

The financial performance of the UK fishing fleet has been directly affected by high prices for diesel fuel. As a result the fishing industry has been faced with an urgent need to move towards more efficient fuel use.

This leaflet summarises the main findings from a Seafish research project (part-funded by Defra via FIGG funds) to identify possible routes to more efficient fuel use.

These findings can give skippers and owners information about fuel efficient practices and provide guidance on evaluating investment in new equipment needed to adopt new practices.

Introduction

Seafish estimates that the entire UK fleet currently consume around 300 million litres of fuel per year. At current price levels this costs the fleet around £100 million each year so a 1% reduction in fuel expenditure is worth around £1 million to the fleet annually.

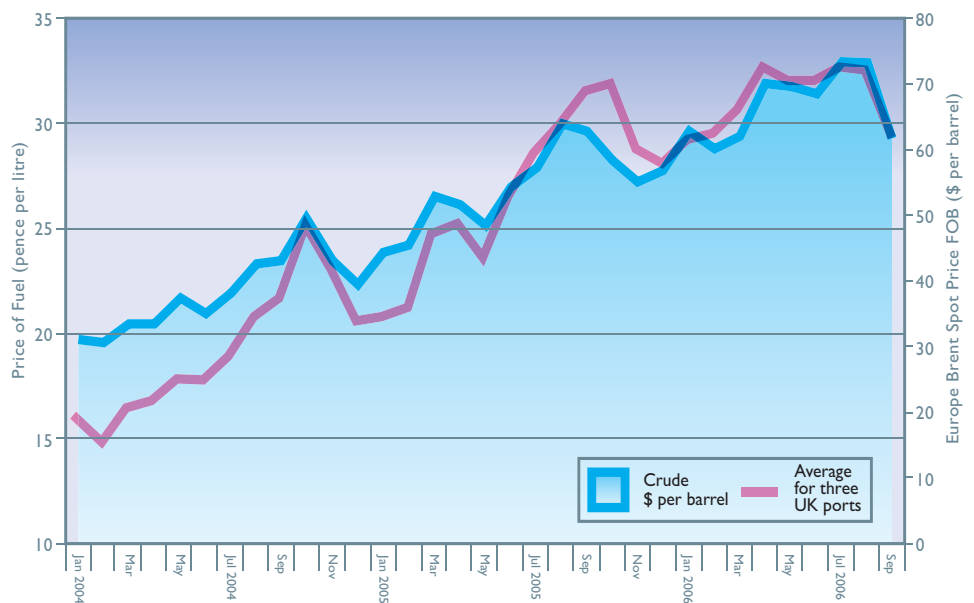
Many fuel analysts indicate that fuel prices will remain high for the foreseeable future. Fleet viability has been rescued to some extent by increased fish prices at the quayside, however, the price of fuel is still a major issue for the industry. If the situation does not improve it is possible that many vessel businesses may be forced to cease trading.

Seafish and Jubilee Fishing Company of Grimsby interviewed over 100 members of the fishing industry and asked them a range of questions relating to fuel efficiency. Most of the vessel owners interviewed reported making at least some small changes to their fishing methods and practices in an effort to improve their fuel efficiency¹. Of those who have made changes most said they have seen some clear benefits to their vessel businesses from taking steps to improve fuel efficiency.

Interviewees identified a range of practical options UK vessel owners can take to further improve their fuel efficiency - not all fishermen were aware of these options.

This study focuses on the beam trawl, whitefish trawl, nephrops trawl and scallop dredge segments of the UK fishing fleet.

Average monthly fuel price (duty free) in three UK ports and average crude price



Current response of the UK fishing fleet to high fuel costs

Fishermen have made a range of practical changes to their vessel operations in order to improve fuel efficiency.

The most common changes made were:

- changing trip planning practices;
- reducing towing or steaming speeds;
- changing the landing port;
- changing fishing method;
- changing target species;
- modifying gear; and
- undertaking preventative maintenance.

Some vessels owners did not make these changes purely because of high fuel prices. For example, a vessel owner replacing an engine

¹ Fuel efficiency can be considered as either the cost of fuel as a proportion of fish sales or the amount of fuel required to catch a certain volume of fish. It is not only a question of miles per gallon.

may have brought forward this investment decision in order to benefit from lower fuel consumption or the scheduled change may simply have coincided with the price increases.

In addition, some vessel owners have also been considering their current fuel purchasing practices including the possibility of entering bulk-buying schemes.

Industry experts who provided input into this study noted that the UK fleet has naturally focussed on the issues which give it the greatest amount of gain for the least amount of investment. There is scope for steady increase in the uptake of fuel efficient fishing methods and many skippers are planning to adopt these methods in the future.

Costs, benefits and barriers to uptake associated with fuel efficiency measures

The full report contains a thorough examination of each fuel efficiency measure. It includes detailed examples which show some of the actions vessel owners have taken to improve fuel efficiency and the costs and benefits they encountered.

The table below summarises the uptake, barriers, costs and benefits of the fuel efficiency measures taken by vessels in the survey sample.

The benefits of each measure need to be weighed against the overall cost of making the change and any potential loss to CPUE (catch per unit of effort). Fishermen undertake cost and benefit

Summary table of uptake, barriers, costs and benefits of various fuel efficiency measures.

Fuel efficiency measure	Indicative industry uptake	Barriers to uptake	Costs	Benefits
Change trip planning practices	■■■	-	£	££
Reduce towing speed	■■■	Knowledge & practicality	-	£
Reduce steaming speed	■■■	Knowledge	-	££
Change landing port	■■	Knowledge	£	££
Replacing engine	■	Cost	£££	££
Change fishing method	■	All	£££	£
Change target species	■	Regulation	££	£
Stop fishing temporarily	■	Cost	£	£
Modify gear	■■■	All	£	£££
Preventative maintenance	■	Knowledge & cost	£	££
Fit gear monitoring unit	■	Cost	££	£
Reduce crew costs	■	Practicality	-	£

Note: Uptake, costs and benefits are illustrated in approximate categories of low (■ £), medium (■■ ££), high (■■■ £££) based on data collected in the survey and knowledge of Seafish technical staff.

analyses frequently as they try to balance the ongoing financial risks of fishing with the benefits but they do not always have the information they need to do this accurately and so can sometimes make sub-optimal decisions.

Summary of the fuel efficiency measures

Changing trip-planning practices

Changing a vessel's trip planning practices can include changing steaming distance; not going to sea in bad weather; changing towing patterns to minimise fuel use and working cleaner grounds.

Previously it may have paid for fishermen to steam long distances to fishing grounds in order to catch the best fish and get the best prices. Increased fuel prices and days at sea restrictions may make this practice less economically viable.

Examples

- Fishermen are reducing their steaming distances and choosing to work closer to shore. For example some Scottish whitefish boats are making alternative trips between the inshore and offshore grounds, with the inshore trip being referred to as the 'fuel trip'.
- Whitefish vessels may tie up during the spring spawning season because they expect fish quality and prices to be low, and would rather use the fuel and days at sea when they expect a better return.

Costs and benefits

In all cases fishermen are examining the costs and benefits of various trip planning practices and this influences their decision making. However, it was near impossible for any of the interviewees to quantify the benefits given that there were so many factors at play. They were able to state that changing the way they make their decisions about when or whether to start a trip, and where to fish, had helped them mitigate the high fuel prices.

Estimated industry uptake and scope for further uptake²

Change trip planning practices	Estimated industry uptake (no. and % of vessels in each segment)	Scope for further uptake (no. and % of vessels in each segment)
Beam trawl (120 vessels)	60 - 90 vessels (50 - 75 %)	c. 25 vessels (c.20%)
Whitefish trawl (270 vessels)	55 - 95 vessels (20 - 35%)	c.55 vessels (c.20%)
Nephrops trawl (450 vessels)	45 - 135 vessels (10 - 30%)	25 - 90 vessels (5 - 20%)
Scallop dredge (178 vessels)	20 - 55 vessels (10 - 30%)	35 - 55 vessels (20 - 30%)

² Estimates are based on data collected in our survey and knowledge of industry experts and Seafish staff.

The difference in revenue for an eight - ten day trip between poorer quality and better quality fish could be £2,000 - £5,000 for the same cost of fuel.

Barriers to uptake

There are no major barriers preventing fishermen from doing this and the benefits can be significant.

Evaluating alternative choices in the complex environment in which fishermen operate is difficult. For example: If bad weather is expected, when deciding whether or not to go fishing, a fisherman would consider the following factors: distance to the fishing grounds and the level of shelter offered; long range weather forecast; days at sea allowance; quota; recent quality of fishing; supply of fish to the market; and the potential of landing to a hungry market.

Reducing towing speed

Most fishermen have experimented with towing speeds to reduce fuel costs. This is a delicate balancing exercise between the volume and value of fish caught and the fuel used per tow.

Costs and benefits

Below a critical speed (2.5 knots) the fish are able to out-swim the net and the losses sustained outweigh the benefit gained from reduced fuel consumption. Towing at a faster speed (4+ knots) is not efficient and the majority of the fleet either already tow at optimum speed or have reduced their towing speed to a point where they aim to maximise their catch per unit of fuel used, rather than minimising the fuel use or maximising the catch.

Barriers to uptake

It is relatively simple for fishermen to implement changes in relation to towing speed although lack of information on exact fuel consumption can make it difficult to find the optimum speed. The

Estimated industry uptake and scope for further uptake

Reduce towing speed	Estimated industry uptake ³ (no. and % of vessels in each segment)	Scope for further uptake (no. and % of vessels in each segment)
Beam trawl (120 vessels)	5 - 30 vessels (5 - 25%)	10 - 45 vessels (10 - 40%)
Whitefish trawl (270 vessels)	15 - 40 vessels (5 - 15%)	No vessels (0%)
Nephrops trawl (450 vessels)	25 - 45 vessels (5 - 10%)	0 - 45 vessels (0 - 10%)
Scallop dredge (178 vessels)	10 - 35 vessels (5 - 20%)	35 - 55 vessels (20 - 30%)

financial benefit is very much dependent on the individual vessel, its engine and its gear and can be difficult to quantify, but significant enough to be noticeable.

Most beam trawlers already tow at the optimum speed so to further lower towing speed would create a lower catch per unit effort (CPUE) which would not be efficient. There is limited scope for some of the larger vessels to reduce towing speed but the smaller beam trawlers would struggle to tow at a slower speed due to the effect of the sea on the vessels (heavier boats manage to handle sea conditions better). The whitefish trawl and nephrops trawl segments also mostly tow at optimum speeds and have limited scope to alter speeds due to the effect on the catch. Scallop vessels are targeting a static stock so there is more scope to reduce towing speed.

Reducing steaming speed

For many reasons it is often desirable to steam as quickly as possible which may require the engine to run 'flat out'. Unfortunately when steaming 'flat out' the engine is operating at or close to its maximum revolutions per minute (revs), which is the least fuel-efficient output of the engine (in terms of miles per gallon).

Many vessels in the beam trawl fleet and the large whitefish trawl vessels fish a long way away from shore so the steaming component of their fuel usage is high. Many vessels in these fleet segments have adjusted steaming speeds.

Costs and benefits

By reducing steaming speed to optimum efficiency the vessel will consume up to 50% less fuel whilst delivering 70% or more of the maximum speed. Given current fuel prices this reduction in steaming speed can have a big impact on the running costs of a fishing vessel.

One interviewee said he saved 450 litres of fuel per eight - ten day trip by steaming 0.5 knot slower and suggested this would be a typical saving for whitefish and beam trawl vessels.

Estimated industry uptake and scope for further uptake

Reducing the steaming speed	Estimated industry uptake ³ (no. and % of vessels in each segment)	Scope for further uptake (no. and % of vessels in each segment)
Beam trawl (120 vessels)	c. 85 vessels (c. 70%)	c. 35 vessels (c. 30%)
Whitefish trawl (270 vessels)	215 - 270 vessels (80 - 100%)	c. 55 vessels (c. 20%)
Nephrops trawl (450 vessels)	45 - 90 vessels (10 - 20%)	90 - 135 vessels (20 - 30%)
Scallop dredge (178 vessels)	c. 35 vessels (c. 20%)	c. 35 vessels (c. 20%)

³ Estimated uptake includes those who have reduced their towing or steaming speeds as a fuel efficiency measure, it does not include those who already towed/steamed at optimum speed.

A cost of this measure is vessels use up more of their days at sea allocation by steaming slower and may have to purchase extra days at sea in order to catch their quota allocation.

Barriers to uptake

Days at sea restrictions can have a negative affect on vessels optimising steaming speed. Many vessels have already reduced their steaming speed, however there is a trade off with time on the fishing grounds for fleet segments which have days at sea restrictions. In order to maximise a vessels fishing opportunity within its days at sea allowance, it is important to minimise time spent steaming and maximise time spent fishing. However, the need to minimise steaming time must be balanced with the need to optimise engine and fuel efficiency.

Changing the landing port

The majority of the skippers surveyed avoid steaming to distant ports to reduce fuel costs. Traditionally fishermen have preferred to land in their home port. In response to high fuel costs, fishermen are landing into the nearest port to the fishing grounds they are working and selling their fish at that port or arranging transport to take the fish to a preferred market across land.

Costs and benefits

There are very few quantitative costs associated with this measure. We can identify items such as the social cost of extra nights away from home for the crew but this is difficult to measure.

Vessels could expect fuel savings from reducing their steaming times by landing at a port closer to their fishing grounds. The MFV Eventide (case study is included in the full report) has reported a fuel saving of approximately 10% for three fishing trips by changing her landing port for two out of every three trips. A newer, broader vessel could expect higher benefits for reducing steaming time than the streamlined Eventide.

The decision surrounding where to land is partly a technical decision

Estimated industry uptake and scope for further uptake

Changing the landing port	Estimated industry uptake (no. and % of vessels in each segment)	Scope for further uptake (no. and % of vessels in each segment)
Beam trawl (120 vessels)	10 - 35 vessels (10 - 30%)	c.25 vessels (c.20%)
Whitefish trawl (270 vessels)	30 - 55 vessels (10 - 20%)	c.25 vessels (c.10%)
Nephrops trawl (450 vessels)	No vessels (0%)	0 - 135 vessels (0 - 30%)
Scallop dredge (178 vessels)	10 - 20 vessels (5 - 10%)	c.20 vessels (c. 10%)

but also depends on business efficiency, ie if fish prices in a particular port are higher than a competing port then it might be worth steaming to it.

Barriers to uptake

The scallop and nephrops fleets fish mainly inshore so uptake of this measure is likely to be low as they already fish close to their port of landing.

There are few barriers to preventing this practice (for the whitefish and beam trawl fleets) beyond knowledge and familiarity. Most fishermen who can benefit from this fuel saving practice do so. The benefits vary from vessel to vessel but are certainly significant. Days at sea restrictions are another motivation for this behaviour change.

Replacing the engine

The average age of vessels in the UK fleet is increasing and in many vessels the engines are now outdated. It is not unusual to see 50 year old technology as standard and old Gardner and Kelvin engines are still fairly commonplace.

A small but significant number of the interviewees stated that they had replaced an engine recently. This was not necessarily purely an attempt to overcome the effects of high fuel prices. In some cases the engine may have been damaged beyond repair and was replaced for that reason. In other instances the engine was due for renewal and this merely coincided with the fuel price increases. But, the need for a new engine to be fuel efficient was taken into account when selecting a new engine.

Costs and benefits

For many vessels in the UK fleet, the benefits of changing an old engine for a new, more technologically advanced engine could be considerable in economic and environmental terms. Changing an engine entails more than just swapping a new engine for an old one - the gearbox, shaft and propeller may have to be altered, all of which adds to the capital investment required.

Estimated industry uptake and scope for further uptake

Replacing the engine	Estimated industry uptake (no. and % of vessels in each segment)	Scope for further uptake (no. and % of vessels in each segment)
Beam trawl (120 vessels)	5 - 10 vessels (5 - 10%)	No vessels (0%)
Whitefish trawl (270 vessels)	0 - 30 vessels (0 - 10%)	c.15 vessels (c.5%)
Nephrops trawl (450 vessels)	25 - 45 vessels (5 - 10%)	0 - 90 vessels (0 - 20%)
Scallop dredge (178 vessels)	10 - 20 vessels (5 - 10%)	10 - 35 vessels (5 - 20%)

Two examples which outline the costs and benefits (associated with fuel efficiency) encountered by the vessel owners of the Eventide, GY120 and Carhelmar, BM23 when replacing their engines can be found in the full report.

Barriers to uptake

A barrier to the uptake of this efficiency measure is the cost of replacing the engine and the lost fishing time. Capital is scarce within several major sectors of the fishing fleet and the poor financial health of certain fleet segments acts as a barrier to increased investment. Despite high fuel costs it is unlikely that the UK fleet will be able to undertake a widespread program of investment in engine renewals using privately raised capital.

Changing fishing method

Sixteen of the fishermen interviewed stated that they had changed their fishing method in response to fuel price increases. Some had moved from beam trawling to otter trawling. Several of the English North Sea vessels and some of the Scottish North Sea vessels have switched from single trawling to pair trawling and some had moved to targeting nephrops. Interestingly some vessels have switched from single-rig to twin-rig trawling while others have switched from twin-rig to single-rig trawl. The biggest change has been in the beam trawl sector where vessels have shifted from fishing with beam trawl to twin-rig, predominantly fishing for the same species but some vessels are now targeting nephrops.

Costs and benefits

The benefits of these changes are variable and wholly dependent on the circumstance of the vessel. Interviewees found it difficult to quantify the benefit of making the changes, beyond stating that they believed there was an improvement in fuel efficiency, ie fuel cost as a percentage of fish sales value.

Barriers to uptake

These opposite changes (single-rig to twin-rig and twin-rig to

single-rig) suggest a lack of information and understanding among fishermen as to which method is appropriate to their needs. This indicates that lack of knowledge may be a barrier to effective change. In the case of anchor seining, a number of interviewees stated that they saw this as a fuel efficient method of fishing but were disappointed that the knowledge of the gear and techniques had been all but lost to the industry.

The fact that skippers are making changes in both directions may also reflect the fact that there is not one single solution to high fuel costs which is appropriate to all vessels in all situations.

Other barriers to change include availability and cost of licences, availability and cost of quota units to buy or hire, and the cost of refitting the vessel and purchasing new gear.

Modify gear

Amongst the interviewees gear modification or tuning was the second most common change in practice in response to the fuel price increases.

Costs and benefits

The benefits of changing or turning the gear can be significant, particularly given the fact that more fuel is consumed in towing the gear than at any other stage in the fishing process. Drag caused by a fishing net can account for 80% of fuel consumed so any changes in this area are likely to yield the greatest benefits.

Detailed interviews with vessel owners produced estimates of benefit ranging from 3% to 20% improvement in fuel efficiency resulting from modifying the set up of towed nets and trawl doors. This is clearly very significant. It is apparent that even making correct or optimal use of existing gear can generate fuel savings of up to 10% for the same volume of fish caught, or, increase the volume of fish caught for the same amount of fuel used. Either way, it seems likely that it is well worth investing in ensuring that gear is correctly set up. Seafish gear technologists are available to offer advice or suggest training. They can be contacted on 01482 327837.

Estimated industry uptake and scope for further uptake

Changing the fishing method	Estimated industry uptake (no. and % of vessels in each segment)	Scope for further uptake (no. and % of vessels in each segment)
Beam trawl (120 vessels)	10 - 35 vessels (10 - 30%)	c. 25 vessels (c.20%)
Whitefish trawl (270 vessels)	25 - 110 vessels (0 - 10%)	c. 55 vessels (25 - 90%)
Nephrops trawl (450 vessels)	0 - 45 vessels (0 - 10%)	25 - 90 vessels (5 - 20%)
Scallop dredge (178 vessels)	0 - 35 vessels (0 - 20%)	0 - 55 vessels (0 - 30%)

Estimated industry uptake and scope for further uptake

Modify gear	Estimated industry uptake (no. and % of vessels in each segment)	Scope for further uptake (no. and % of vessels in each segment)
Beam trawl (120 vessels)	70 - 120 vessels (60 - 100%)	c.10 vessels (c.10%)
Whitefish trawl (270 vessels)	245 - 270 vessels (90 - 100%)	c.80 vessels (c.30%)
Nephrops trawl (450 vessels)	45 - 180 vessels (10 - 40%)	c. 135 vessels (c.30%)
Scallop dredge (178 vessels)	0 - 20 vessels (0 - 10%)	10 - 35 vessels (5 - 20%)

Some interviewees noted that modifying gear has helped improve the quality and price per kg of fish. For example increasing the size of the fishing circle can give skippers two choices:

- a) Tow for the same amount of time, use the same amount of fuel and increase the volume of fish caught; and
- b) Tow for less time, use less fuel and catch the same volume of fish of better quality (due to shorter tow time) and therefore an average higher price.

Barriers to uptake

In the beam trawl sector most potential improvements in beam construction have already been made leaving little scope for change.

A barrier to implementation to any major gear alteration is cost. Very often the alteration will take the form of a new net and given their expense, fishermen prefer to wear out an old net before buying a new one

Lack of knowledge of gear and its correct set up is also a restricting factor.

Given the difficult financial state of some sectors of the fleet, it is difficult and risky for the fleet to experiment with new gears and this creates a 'catch 22' scenario.

Preventative maintenance

In any business, preventative maintenance tends to be one of the first budgets to be cut when financial pressures take hold. Seafish staff are aware that preventative maintenance in the fishing industry has been declining for over ten years. However, vessel owners are now focused on more preventative maintenance due to days at sea restrictions. They do not want to risk losing days at sea due a breakdown. Vessels also have more days in harbour when they can undertake maintenance.

There is always scope for improvement and some insurance

Estimated industry uptake and scope for further uptake

Preventative maintenance	Estimated industry uptake (no. and % of vessels in each segment)	Scope for further uptake (no. and % of vessels in each segment)
Beam trawl (120 vessels)	10 - 25 vessels (10 - 20%)	c.25 vessels (c.20%)
Whitefish trawl (270 vessels)	25 - 55 vessels (0 - 20%)	c.55 vessels (c.20%)
Nephrops trawl (450 vessels)	25 - 45 vessels (5 - 10%)	90 - 225 vessels (20 - 50%)
Scallop dredge (178 vessels)	0 - 20 vessels (0 - 10%)	35 - 90 vessels (20 - 50%)

companies are now insisting on regular (between vessel survey) checks which promotes good practice.

Examples

• Maintaining the paint system

It is important to maintain as little friction as possible between the hull and the water because friction has a negative effect on fuel efficiency. More marine growth means more friction, which means more power is required to propel the vessel through the water.

An increase in resistance of over 30% has been noticed on vessels that have been left to foul, and in some cases the hull has become so badly fouled that 30% more power was actually required just to maintain regular speeds.

Badly maintained paint can also result in an increase of marine growth and rough paintwork increases friction between the hull and the water in much the same way as fouling.

• Regular engine maintenance

Regular maintenance will ensure that the engine is running efficiently and using less fuel than a poorly maintained engine. This applies to all the components of a vessels power system. Faulty or badly worn components may affect fuel efficiency and the long term additional cost of fuel may exceed the cost of replacing the component.

For example, one vessel owner noted his vessels fuel consumption increasing over a 12 month period. His first thought was this was the result of a change in the size of doors he was using. It was not until an engine stoppage, due to the day service tank running empty, that the return fuel line filter was found to be blocked. He discovered all the diesel being delivered to the engine by the fuel pump was passing through the combustion chamber and out the exhaust without being burned. Once the fuel filter was unblocked consumption fell by 45%.

Costs and benefits

The benefit of preventative maintenance is difficult to measure as a given problem may not have manifested if the correct maintenance had been carried out, however in the long-term the money saved through preventative maintenance is likely to be greater than the cost.

Barriers to uptake

The barrier to preventative maintenance is principally the initial cost and assessment of the cost benefit relationship. Vessels which are struggling financially cannot afford to replace inefficient components or carry large quantities of spares aboard. When ashore they cannot afford to pay for external contractors to come aboard and carry out work.

Stop fishing temporarily

Stopping fishing temporarily (fishing fewer days per year than would have been permitted by quota and days at sea regulations) may seem to be a drastic reaction to the increase in fuel prices, however for some businesses it is the least cost option.

Some vessel owners are tying up their boat for part of the year and leasing out quota and selling days at sea, or using the boat for other purposes (eg guard vessel work).

Costs and benefits

Vessel owners have found that by sending the vessel to sea, more money is lost than if the vessel was tied up in port and the quota is leased out. In other instances interviewees stated that at certain times of the year when they know that the fishing will be uneconomic they tie-up their vessels. The benefit of such an action will be marginal and form part of a damage limitation strategy.

Barriers to uptake

Uptake of this measure is low since any vessel doing this on a long term basis would find itself out of business due to loss of skilled crew. At present this measure mainly applies to the beam trawl fishery. Some beam trawlers have already tied up (for short periods during the year) due to difficulties paying crew as a result of increased fuel cost.

Once a vessel loses its crew, it has lost the means to use the fixed asset (the vessel) to generate profit from the fishery. It is not a

Estimated industry uptake and scope for further uptake

Stop fishing temporarily	Estimated industry uptake (no. and % of vessels in each segment)	Scope for further uptake (no. and % of vessels in each segment)
Beam trawl (120 vessels)	5 - 12 vessels (5 - 10%)	c.35 vessels (c.30%)
Whitefish trawl (270 vessels)	No vessels (0%)	No vessels (0%)
Nephrops trawl (450 vessels)	No vessels (0%)	No vessels (0%)
Scallop dredge (178 vessels)	No vessels (0%)	No vessels (0%)

straightforward proposition to put together a skilled crew for a fishing vessel.

This measure only applies to beam trawlers at the moment due to higher fuel consumption. Fuel cost is around 45% - 55% of turnover for beam trawlers.

Conclusions

To improve fuel efficiency it is clear that no single solution will be the best answer for all types of vessels in the fleet. Each vessel owner can benefit from considering the measures presented here and evaluating the potential benefit of the same action for their individual vessels. If fuel prices continue to remain high, more radical action may become necessary. The fall in prices in recent weeks is good news for the fleet but fuel is still around twice the price that vessel businesses were designed for.

The members of the fishing industry who participated in this survey identified the following fuel efficiency measures as the most cost effective options which have had clear benefits to their vessel businesses:

	Cost	Benefit
Changing trip planning practices	Low	Medium
Changing the landing port	Low	Medium
Modifying gear	Low	High
Reducing steaming speeds	-	Medium
Undertaking preventative maintenance	Low	Medium

This list is not exhaustive but vessel owners and skippers can use it as a first guide when considering ways to improve the fuel efficiency of their vessels.

The estimated financial benefits (excluding cost) per year that might arise from further vessels adopting each fuel efficiency measure are illustrated in the graphs below. These estimates are based on data collected in the survey, knowledge contributed by industry experts and Seafish staff, case studies and other Seafish work.

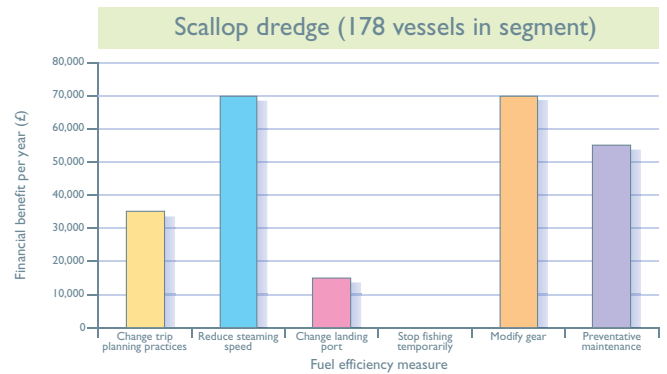
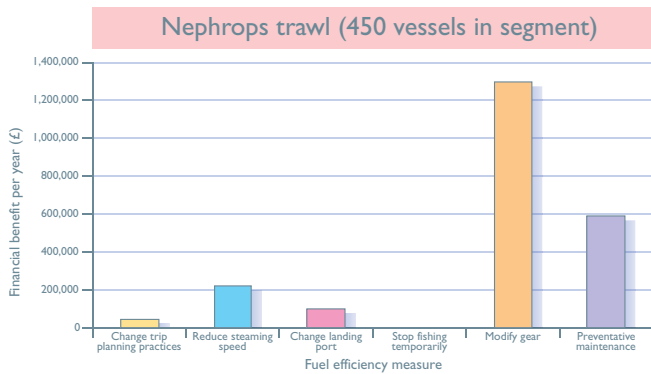
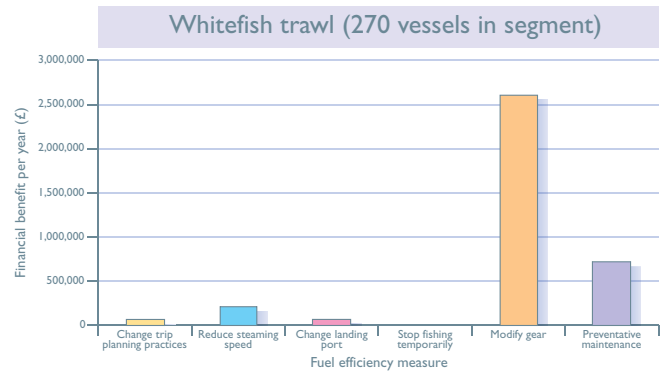
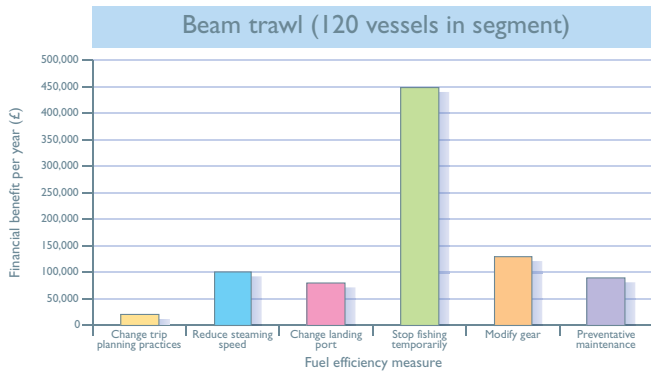
Further advice on adopting fuel efficient measures and evaluating any investment in new equipment needed to adopt new practices is available from Seafish.

The Seafish training and Seafish research and development teams can help provide knowledge and advice on fuel efficient gear operation. They can be contacted on 01482 327837.

The Seafish economics team can help evaluate the likely costs and benefits of proposed changes. They can be contacted on 0131 524 8661.

Options for Improving Fuel Efficiency in the UK Fishing Fleet

Potential financial benefits from further uptake of fuel efficiency measures



October 2006

To order copies of the full report:
Options for Improving Fuel Efficiency in the UK Fishing Fleet

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