a fuel cost increase of about EUR 45. While gross profit remained positive, the fleet segment registered operating losses. For vessels of less than 12 m using active gears, on average, they saw fuel costs increase by about EUR 1956. Likewise, these vessels obtained gross profits but suffered operating losses.

Vessels between 12 and 24 m had their profitability reduced on average by about EUR 22,300, resulting in a gross profit of EUR 15,500 per vessel.

The profitability of vessels between 24 and 40 m and larger than 40 m decreased the most, and these segments suffered significant losses, with profitability reduced by EUR 133,000 and EUR 865,000, respectively. These cases (over 24 m) are analyzed in more detail in Table 3.

Of the larger-sized vessels, the fleets suffering the most were purse seiners, beam trawlers, and long-liners greater than 40 m. Larger vessels use more fuel in absolute terms but also tend to do so in relative terms (e.g., per revenue). The main fishing techniques are drift and/or fixed netters (DFN), dredgers (DRB), demersal trawlers and/or demersal seiners (DTS), vessels using pots and/or traps (FPO), vessels using hooks (HOK), vessels

using polyvalent passive gears only (PGP), vessels using active and passive gears (PMP), purse seiners (PS), beam trawlers (TBB), and pelagic trawlers (TM).

**Table 2.** Impact of the fuel price increase on the EU fishing fleet by vessel length.

| | Vessel Length | Less than 12 m Passive | Less than 12 m Active | 12–24 m | 24–40 m | More than 40 m | Overall EU Fleet |
|---|---|---|---|---|---|---|---|
| In 2021 | Fuel price (EUR/L) | 0.92 | 0.74 | 0.63 | 0.52 | 0.47 | 0.57 |
| | Gross profit per vessel (EUR) | 2675 | 7327 | 37,772 | 100,814 | 863,503 | 15,475 |
| | Operating profit per vessel (EUR) | 19 | 1823 | 7133 | −4312 | 335,975 | 2001 |
| | Gross profit margin (%) | 12.5% | 15.2% | 16.0% | 12.0% | 18.2% | 14.9% |
| | Operating profit margin (%) | 0.1% | 3.8% | 3.0% | −0.5% | 7.1% | 1.9% |
| | Short-term break even fuel price (EUR/L) | 0.92 | 0.92 | 0.72 | 0.51 | 0.65 | 0.63 |
| | Long-term break even fuel price (EUR/L) | 1.71 | 1.46 | 1.14 | 0.83 | 0.93 | 1.03 |
| 2022 estimate with approach 1: Constant fuel price | Fuel price (EUR/L) | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| | Fuel cost increase per vessel (EUR) | 45 | 1956 | 22,294 | 133,095 | 865,212 | 12,161 |
| | Gross profit per vessel (EUR) | 2630 | 5371 | 15,478 | −32,281 | −1709 | 3314 |
| | Operating profit per vessel (EUR) | −26 | −133 | −15,161 | −137,407 | −529,237 | −10,160 |
| | Gross profit margin (%) | 12.3% | 11.2% | 6.6% | −3.8% | 0.0% | 3.2% |
| | Operating profit margin (%) | −0.1% | −0.3% | −6.4% | −16.3% | −11.1% | −9.8% |
| 2022 estimate with approach 2: Proportional fuel price | Fuel price (EUR/L) | 1.50 | 1.20 | 1.02 | 0.85 | 0.77 | 0.93 |
| | Fuel cost increase per vessel (EUR) | 1967 | 4736 | 29,196 | 106,336 | 560,224 | 12,161 |
| | Gross profit per vessel (EUR) | 708 | 2591 | 8576 | −5522 | 303,279 | 3314 |
| | Operating profit per vessel (EUR) | −1948 | −2913 | −22,063 | −110,648 | −224,249 | −10,160 |
| | Gross profit margin (%) | 3.3% | 5.4% | 3.6% | −0.7% | 6.4% | 3.2% |
| | Operating profit margin (%) | −9.1% | −6.1% | −9.4% | −13.1% | −4.7% | −9.8% |

**Table 3.** Impact of the fuel price increase on the EU fishing fleet by fishing technique for vessels of more than 24 m.

| | Vessel Length | 24–40 m | 24–40 m | 24–40 m | 24–40 m | 24–40 m | 24–40 m | 24–40 m | 24–40 m | 24–40 m | 24–40 m | More than 40 m | More than 40 m | More than 40 m | More than 40 m | More than 40 m | EU Fleet more than 24 m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Fishing Tech** | **DFN** | **DRB** | **DTS** | **FPO** | **HOK** | **PGP** | **PMP** | **PS** | **TBB** | **TM** | **DTS** | **HOK** | **PS** | **TBB** | **TM** | |
| In 2021 | Number of vessels | 30 | 7 | 911 | 2 | 229 | 59 | 1 | 268 | 100 | 191 | 97 | 30 | 61 | 60 | 56 | 2102 |
| | Employment in number | 350 | 38 | 6914 | 20 | 2968 | 1027 | 4 | 3372 | 472 | 1131 | 2293 | 624 | 2267 | 409 | 1188 | 23,077 |
| | Employment in FTE | 319 | 41 | 6722 | 15 | 2980 | 1162 | 7 | 2640 | 407 | 829 | 2230 | 791 | 2471 | 396 | 1132 | 22,142 |
| | Landings value (million EUR) | 40.6 | 13.4 | 770.5 | 0.6 | 186.9 | 62.6 | 0.1 | 231.6 | 102.3 | 104.6 | 463.9 | 49.3 | 456.2 | 102.8 | 372.8 | 2958.2 |
| | Landings weight (thousand tons) | 13.9 | 2.7 | 364.4 | 0.0 | 90.2 | 19.7 | 0.1 | 122.1 | 23.3 | 298.6 | 406.8 | 23.3 | 307.2 | 23.6 | 749.8 | 2445.8 |
| | Fuel consumption (million L) | 6.8 | 1.3 | 369.1 | 0.2 | 70.1 | 21.2 | 0.1 | 29.5 | 58.0 | 25.2 | 142.9 | 27.3 | 199.9 | 78.0 | 123.5 | 1153.1 |
| | Fuel price (EUR/L) | 0.55 | 0.59 | 0.51 | 0.77 | 0.49 | 0.43 | 0.17 | 0.59 | 0.52 | 0.65 | 0.49 | 0.44 | 0.44 | 0.51 | 0.47 | 0.49 |
| | Gross profit per vessel (EUR) | −113,217 | 1,320,504 | 100,741 | 68,027 | −25,292 | −120,675 | −125,279 | 214,650 | 70,783 | 167,211 | 1,376,460 | −114,946 | 613,322 | 19,010 | 1,676,490 | 211,117 |
| | Operating profit per vessel (EUR) | −209,789 | 1,317,434 | −19,388 | 39,015 | −93,434 | −177,528 | −136,581 | 143,697 | −24,498 | 85,024 | 819,370 | −255,015 | 150,571 | −24,499 | 435,029 | 52,113 |
| | Gross profit margin (%) | −8.4% | 69.2% | 11.9% | 21.7% | −3.1% | −11.4% | −170.3% | 24.8% | 6.9% | 30.5% | 28.8% | −7.0% | 8.2% | 1.1% | 25.2% | 15.0% |
| | Operating profit margin (%) | −15.5% | 69.0% | −2.3% | 12.5% | −11.4% | −16.7% | −185.7% | 16.6% | −2.4% | 15.5% | 17.1% | −15.5% | 2.0% | −1.4% | 6.5% | 3.7% |
| | Short-term break-even fuel price (EUR/L) | −0.38 | 7.60 | 0.47 | 1.18 | 0.19 | −0.06 | −1.11 | 1.90 | 0.48 | 1.29 | 1.05 | 0.16 | 0.49 | 0.49 | 0.67 | 0.59 |
| | Long-term break-even fuel price (EUR/L) | 0.05 | 7.61 | 0.76 | 1.49 | 0.41 | 0.09 | −1.01 | 2.54 | 0.64 | 1.91 | 1.43 | 0.32 | 0.63 | 0.53 | 1.23 | 0.88 |
| 2022 estimate with approach 1: Constant fuel price | Fuel price (EUR/L) | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | | | | | | | | | | |
| | Fuel cost increase per vessel (EUR ) | 86,667 | 63,915 | 168,822 | 15,184 | 133,714 | 179,822 | 80,698 | 37,414 | 239,371 | 37,458 | 644,280 | 443,614 | 1,600,487 | 545,764 | 1,015,092 | 238,976 |
| | Gross profit per vessel (EUR) | −199,883 | 1,256,589 | −68,081 | 52,843 | −159,005 | −300,497 | −205,977 | 177,236 | −168,587 | 129,753 | 732,180 | −558,560 | −987,165 | −526,754 | 661,397 | −27,860 |
| | Operating profit per vessel (EUR) | −296,456 | 1,253,519 | −188,210 | 23,831 | −227,148 | −357,350 | −217,279 | 106,283 | −263,869 | 47,566 | 175,090 | −698,629 | −1,449,916 | −570,263 | −580,063 | −186,863 |
| | Gross profit margin (%) | −14.8% | 65.8% | −8.0% | 16.9% | −19.5% | −28.3% | −280.1% | 20.5% | −16.5% | 23.7% | 15.3% | −34.0% | −13.2% | −30.7% | 9.9% | −2.0% |
| | Operating profit margin (%) | −21.9% | 65.7% | −22.3% | 7.6% | −27.8% | −33.7% | −295.4% | 12.3% | −25.8% | 8.7% | 3.7% | −42.5% | −19.4% | −33.3% | −8.7% | −13.3% |
| 2022 estimate with approach 2: Proportional fuel price | Fuel price (EUR/L) | 0.89 | 0.96 | 0.84 | 1.26 | 0.81 | 0.70 | 0.28 | 0.96 | 0.85 | 1.06 | 0.80 | 0.72 | 0.72 | 0.83 | 0.77 | 0.81 |
| | Fuel cost increase per vessel (EUR) | 78,425 | 70,333 | 131,876 | 46,515 | 95,674 | 98,179 | 11,502 | 41,173 | 190,486 | 54,022 | 460,022 | 255,201 | 917,446 | 420,968 | 657,282 | 171,979 |
| | Gross profit per vessel (EUR) | −191,642 | 1,250,172 | −31,135 | 21,512 | −120,965 | −218,855 | −136,782 | 173,477 | −119,702 | 113,189 | 916,438 | −370,147 | −304,123 | −401,958 | 1,019,208 | 39,138 |
| | Operating profit per vessel (EUR) | −288,214 | 1,247,101 | −151,264 | −7500 | −189,108 | −275,707 | −148,083 | 102,524 | −214,984 | 31,002 | 359,348 | −510,216 | −766,875 | −445,467 | −222,253 | −119,866 |
| | Gross profit margin (%) | −14.2% | 65.5% | −3.7% | 6.9% | −14.8% | −20.6% | −186.0% | 20.1% | −11.7% | 20.7% | 19.2% | −22.5% | −4.1% | −23.5% | 15.3% | 2.8% |
| | Operating profit margin (%) | −21.3% | 65.3% | −17.9% | −2.4% | −23.2% | −26.0% | −201.4% | 11.9% | −21.0% | 5.7% | 7.5% | −31.0% | −10.3% | −26.0% | −3.3% | −8.5% |

## 4. Discussion

Since February 2022, fuel prices increased sharply because of the military invasion of Ukraine by Russia and the resulting economic sanctions. This led to cost increases in many economic activities, including the EU fishing fleet.

As the fleet made about EUR 850 million in gross profits in 2021, the fuel price increased to EUR 0.93 per liter in 2022, leading to a decrease in profitability of about EUR 670 million, resulting in a gross profit slightly above EUR 180 million. This implies that a 10 cents increase in the fuel price per liter results in about a EUR 185 million loss for the EU fishing sector.

Thus, the economic performance of the EU fishing fleet deteriorated significantly in 2022. The gross profit remained positive but very low, showing that, on average, fishing activity in the EU was still viable in the short term. However, there were important variations in the fuel price during the year, reaching more than EUR 1.2 per liter in June 2022.

Moreover, many fleets and vessels moved from a profit-making position to suffering losses. The losses in the operating profits informed that with such fuel prices, the activity was no longer viable in the long term since the sector was not earning enough to be able to replace its capital factors (i.e., the fishing vessels) in the future.

Hence, the break-even fuel price estimations can complement such viability analysis. Overall gross profits would be null, on average, at a fuel price of about EUR 1.03 per liter (short-term break-even fuel price). This estimate is more in line with the fuel price of GBP 1.15 (about EUR 1.35), which is considered the limit for UK trawlers [11]. Meanwhile, the EUR 0.60 per liter reported by the EU fisheries sector [14] corresponds with the fuel price that would lead to overall operating profits being null on average (long-term break-even fuel price), which is about EUR 0.63 per liter in our estimates. Hence, overall, the EU fishing activity struggled to be viable in the short-term during 2022, but it was not viable in the long term at those high fuel prices since the sector did not earn enough to be able to replace its capital factors (i.e., the fishing vessels) in the future.

The latest available fuel prices at the finalization of this communication are from May 2023, which are down to an average of EUR 0.61 per liter [1], indicating that, on average, the EU fleet is also sustainable in the long-term, even if this varies significantly by fleet.

The European Commission triggered the temporary crisis framework to support the viability of the fishing sector on 25 March 2022 with a limit of up to EUR 35,000 per company [15,16], which was amended on 20 July and 28 October 2022 to up to EUR 75,000 and EUR 300,000, respectively [17,18].

The results confirm that while for all vessels below 24 m, the initial up to EUR 35,000 per undertaking sufficed to compensate vessels for the extra costs—for example, for vessels between 12 and 24 m, the increase in fuel costs was about EUR 22,300 per vessel.

However, the initial EUR 35,000 undertakings did not, on average, compensate fishing vessels above 24 m, while the amendment of up to EUR 75,000 per vessel would only fully compensate some of the fleet segments between 24 and 40 m but not vessels above 40 m. In fact, the profitability of vessels between 24 and 40 m and larger than 40 m decreased by EUR 133,000 and EUR 865,000, respectively. Hence, as can be seen in Table 3, the last amended support of up to EUR 300,000 per vessel was key to ensure the business continuity of the vessels between 24–40 m but was not enough to fully cover the losses of the vessels larger than 40 m.

The results from the second approach, available in Tables 2 and 3, confirm these results, even if under the second approach, the fuel cost increase for the smaller vessels is higher as it is a higher fuel price they have to bear. On the contrary, the fuel cost increase for the larger vessels is lower as it is a lower fuel price they pay.

High fuel prices and the consequent increase in fuel costs often lead to a reduction in fishing effort and changes in fishing strategies [3–8], aiming at reducing fuel consumption and costs. This implies that the weight of landings in 2022 could well be below the average annual quantities landed. But, given the impact of the COVID-19 pandemic on the EU

fishing sector in 2020 and 2021 [2,22,23], it is uncertain whether 2022 landings are going to be above or below previous years. It is challenging to estimate changes in effort and strategies for all the EU fishing fleets. Likewise, the effort reduction during the COVID-19 pandemic, the loss of fishing opportunities because of the EU–UK Trade and Cooperation Agreement after Brexit, management plans with important fishing effort reductions like the ones in the Mediterranean Sea, and the long-term decrease in fishing capacity make difficult to estimate a robust baseline, as can be seen in Figure 2. In fact, many factors besides fuel prices also influence fishing fleets and fisheries, such as changes in demand for fish products, fishing opportunities in terms of both having the required fishing rights as well as the abundance of commercial fish stocks that may depend on recruitment, overfishing, climate change, etc. [24–27].

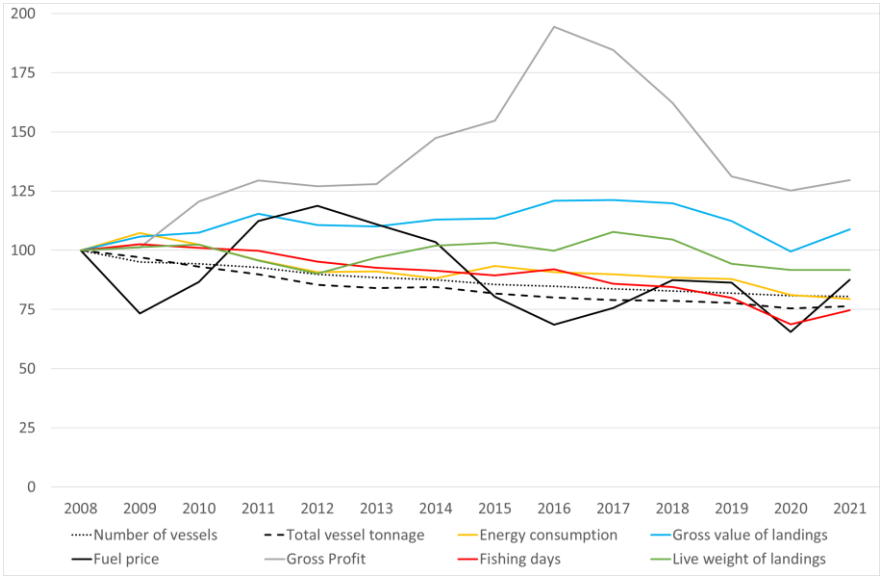


**Figure 2.** Evolution of key figures for the EU fishing fleet for the period 2008–2021 (2008 base year = 100). Source: own calculation from STECF data [2].

Changes in seafood supplied to the market can lead to changes in fish prices. Higher seafood prices from reduced supply may partially offset some of the increased costs and the reduction in landings. However, here, it is necessary to see how responsive fish prices are to the domestic quantities supplied, as well as the availability of imports—especially considering that the EU imports about 2/3 of its seafood consumption [28].

Data on the 2022 landings are still rather scarce and incomplete in the first half of 2023, while we will need to be at the end of 2023 or the beginning of 2024 to receive complete economic data for some countries.

This stresses the importance of systematically monitoring the fleet in almost real-time and analyzing the performance of the fishing sector with the most up-to-date information to tailor adequate policy measures and government supports more accurately to the sector.

According to the literature [29], developed countries, such as EU countries, are likely to be most exposed to the effects of energy price increases due to their high rates of fleet motorization and preference for high-value and often energy-intensive seafood products. However, developing countries are often more vulnerable because of their heavy reliance on seafood as a source of food and income, as well as limited national adaptive capacity.

While high fuel prices may not pose an immediate risk to overall food security in the EU, a positive side effect of reduced activity could be a reduction in carbon emissions and an improvement in the status of some stocks.

Trends in Europe suggest fuel use efficiency, i.e., landings per ton of fuel consumed-has been improving in this century [30]. This improvement has benefited from an increase in oil prices [30], as well as an improvement in the stock status of certain commercial

species in the North-east Atlantic and a reduction in overcapacity [31–33]. High fuel prices highlight the importance of the energy transition to a less fuel-intensive activity since it can result in cost decreases for the fishing sector as well as environmental benefits.

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