

Bones about fish

Marine fisheries have become very energy intensive

■ In the first assessment of its kind, a Canadian study has revealed that global fisheries have become dependent on large amounts of non-renewable, petroleum-derived fuels

■ Marine fishing is the most diverse of the major global food-producing sectors, both in terms of the range of species harvested and harvesting technologies used. But it's also the most energy intensive method of food production

■ In 2000, around 80.4 million tonnes of marine fish and invertebrates was netted and loaded offshore. Around 620 litres of fuel was spent on catching a tonne of fish that year. So fisheries consumed almost 50 billion tones of fuel in 2000, around 1.2 per cent of the world's fuel consumption that year. Oil consumed by fisheries is almost equal to the amount burned in the Netherlands, the 18th most oil consuming country in the world

■ Translated into calories this oil use is 12.5 per cent of the protein content of the fish catch of 2000

■ In 2000, fisheries directly emitted more than 134 million tonnes of CO₂. On average an un-dried netted fish weighing about a tonne released 1.7 tonnes of CO₂ in 2000

■ Maritime vessels are typically fuel intensive. In a vessel that does not pull a net or dredge, of the energy that reaches the propeller, 35 per cent is used to turn the propeller, 27 per cent to overcome wave resistance, 18 per cent to overcome skin friction, 17 per

cent to overcome resistance from the wake and propeller wash against the hull and 3 per cent to overcome air resistance. Fishing vehicles, naturally require more energy. In a slow-speed vessel, only a third of the energy generated by the engine reaches the propeller and a third of this is actually spent on pulling the net

■ So direct fuel inputs to fishing fleets account for between 75 and 90 per cent of total energy inputs to fishing activities. The scale varies: small pelagic species — such as herring — use under 50 l of

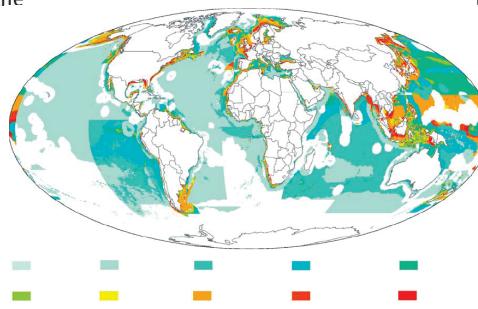
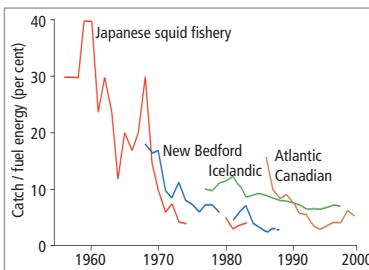
fuel per tonne of fish netted and loaded offshore, while more than 2000 l is expended when high value species like shrimp and tuna are involved

► ■ The fuel requirement goes up by about 1,000 l every year because vessels have to venture into deep seas to fish. This means that the catch-fuel energy ratio is declining

► ■ Fishing grounds in which heavy fuel use was particularly widespread in 2000 included the western Pacific and adjacent seas — the Bering Sea and the coastal waters of the northeastern and southwestern Atlantic and northern Indian Ocean

■ Given the fossil fuel intensities of fishing by trawler/vessels and crop rearing in western Europe, for every gram of protein, the input of fossil fuels for catching fish may be up to about 14 times higher than for the production of vegetable protein

► ■ Even then the fisheries sector's energy use is more efficient than many other animal food production systems



Production system (locale)	Edible-protein ERI (%)
Chicken (US)	25
Tilapia — extensive pond culture (Indonesia)	13
Turkey (US)	10
Carp — unspecified culture system (Israel)	8.4
Global fisheries	8.0
Milk (US)	7.1
Swine (US)	7.1
Tilapia — pond culture (Zimbabwe)	6.0
Beef — pasture-based (US)	5.0
Eggs (US)	2.5
Beef — feedlot (US)	2.5
Tilapia — intensive cage culture (Zimbabwe)	2.5
Shrimp — semi-intensive culture (Ecuador)	2.5
Chinook salmon — cage culture (Canada)	2.0
Atlantic salmon — cage culture (Sweden)	2.0
Lamb (US)	1.8