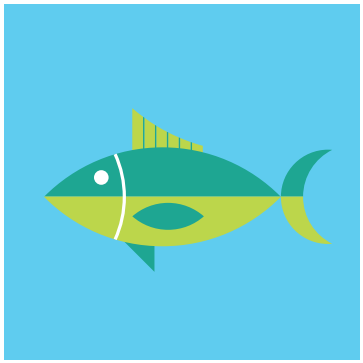
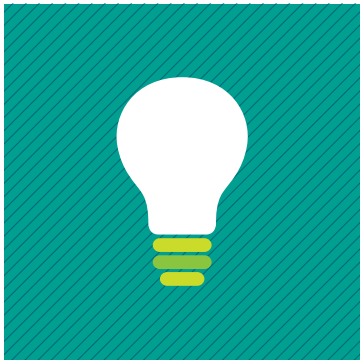




Resource Efficiency Guide

for Seafood Processors

BIM Ireland's Seafood Development Agency

CONTENTS

INTRODUCTION

Bord Iascaigh Mhara (BIM) is the Irish State Agency responsible for developing the Irish seafood industry. BIM's mission is to grow a thriving Irish seafood industry; expand the raw material base, add value and develop efficient supply chains. We help to develop the Irish seafood industry by providing technical expertise, business support, funding, training and by promoting responsible environmental practices.

BIM see a key opportunity for the Irish seafood industry to enhance its credentials of being a **clean, green and sustainable seafood sector**. Our Green Seafood Business programme, launched in 2012, aims at assisting Irish seafood processors in reducing their environmental impacts and saving them money. The objective is to deliver resource efficiency improvements and cost savings, through improvements in:

This **Resource Efficiency Guide** demonstrates how the seafood processing industry can achieve significant savings by maximising the efficient and sustainable use of resources.

WHERE DO WE START?

In order to successfully manage your resources and costs it is crucial that your business takes a simple but structured approach to resource efficiency management.

1.
Commit

Management commitment is absolutely vital to the success of a resource efficiency programme.

2.
Form a Sustainability Team

Form a core group of staff from all areas of the business. Include a representative from senior management, production, finance and quality. Choose a sustainability leader and outline the responsibilities of all team members.

3.
Measure & Monitor

Before you can improve your business' efficiency you need to understand the current resource use. Collect data on water, energy and fuel use and on waste generation.

4.

Identify Targets

Using the data gathered, identify where the biggest inefficiencies are. Outline a clear plan including a timeline on how you are going to improve.

5.

Implement Changes

Get to work carrying out the planned improvements.

6.

Review & React

Continuous monitoring will allow you to assess how effective the work has been and how much money has been saved. Evaluate how projects are progressing, make changes where necessary and when finished start the process again.

Water

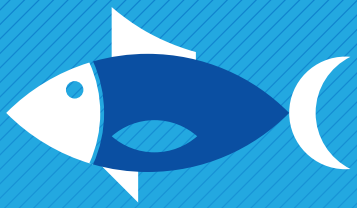
Water can be a significant cost for seafood processors especially when additional costs like on-site heating and treatment are considered.

1%

of global freshwater is accessible for human use.

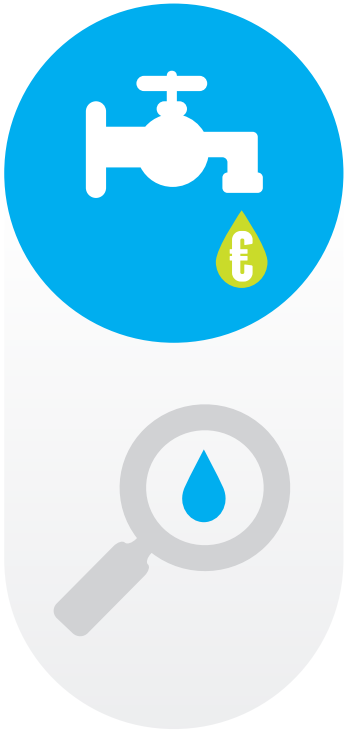
47%

of tap water in Ireland is lost due to leaks.



€1,000

is the cost per year of a leak of 1 litre per minute.



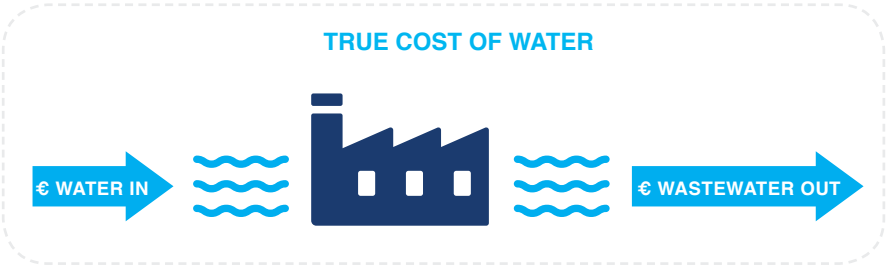
GETTING STARTED

Irish seafood processors either get infrequent water bills or have their own water supply. Usually water use is only examined if there is a serious problem. However, through proper monitoring and regular leak detection, water bills can be kept to a minimum.

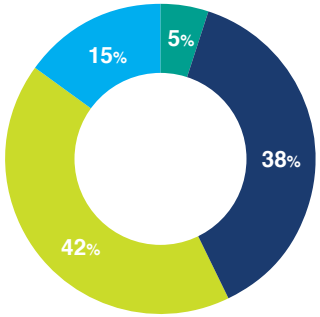
Monitor

Take a close look at your water bills to see how much you are paying. An unexplained increase in your bill may point to a possible leak.

Typically water bills are issued only quarterly or half-yearly. This leaves a very large time frame for leaks to occur unnoticed. More regular monitoring is necessary to effectively manage your water use.



Typical Sub-Metering Data in a Seafood Processing Facility



Find and check your water meter (or meters)

- **Find** out how many water meters are installed and their exact location in your premises.
- Assign the task and the time to a member of staff to **read** the water meter(s) at a set time, at least once a week.
- **Record and graph** the data each week so changes in water consumption can be easily identified and problems quickly addressed.

Meters can be used to identify unnecessary background water use through a night-time test.

Sub-metering can be costly but is very useful for identifying where exactly water is being used on-site.

Leak Detection

Leaks are common but can be hard to detect in wet seafood processing plants. You can use your water meter to check for background water use or you can walk around the factory and physically check for leaks.

How to carry out a background water-use test

1. At the end of a working day/week ensure all water on the premises is turned off. This includes all taps, toilets, urinals and machinery using water.
2. Record meter reading and time before leaving.
3. Record meter reading and time again on arrival before operations commence each morning.

The difference in the reading is your background usage. Ideally this should be zero though there may be some legitimate uses (e.g. cooling towers, ice machines).

This method can be used to measure the water usage on-site more closely. By reading the meters before and after a processing or a cleaning shift you can see what activities are using the most water.

Steps to Finding a Leak

Look

Walk around your site and look for leaks in the obvious places – hoses, taps, toilets and urinals. Don't forget to check outdoor water fittings.

Seafood processing plants are usually wet, so do this before work starts.

Listen

When the site is quiet have a walk about and listen for flowing water, especially in toilets and at water storage tanks.

Faulty ballcock valves are a common offender and because the leaking water is not visible they are often missed.

Detect

If you have performed the previous two tasks and you still cannot find your leak then you may need to hire a specialist to conduct a leak detection.

If a large leak is found the cost for the service may be worthwhile.

KEY WATER USERS

Processing Operations

Continuous flowing water is often used in seafood processing and can be very inefficient. There are several alternatives that can provide huge water savings.

- **Solenoid valves** can be fitted to conveyor systems turning the water off when the conveyor stops. This can save up to 40% water.
- **Water control pedals** for filleting table(s) and manually operated machines allow controlled water use.
- **Batch supply holding tanks** use up to 70% less water than continuous flow tanks.
- **Accessible valves** are important to facilitate water being turned off when it is not in use.

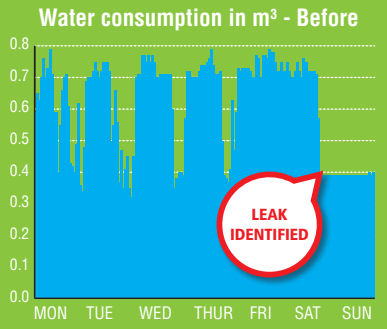
When continuous flowing water is necessary consider the flow rate.

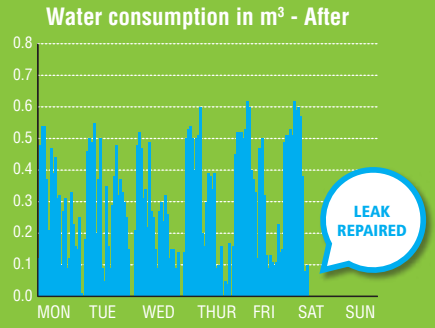
- **Measure the flow rate** using a flow cup or a bucket (of known size) and a stopwatch.
- Modern systems often have very efficient **high-pressure, low-volume** fittings which can reduce water use by up to 70%.

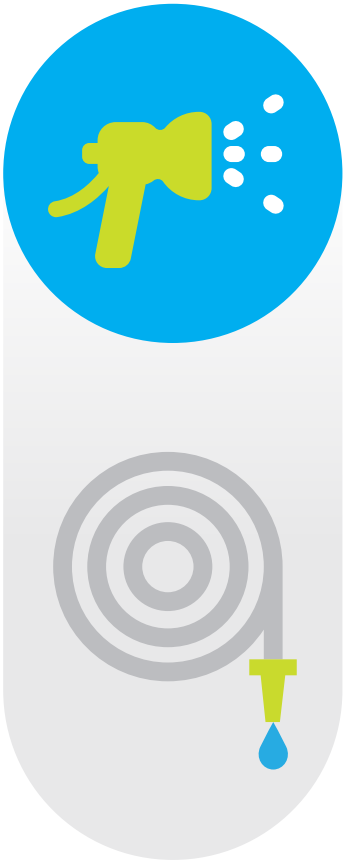
Atlantis SEAFOODS WEXFORD

Case Study: Leak Detection

Atlantis Seafoods installed online water meters to learn more about their water use. They found when the site was closed at the weekend they were still using 400 litres of water per hour. A leak check was carried out and both a faulty ballcock valve in the holding tank and a leak in the ice machine were found. These leaks were repaired saving Atlantis approximately €3,000-5,000 per annum.







Cleaning

A substantial amount of the water used in a fish processing site is for cleaning. Through upgrading equipment and improving practices this can be significantly reduced.

- **Dry cleaning** should be carried out periodically during a shift. All solid materials should be swept, scraped or brushed away from work surfaces, walls and floors and placed in holding bins for disposal.
- **Drip trays and catch baskets** fitted strategically will reduce the amount of solid waste falling on the floor.
- **Automatic reel-up systems** will prevent damage to the hoses and nozzles and reduce the chance of leaks.
- **Drain covers** should be on all drain access points to capture any solid waste. Make sure these are not removed during cleaning – if they need to be removed due to flooding in an area, then too much water is being used.
- **Efficient nozzles** with **trigger guns** should be fitted to replace any old fire-hose style nozzles.
- **Consider the durability of nozzles**. Wear and tear can increase water consumption by up to 20%.

SOFRIMAR

KILMORE QUAY

Case Study: Flow rates

Sofrimar installed online hourly water metering and identified that large amounts of water were being used for cleaning. The company installed a new system which improved nozzles, centralised their chemical dosing and reduced flow rates from 100 litres per minute to 30-40 litres per minute. This reduced Sofrimar's water use by 30%.

Product Temperature Control

Controlling the temperature of fish during processing is vital for maintaining fish quality and consumer safety. The risks associated with temperature control means it is often overlooked as an opportunity to make efficiency improvements. However, it is possible to make large water savings while maintaining required standards.

Cooling

Good practice requires product to be cooled before going into refrigeration. Traditionally this is done with constant flowing water but this practice is highly inefficient.

- Use periodically changed plunge baths with cooling jackets.
- Allow the fish to air cool initially.

Thawing

Thawing fish using continuous flowing water is another uncontrolled and wasteful practice that is often used. If you are using water to thaw fish, an overhead spray system is the most efficient option.

- Spray systems can be set up to include valves connected to probes measuring the temperature of the frozen fish. This can automatically turn off the water once the product has thawed.
- Additional controls can be added to each spray bar line so that only necessary nozzles are turned on.

Calculate your water cost for cooling/thawing

$$\frac{\text{Flow rate of water x time taken x cost of water unit}}{\text{Quantity of fish cooled/thawed}} = \text{Cost to cool/thaw}$$

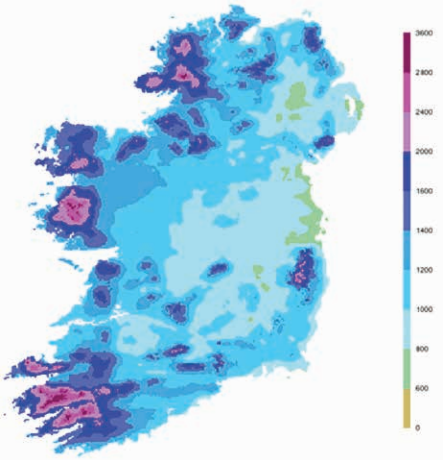
Other areas

Although the vast majority of water used in seafood factories is in processing, savings can also be made in the water services provided on-site.

Best practice flow rates	
Washroom sinks	2-4 litres/min
Toilets	4-6 litres/flush
Canteen sink	<8 litres/min

- Unmanaged **urinals** are engineered leaks – they flush too much water too regularly and typically cost €1,000 worth of water a year. Install solenoid valves, motion sensors or waterless urinals to reduce their consumption.
- Install **dual-flush systems** or place **water saving devices** (like a full water bottle) in the cisterns of toilets.
- **Aerators** in washroom and canteen taps cost just €5 but can reduce flow rates by 70%.

1981-2010 Mean Annual Rainfall (mm)



Rainwater Harvesting

Not all uses of water within a fish processing site require high quality potable (drinkable) water.

Non-potable water can be used for flushing toilets and urinals and cleaning outdoor machinery, vans and for general, external wash-downs.

Ireland's coastal areas receive approximately 1 metre of rainfall per year making them excellent locations for rainwater harvesting.

Efishiency Tip:
Placing fish bins under downpipes is an easy and inexpensive way of collecting rainwater for use in the yard.

Energy

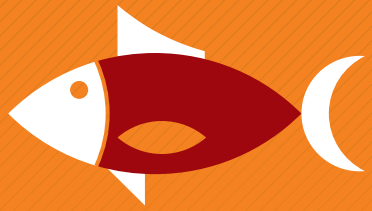
Energy is the largest overhead cost associated with seafood processing. Energy consumption is at the core of most processes on-site. Improving energy efficiency can result in huge cost savings.

15%

of global energy consumption is related to refrigeration and air conditioning.

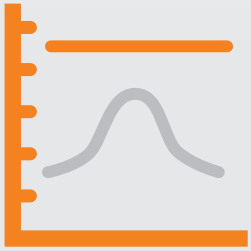
85%

of energy used in Ireland is imported.



€7

is the cost per hour of an open freezer door.



GETTING STARTED

Savings can be made on energy costs by either reducing the price you pay for each unit or reducing the amount of units you use. To do either of these you need to know about your energy consumption.

Bills

To know more about the price you pay for your electricity take a good look at your bills. You should consider the following:

Energy Provider

Shop around for energy providers before renewing contracts. This is often a great way to reduce energy cost.

Tariff

If you don't already know, check what electricity tariff you are on. Is this the most suitable for your business? It is recommended to be on a **nightsaver tariff** if more than **15% of your electricity** consumption is at night.

Maximum Import Capacity (MIC)

This is the maximum electrical load that you have agreed with your supplier. The lower the MIC is the less it costs but if it is exceeded there are hefty fines. A balance must be found to maintain the best price.

Efficiency Tip:

Assess the suitability of your MIC periodically, especially if there are major changes in electricity consumption due to changes in production or expansion of the site.

Low Power Factor/Wattless Charge

Electric power consists of two components: **active power** and **reactive power**. Active power produces useful work but reactive power is used to support the voltage of the system.

Reactive power is unavoidable but old, poorly-maintained or inefficient equipment uses more reactive power to produce the same amount of work.

A Low Power Factor (LPF) or Wattless charge is applied if your site is consuming too much reactive power i.e. your machinery is operating inefficiently.

Efishiency Tip:

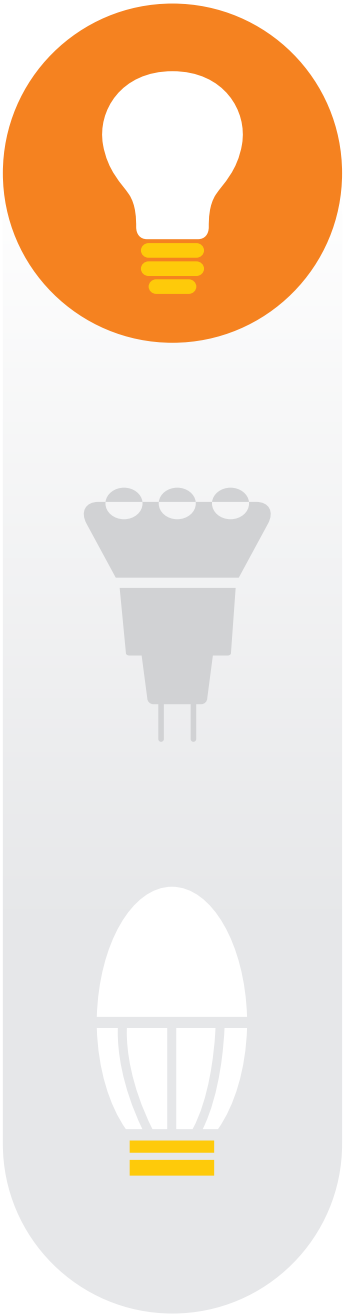
Low Power Factor or Wattless Charges can be reduced by installing capacitors or by upgrading/servicing old equipment. Talk to your electrician if you see this charge on your bills.

Monitor

Review your electrical consumption and compare month by month. If you then compare this consumption data against production output you very quickly start to get a picture of how your plant is performing over time.

This type of analysis can help identify when the plant operates at its highest and lowest efficiencies. This can be further broken down to weekly and daily analysis through the use of online electricity accounts and sub-metering.

This method of monitoring can also be easily applied to other energy sources such as gas and fuel and also to water consumption.



KEY ENERGY CONSUMERS

Lighting

With long operation hours, lighting can make up a significant portion of energy consumption in a seafood processing site. Light Emitting Diodes (LEDs) are the most energy efficient lightbulb option. Replacing existing bulbs with LEDs will reduce your lighting costs.

Benefits of LEDs

- **Energy savings:** LEDs use up to 80% less than their halogen equivalent.
- **Less heat:** LEDs produce a fraction of the heat produced by incandescent and halogen bulbs. This makes them ideally suited for processing halls, chills and freezers.
- **Long life:** LEDs operate for up to 50,000 hours. Fluorescents and halides last 10,000-30,000 hours and incandescent last just 2,000 hours.
- **Instant on:** Unlike other energy efficient bulbs, LEDs do not take time to 'warm up' and so are ideal for motion/occupancy controls which further reduces electricity consumption.
- **Durable:** LEDs do not use fragile filaments or glass so are less likely to break than conventional bulbs. As a result, they lower the food safety risk of foreign bodies entering the product.

Make the most of your lighting

- **Clean bulbs and fittings** periodically. Dirt and dust can reduce the effectiveness of lighting by 35%.
- **Task lighting** should be installed to reduce the need for bright overhead lighting and provide more control and comfort to staff.

Potential savings when converting traditional bulb types to energy efficient alternatives

Commonly Used	The Alternative	The Savings
 **Incandescent or tungsten bulbs**	 **Light emitting diodes (LEDs)**	Changing a 100W incandescent bulb to an 8W equivalent LED will save you **€84* per bulb each year.**
 **T8 fluorescent tube**	 **LED tubes**	Changing a 58W fluorescent T8 with a 29W LED tube will save you **€53* per bulb each year.**
 **Halogen down-lighter**	 **LED down-lighter**	Changing a 100W halogen down-lighter with an adjustable 36W LED down-lighter will save **€33* per bulb each year.**
 **Halogen flood lights**	 **LED flood lights or induction lighting**	Changing a 400W halogen floodlight to an equivalent 90W LED will save you **€100** per bulb each year.**

**Based on 16 hrs operation/day **Based on 8hrs operation/day (AUP 16 cent per kWh)*

Reference Green Business Resource Efficiency Guide for the Retail Sector

Refrigeration

For most fish processors refrigeration is the major electricity user. It is often responsible for up to 70% of the electricity bill. Improvements in refrigeration efficiency can result in huge cost savings.

Efishiency Tip:

Close the door on inefficiency. An open chill door costs €2 per hour and an open freezer door costs €7 per hour!

- **Temperature control** A 1°C decrease in temperature results in 2-4% increase in energy consumption. Setting your freezer to -18°C, (the optimum temperature), instead of -22°C will use 10% less energy.
- **Defrost cycles** should be carried out when required.
- **Proper insulation** of refrigerated areas is very important to reduce energy losses. Insulation material should be checked using thermal imaging to ensure losses are not occurring.
- **Strip curtains** should be installed and well maintained in areas that are chilled to reduce the loss of cool air through doorways. This can reduce electricity consumption by 10%.

IslandSeaFoods Ltd.

Case Study: Re-Insulating Cold Stores

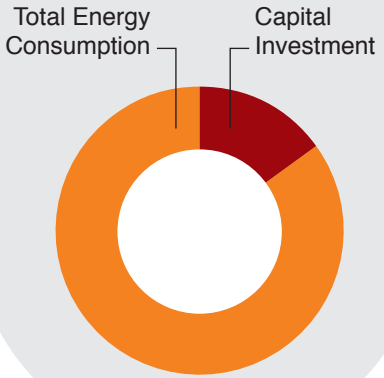
Maintaining product in cold stores is highly energy intensive. Island Seafoods heat tested their cold stores to find gaps and weak spots in the insulation. The test showed that heat was entering the cold stores through the ceiling edges and corners. To solve the problem further insulation was added to these parts of the store. The project resulted in a saving of 20 MWh per year.

Case Study: Heat Recovery

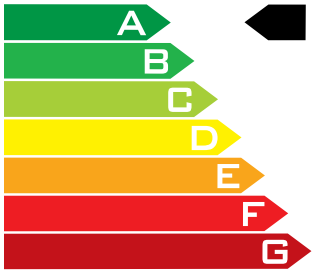
A seafood processing company based in the West of Ireland installed a heat exchanger on the hot gas discharge pipe of their refrigeration system. The exchanger recovers waste heat from the gas and uses it to generate hot water. This project reduced their hot water bill by 70% and also resulted in significant electricity savings by reducing the load on the refrigeration system.

- **Condensers** should be placed in well ventilated areas and not in direct sunlight.
- **Clean coils regularly** and check for damage. Dirty or clogged coils will reduce the condensers ability to dissipate heat.
- **Door seals** should be checked regularly. Faulty seals can cause an 11% increase in electricity consumption.
- Regular **monitoring and maintenance** is vital for efficient refrigeration. Set up a refrigeration check-list and schedule periodic inspections.
- Think carefully about **energy efficiency** when **purchasing** new refrigeration systems. Over time, the running costs will amount to 8 - 10 times the capital investment.

Overall Refrigeration Costs



Energy Rating Guide



Pumps and motors

Energy usage can account for up to 85% of ownership costs for pumps and motors.

- **Size pumps and motors correctly**. Motors are often oversized for the work required. Matching the motor rating with the actual rating required will result in higher efficiencies. Similarly, motors which are severely under-loaded will lower the power factor of the plant resulting in excess charges.
- **Invest in efficiency**. Over the typical lifetime of a motor the running costs far exceed the initial investment. Although energy efficient motors often have a higher capital cost, they will end up saving you money in the long run.
- **Regular maintenance** can reduce the electrical consumption of pumps and motors by up to 10%. This maintenance should include lubrication, cleaning, belt tensioning and alignment checks.

Soft Starters and Variable Speed Drives

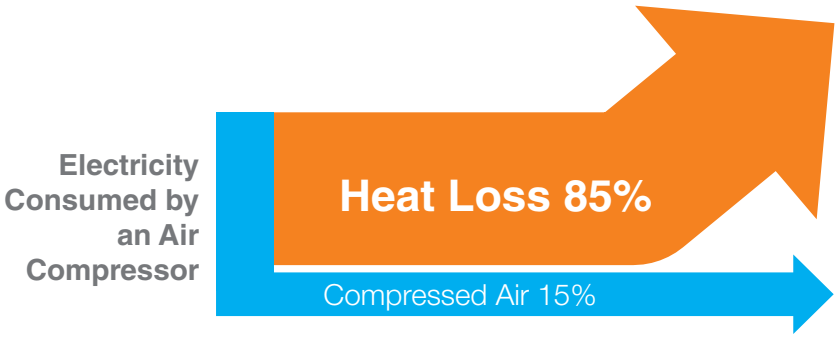
Installing soft starters and variable speed drives can save on electricity while reducing the wear and tear to equipment.

Soft starters	**Soft starters limit the initial rush of electrical current reducing the mechanical shock to a motor during start-up.**	Reduce wear and tear on a motor saving in maintenance and increasing the lifespan.	Control speed and torque during start-up only.	For surges in start-up electricity use exceeding MIC.	Lower capital investment and less space needed.
Variable Speed Drives (Variable Frequency Drives)	**A variable speed drive (VSD) is a motor control device that protects and controls the speed of an AC induction motor.**		Control speed and torque throughout the full run cycle.	For overall energy savings.	Higher capital investment and more space needed.

Ventilation and Air Conditioning

Seafood processing halls are typically kept at 8-12ºC. Maintaining this temperature can use a large amount of energy, especially for plants that operate in the summer months.

- **Air filters** should be cleaned or replaced regularly. Dirty or clogged filters can increase energy consumption by up to 15%.
- **Timers** can be fitted to automatically turn air conditioning off when it is not required.
- **Don't get too chilly** Set the air conditioning to the optimum temperature that is suitable for food safety. This will reduce your air conditioning load and the pressure on the refrigeration compressor if it is inside.
- **Free cooling** is using air from outside to cool the production hall whenever possible. For approximately half of the year ambient air temperatures in Ireland are below 10ºC, meaning the air outside is cool enough to use for the processing hall.
- **Remove heat sources** wherever possible. Equipment like condensers and air compressors generate large amounts of heat and so should be placed in well ventilated, cool areas. This will allow them to operate more efficiently and reduce excess load on air conditioning.

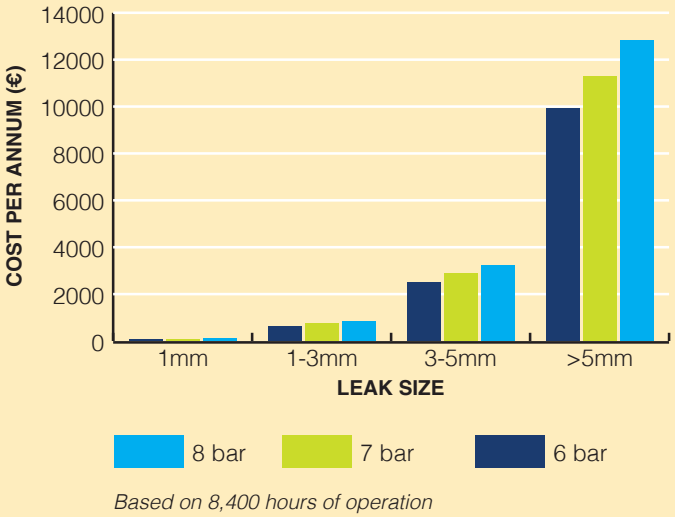


Compressed Air

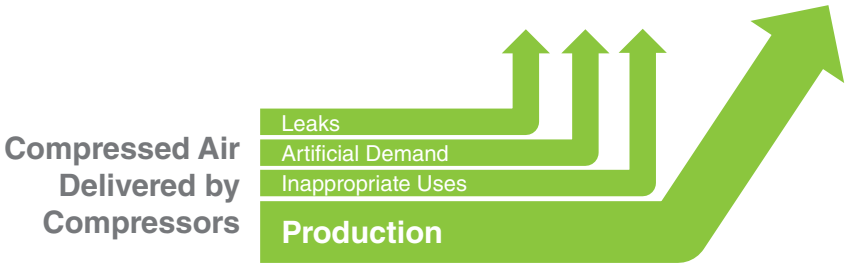
The air compressor is often the machine with the single largest energy consumption in a fish processing plant. Compressed air is the most expensive form of energy used in seafood processing.

- **Don't over work** your air compressor by setting the pressure higher than it needs to be. Reducing the pressure by just 1 bar produces a 6-7% energy saving.
- **Check for leaks**. Leaks in compressed air systems are very expensive. Typically 10% of the annual cost of compressed air can be eliminated through good leak detection and repair.
- **Keep it cool!** Compressors generate large amounts of heat. Approximately 85% of the energy they consume is converted to waste heat. If a compressor is not well ventilated the surrounding air warms and becomes more difficult (and expensive) to compress.
- The excess **heat** produced by compressors can be harnessed using heat recovery systems. This heat can then be used to heat air and/or water.
- **Switch off** when not in use during lunchtime or breaks in production. An idling compressor can still use up to 40% of the full electrical load.

Cost of compressed air leaks



Based on 8,400 hours of operation



Hot Water and Steam

Water takes a lot of energy (and therefore money) to heat. It can cost over €10 per 1,000 litres to produce so inefficient use of hot water or steam is very costly.

- **Insulate** the entire hot water system including all tanks, pipes, flanges and valves. Good insulation prevents the need to overheat water and reduces heat loss into chilled processing halls.
- **Service your boiler regularly**. A poorly maintained boiler can consume up to 10% more fuel compared to a well maintained one.
- **Check the temperature** at the point of use to ensure that it is not overheated.
- **Waste heat** from compressors, condensers and boiler flue gases can be extracted by an economiser to heat water for use throughout the site.
- **Solar thermal panels** if sufficiently sized, can generate 50-60% of your hot water requirements or reduce the load on a steam generator.

Efishiency Tip:

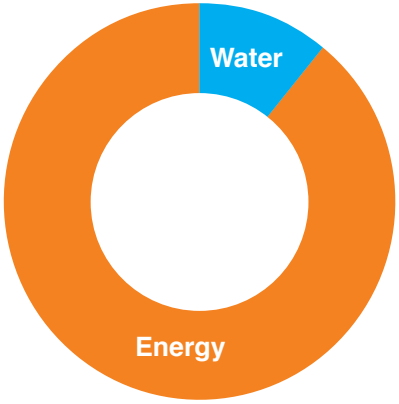
Switch to gas – heating water with electricity can cost up to four times more than heating it with gas.

SHELLFISH IRELAND

Case Study: Diesel Reduction

Shellfish Ireland use significant amounts of diesel fuel to generate steam in their cooking process. Through work with BIM's Green Seafood Business Programme the theoretical quantity of fuel was calculated and compared with actual consumption. This showed an overuse of fuel per kg of cooked product. Through better optimisation and upgrading of their steam injection process, Shellfish Ireland reduced their diesel consumption by 10%.

Cost Breakdown of Hot Water



Other areas

- **Switch off** photocopiers, computers, screens and other electrical equipment around the office before leaving. Don't leave on sleep mode.
- **Timers** can be fitted on electrical equipment to automatically power down at night.
- **Ice machines** operate more efficiently in cool, ventilated areas. Water-cooled ice machines use 2-3 times more water for cooling than for actually making the ice. When replacing, consider a more efficient air-cooled machine.

Renewable Energy

- **Solar PV (photovoltaic) panels** generate electricity and are becoming more of an attractive option for seafood processors as technology improves and cost becomes more competitive. Solar PV is a good fit for the seafood industry as refrigeration systems tend to consume more electricity in the summer when solar availability is at its highest.
- **Wind turbines** can be a realistic option for energy generation for seafood processors in some areas. It is predicted that wind power will make the most significant contribution to Ireland's renewable energy targets over the next number of years. Planning permission can be a stumbling block for these installations but it can, and has, been granted in a number of locations. Care should be taken to size the turbine correctly according to the wind availability in the area.

Transport

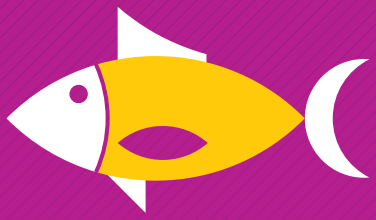
Road fuel has proved to be one of the largest sources of carbon emissions in the fish processing sector. Improved transport efficiency presents a great opportunity to reduce emissions while increasing profit.

14%

of global greenhouse gas emissions is attributed to transport and logistics.

40%

of the final energy used in Ireland is for transport.



CO_2

Once landed, transport is responsible for the majority of seafood's CO_2 emissions.

GETTING STARTED

Monitor

Similar to the water and energy usage in seafood processing it is vital to monitor the amount of fuel used in transport.

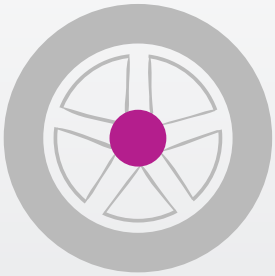
- **Fuel log books** should be issued to each driver to record daily/ weekly mileage and fuel consumption.
- **Record fuel use in litres** rather than in cost. Fuel costs vary so recording data in litres allows much more accurate comparison of fuel use over time.
- **Log maintenance work** to ensure that all vehicles are serviced as needed.

Fuel Management

It is common for fish processors to fuel from a tank in the yard. Whilst this can be convenient and a good way to control against theft, it also:

- risks leakages and spillages, resulting in environmental issues on sites inspected by customers.
- makes it hard to measure and manage fuel performance.
- risks paying higher prices when oil prices fall.

Efishiency Tip:
Using fuel cards often allows you to maintain much better measurement of how much fuel is being used.



KEY ASPECTS OF TRANSPORT

The Fleet

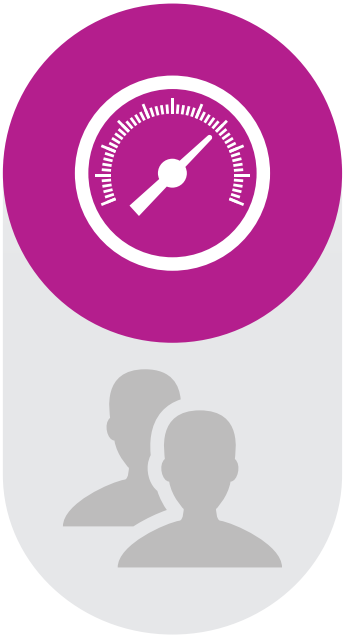
Vans are the predominant vehicle choice, designed for short run multi-drop work; many are deployed on long thin routes

Maintenance

- **Check tyre pressure** at least weekly. Roughly 20% of a vehicle's fuel consumption is used to overcome rolling resistance of the tyres. When tyre pressure is 25% too low, overall fuel consumption increases by 2% and wear and tear on tyres is much faster.
- **Fuel efficient tyres** (Class A/B) use up to 5 litres less fuel per 1000 km than low efficiency tyres (Class E/F).
- **Service vehicles regularly** to ensure they are operating to full efficiency.

Vehicle Procurement

- **Prioritise aerodynamics.** Longer and lower vans are better for long main road routes. Fared-in, streamlined edges and refrigeration packs reduces the drag and saves fuel.
- **Size** the vehicles for optimum effectiveness.
- **Vehicle features** like start/stop mild hybrid technology for multi-drop and urban work and cruise control, semi-automatic (dual clutch) transmissions should be prioritised and matched to driving type.
- **The fridge unit** should be incorporated into the van design rather than being placed on top. This will reduce drag and save money on fuel.



The Drivers

Ecodriving is a style of driving that emphasises fuel efficiency. Training your drivers in ecodriving can save approximately 8% in fuel consumption and shorten delivery times.

Ecodriving Tips:

- **Drive at a steady speed** Switching between sharp acceleration and jerky braking uses more fuel than slow acceleration and deceleration. Aggressive driving can increase motorway fuel consumption by up to 33%!
- **Slow down** The faster you drive the larger the effect of drag on the vehicle is. Driving at 100 km/h uses 25% less fuel than driving at 120 km/h.
- **Anticipate traffic** Look ahead as far as possible and adjust your driving accordingly. By watching the road ahead your driving will become smoother, safer and more efficient.

Case Study:

BIM conducted a pilot project with 3 seafood processors to investigate potential transport fuel savings. A number of initiatives were implemented as part of the project. By monitoring and recording fuel use, improving maintenance and procurement procedures and training drivers in ecodriving savings of 10% on fleet fuel costs is very achievable for seafood processors.

The Route

Long thin delivery routes are common for seafood processors.

- Long routes put a lot of pressure on drivers to maximise performance to and from customers.
- Regularly assess the **profitability** of all delivery routes. In some cases isolated or lengthy routes can end up costing as much as they make.

Route optimisation can require a lot of time and analysis but saves money in the long run.

Waste

Waste management is often overlooked in seafood processing as a potential area for cost savings. The simplest way to save money on waste is to reduce the amount you produce in the first place. Innovative reuse and recycling can transform wastes into valuable by-products.

1/3

of all food produced globally for human consumption is wasted.

2nd

Ireland's world ranking for waste generated per capita by a developed country.

3million

the number of polystyrene fish boxes imported to Ireland annually.

GETTING STARTED

Monitor

In order to improve waste management you need to know as much as possible about your waste.

- How much is there?
- Where is the source?
- What is it?

To know this you may need to do a waste survey.

Once you are aware of what waste you are producing you can set a plan to reduce it.

How to carry out a waste survey:

What you need:

Clear plastic bags.

Weighing scales (household scales will do).

Clearly printed signs/labels.

Gloves, pens, paper.

What to do:

Plan your survey ahead of time.

Communicate what you are doing to staff and explain why it is beneficial.

Replace existing bins with **very clearly labelled** bins/bags before any work begins.

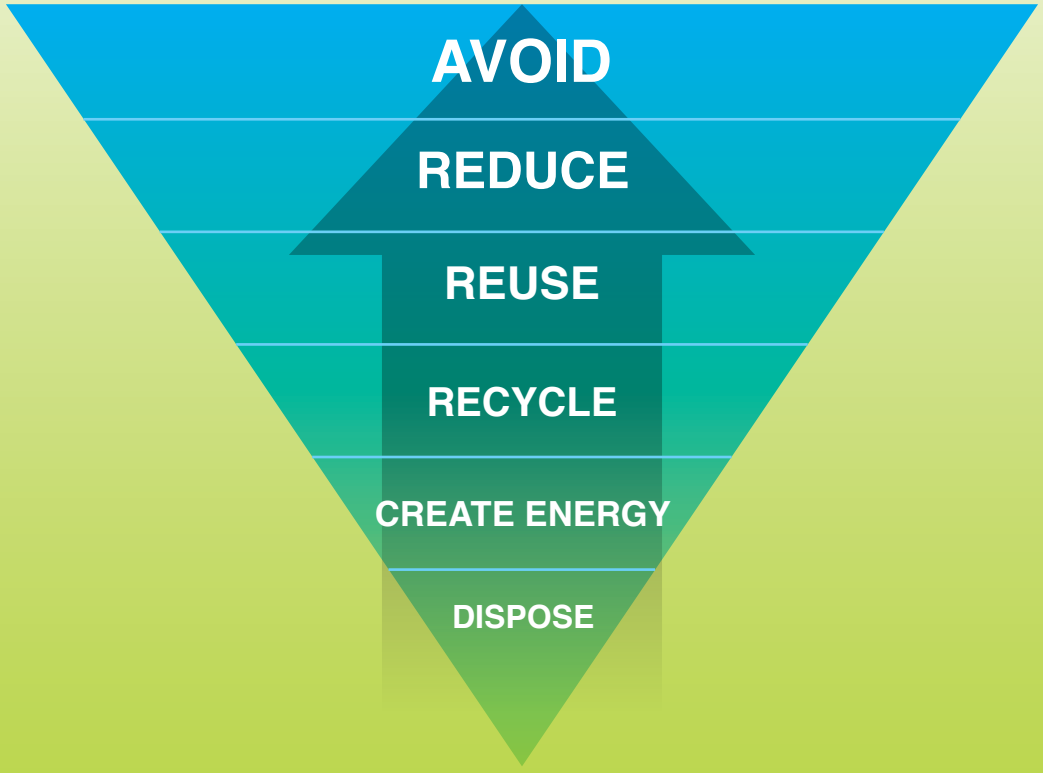
Instruct staff to **segregate** all waste generated throughout the day into the correct bin/bag.

At the end of the day **weigh** each bag and record the weight and the location.

Compile your results.

HIERARCHY OF WASTE MANAGEMENT

MOST PREFERABLE



LEAST PREFERABLE

The simplest way to reduce the cost of waste is to avoid producing it in the first place.

LESS WASTE = LESS COST!

Case study: Food Waste

A waste assessment was carried out in a seafood processing business in the south west. The assessment showed that there was approximately 3 tonnes of food ingredients (vegetables and sauces) discarded in a year. This was costing the company €9,000 per annum between purchasing and removal.

Improving Waste Management

Skip the skip: Using a skip on-site is the most expensive and least efficient way to manage your waste. Replace the skip with wheelie bins. This allows you to:

- Separate waste
- Monitor what is being generated
- Reduce odour
- Prevent rainwater accumulating

Segregate at source once you know what waste is being generated set up specific bins at a convenient waste collection point. Make sure they are very clearly labelled and colour coded and ensure the system is uniform throughout the entire facility.

Add **transparency** in your waste management – **clear plastic bags** are better than black bin bags. They make it easier to identify problems in segregation and remove the 'out of sight out of mind' mentality about waste.

Contact your waste contractor about possible reduced costs or rebates for segregated waste. Maintaining good contact is important to ensure you are always getting the best rates.

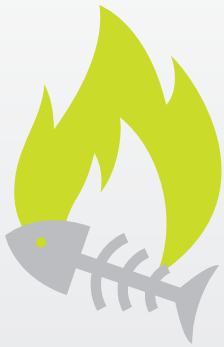
Animal By-products in the Seafood Sector

The organic waste generated by seafood processors known as Animal By-products usually comprises of fish heads, frames and offal, shellfish and waste-water sludge. Producers are legally obliged to segregate organic waste and ensure it is appropriately stored, transported and treated.

- Animal By-products are defined as animal carcasses, parts of carcasses and other products of animal origin that are not intended for human consumption. This includes both cooked and uncooked fish, shellfish and other products of animal origin that are not intended for human consumption. Animal By-products can pose a threat to animal and human health if not properly handled or disposed of.
- EU Regulation 1069 of 2009 as implemented by EU Regulation 142 of 2011 controls the collection, transport, storage, handling, processing and use or disposal of all Animal By-products.
- This legislation divides animal by-product material into 3 categories based on its potential risk to animals, humans or the environment and sets out how each category should be used or disposed of. Regardless of their category, Animal By-products must be collected and transported in sealed new packaging or covered leak-proof containers or vehicles.

The majority of Animal By-products of fish origin are classified as Category 3 which includes:

- Fish material that is not destined for human consumption.
- Finfish By-products arising from processing activities (excluding fish farm mortalities).
- Shellfish that have been previously fit for human consumption but have now passed their shelf-life.



Treatment Options for Animal By-products

There are a number of permissible disposal routes for each category including:

Category 1

- Disposed of as a waste by incineration
- Rendering.

Category 2

- Disposed of as a waste by incineration
- Rendering.

Category 3

- Disposed of as a waste by incineration
- Rendering
- Composting
- Processed as animal or pet food
- Sent for feeding Fur Animals (mink)
- Supplied as bait.

Collection, Storage, Transportation and Processing

Animal By-products can only be collected and transported by approved licensed hauliers and can only be stored and processed at licensed facilities. These licences are issued by the Department of Agriculture, Food and the Marine. Pet food facilities also require a license to operate from the same Department.

Packaging Waste

Similar to organic waste, businesses are obliged by law to segregate packaging waste for separate collection.

Polystyrene boxes

Expanded polystyrene (EPS) boxes are widely used in storing and transporting fish due to their excellent insulation, waterproof and shockproof properties. Approximately 3 million EPS fish boxes arrive in Ireland every year. EPS is recyclable but when used as fish boxes it is contaminated and so is deemed as low grade by recycling facilities.

Efishiency Tip:

Consider whether you really need polystyrene boxes. Businesses with short and well managed cold distribution chains do not necessarily need the added thermal properties of EPS. Use re-usable fish boxes where possible to save on purchasing and disposal costs.

Cardboard

Rebates are available for clean, dry cardboard. Once wet, cardboard weighs up to 5 times more. Putting wet cardboard into the general waste adds large amount of unnecessary weight and cost to your waste disposal.

Plastics

When plastic waste is clean and segregated it becomes much more valuable. In fact some plastics, when properly managed, can be worth over €100/tonne.

Case Study:

When stacking polystyrene fish boxes for shipment, the Castletownbere Co-op only use a lid for the boxes on the top. This simple step saves 9 out of every 10 lids and 15% polystyrene overall.

Maximum resource utilisation – Value added seafood by-products

Efficient utilisation of seafood by-products has a direct impact on the environment but also impacts on an economic perspective for seafood processors. Management of by-products not only leads to an increase in potential revenue but also leads to a decrease in cost of disposal of these products.

Treated fish waste has found many applications as:

- Animal feed
- Pet food
- Fish meal
- Fish oils
- Biodiesel / Biogas
- Dietetic products
- Cosmetics

Efishiency Tip:

By **increasing** the amount of fish used in the final product, you can reduce the amount of waste created while increasing your income.

Monitor yields: The most cost effective method for removing fish from your premises is as part of your product. Yields should be regularly checked to identify inefficiencies. Improving staff training or machinery maintenance may help increase yields.

Meat recovery: In order to maximise the raw material and minimise waste, recovered meat from fish carcasses can be utilised and made into reformed seafood products and ready-meal concepts. With a growing market for these products, meat recovery is worth investigating for seafood processors.

Functional ingredients: Fish and shellfish are rich sources of a range of useful nutritional compounds. Omega fatty acids, proteins, vitamins and minerals can all be extracted from fish frames, off-cuts and offal. Chitosan, produced from shrimp and crab shell, has shown a wide range of applications from the cosmetic to pharmaceutical industries. With a growing market for nutritional supplement and additives the potential for income from high value fish by-products is increasing.

Case study: Salmon recovery

BIM have trialled meat recovery equipment with several Irish salmon processors. After filleting, the waste salmon frames are fed through a meat separator which achieve a 40% yield. For every 100 kg of previously unused salmon frames 40 kg of usable salmon mince can be recovered.

This mince can then be developed into new reformed, value-added products.

Other areas

Continuing good waste management outside of the processing hall is good practice and encourages broader staff engagement with the company's sustainability goals.

Canteen

If food is served in the canteen you are legally required to segregate any food waste. If no food is served it is still best practice to do so.

Replace disposable coffee and water cups with reusable ones. Encourage staff to bring in a mug for use in the canteen.

Office

Think before you print: Only print what is necessary and set the printer to duplex or double sided to reduce the paper used.

Replace individual under the desk bins with **centralised waste areas**. Staff can then no longer thoughtlessly toss all waste into the same bin. The majority of office waste is recyclable so include clearly marked recycling bins in this area. This has been proven to increase recycling rates and employee awareness.

Set up battery/mobile phone/ink cartridge recycling points in your company.

SUMMARY

This guide gives an overview of how to reduce costs associated with energy, water, waste and transport fuel for seafood processors. The information in this booklet comes from best practice procedures and experience from the Green Seafood Business programme team working directly with seafood processors on resource efficiency projects.

To implement and embed a programme of resource improvement in any facility there needs to be a strong commitment from management. Ideally a green team should be formed with members coming from different areas of the factory. The team should meet regularly to monitor progress and report to management.

Staff engagement and involvement is also vitally important in this process. Green Awareness Days and communication of green projects and results should occur regularly.

When done correctly a culture of continuous improvement becomes engrained in the company which is positive for cost reductions, environmental performance and also contributes to a better working environment for all employees.

WHERE TO BEGIN?

Download the following form from the BIM website and email to **greenseafood@bim.ie**.

One of the Green Seafood Business team will be in contact to arrange a free on-site Resource Efficiency Assessment (REA) which could help to reduce your energy, water and waste bills.

BIM Irish Seafood Development Agency

Green Seafood Business

Resource Efficiency Assessment

Please fill out this form to the best of your ability as this will enable us to get a good idea of your site operations before we visit. Please note all information will be held in the strictest confidence.

Company name	
Site address	
Applicant name	
Nominated contact (if different from above)	
Telephone number	
Email address	

Brief description of company operations

Electricity

What are your average electricity costs per annum?	
Do you know what electricity tariff you are on and do you have access to online facilities?	
Do you analyse bills for appropriate MIC setting and wattless charges?	
Do you have any sub-meters for electricity?	
In your opinion what is the greatest user of electricity on site?	

Please supply copies of your last 4 electricity bills.

Water

What are your average water costs per annum?	
Is it all mains supply or do you have other supplies?	
Do you have any sub meters on site?	
Do you read your water meter(s) regularly?	
In your opinion where is the greatest user of water on site?	
Do you have a steam and/or hot water boiler?	
If yes, what is hot water/steam used for?	

Please supply copies of your last 4 water bills.

Waste

What waste streams are you generating on site?	
How is this waste disposed of? (recycled, landfilled or other)	
What are your waste disposal costs per annum?	

Fuel

What are your factory fuel costs per annum?	
Does your company operate a transport fleet?	
If yes what type of vehicles are in operation & how many of each type?	
What are your fleet fuel transport costs per annum?	
If transport is contracted out, what are these costs per annum?	

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BIM Ireland's Seafood Development Agency

Green Seafood Business

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Sources

Information in this handbook has been supplemented with material from the following agencies: Environmental Protection Agency BeGreen Programme, Green Business, Enterprise Ireland, Bord Bia, SEAI, Met Eireann, Seafish, FAO and the Carbon Trust.

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