

Image: Peter Prokosch.  
[http://www.grida.no/photolib/detail/atlantic-cod-gadus-morhua-alesund-aquarium-norway\\_cf29](http://www.grida.no/photolib/detail/atlantic-cod-gadus-morhua-alesund-aquarium-norway_cf29)

A large group of Atlantic cod fish swimming in clear blue water. The fish are the central focus of the image, with several large ones in the foreground and many smaller ones in the background. The lighting is bright, highlighting the texture of their scales and the white stripe along their sides.

# Super Chilling

is forward  
thinking

[www.skaginn.is](http://www.skaginn.is)



# Icelandic fisheries: Sustainable and efficient

*Sigurður Ingi Jóhannsson, Minister of Fisheries and Agriculture in Iceland considers the role the fishing industry plays on the Icelandic economy*

**F**or most developed countries wild capture fisheries are not economically very significant, but Iceland is one of the exceptions. Fisheries have for a long time been the backbone of the Icelandic economy. In 2012 some 1.5 million tonnes of fish were caught around the island with an export value of €1.7bn. Fisheries and fish processing represent some 11% of GDP and 27% of the total export earnings. New research indicates that, if the various sectors supporting the fisheries sector are taken into account, their contribution to GDP might be as high as 26.7%. Today, fisheries in Iceland are sustainable, efficient and highly profitable.

## **How did this come about?**

In Iceland, like most other coastal states, there was no perceived need for fisheries management in the early days, when landings just kept on increasing year after year. Inter-

national acceptance through UNCLOS (UN Convention on the Law of the Sea) of the 200 mile Exclusive Economic Zone finally gave Iceland full control of its fishing grounds. After the “cod wars”, when foreign fleets were excluded from Icelandic waters, fishing was free and practically unrestrained for all Icelanders. Around 1977 signs of overfishing had become undeniable. Something had to be done. To deal with the problem, Iceland, like most other nations, opted for “input controls” such as “days at sea” programmes plus various other technical options to curb the fishing power of the fleet. However, this proved to be ineffective. The fleet was quick to increase its fishing efficiency within this framework, so overfishing persisted. Fishing was really driven by fierce competition for the fish, regardless of quality and market conditions. To catch the most the fastest was the name of the game. As an example, 70% of the cod (representing over



**Sigurður Ingi Jóhannsson**  
*Minister of Fisheries and Agriculture*

50% of the value of total fish exports) was caught in a period of 3 months in the summer, often leading to very poor yields and poor quality.

In 1984, permanent quota shares of the annual total allowable catch (TAC), decided by the Minister of Fisheries, were allocated to individual fishing vessels. This meant that each fishing vessel could now catch its share of the different fish stocks in its own time. The benefits soon came to light, such as saving fuel by not racing to the fishing grounds, staying in harbour in bad weather, using the most efficient vessels etc. Quotas became transferable between vessels in 1990, leading to a market system for fishing quotas that were nevertheless subject to certain restrictions. On the whole, this led to an important transformation of the industry: From a quantity mentality to that of quality and value. The quota system also led to vastly improved efficiency: Only 9,000 people are now directly employed in fishing and fish processing. This corresponds to 5.3% of the Icelandic workforce, but new jobs have been created in specialised industries serving the fisheries sector, driving the change to more efficiency every year.

Improvement in productivity has been achieved by constant streamlining and the use of automation and robotics, as well as incentive schemes of various types. As a result, the real

value of cod products over the last 30 years has doubled due to higher yields, better quality, value-added products and more focussed marketing. By-products, which were formerly considered as waste, such as fish heads, livers, fish frames, skin etc. are now processed.

From a political point of view many view the system as being “unfair“. Cases have been brought to the courts of law, even international courts, to test various aspects of access limitations to this common resource of Icelanders. There is an on-going debate on how high the resource rent or fishing fee should be. Admittedly, the system has not proved to be perfect. Many of the remote villages around the island have faced severe difficulties, e.g. when fishing quotas have been transferred to vessels operating in other parts of the country. It is a system under constant development and various measures have been taken by the government over the years to counteract the negative aspects. Yet, it is clear that the nation as a whole is the biggest beneficiary of an efficient fisheries management system. That is the fact that should be kept in focus – the rest is all about fine tuning a well functioning system.

The figures about efficiency speak for themselves. The industry is efficiently managed, rather than (top down) regulated, and it is not subsidised. Over the years, vessel ownership has become more concentrated through the transfer of quotas and a vertical integration of companies has taken place. Most importantly, management decisions are moving towards long-term harvesting rules and discards are forbidden. All decisions of this kind are now based on the best available science, a policy that is supported by most of the industry. The outcome has been that fish stocks are now generally at good levels. That is the key issue when it comes to responsible and sustainable harvesting of living marine resources.

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# Super Chilling is forward thinking

A revolutionary technique by Icelandic pioneers of Skaginn  
welcomed by the seafood industry

Image: Peter Prokosch.  
[http://www.grida.no/photolib/detail/atlantic-cod-gadus-morhua-alesund-aquarium-norway\\_43d6](http://www.grida.no/photolib/detail/atlantic-cod-gadus-morhua-alesund-aquarium-norway_43d6)



“The quality of  
seafood caught in  
the pristine waters  
around Iceland  
has been well  
documented for  
decades.”



*Albert, manager of Research and Development at 3x Technnology, demonstrates the firmness of Super Chilled Cod right after landing.*

Super Chilling is a fish processing technique developed by the Icelandic pioneers of Skaginn. Tests have confirmed that by using the Super Chilling technique the shelf life of products can be up to doubled. An environmentally friendly solution, Skaginn's mission is also to minimise, even eliminate, the use of ice for cooling. Currently undergoing a patenting process, the revolutionary technique has already thrust Skaginn into the limelight as one of the seafood industry's brightest innovators of the modern era.

### **The quality challenge**

The quality of seafood caught in the pristine waters around Iceland has been well documented for decades. Adequate on board chilling methods immediately after catch – the importance of which has been outlined by various Icelandic scientists and their counterparts the world over – is now a pivotal element in the catching

process. Through the Super Chilling technique the initial quality loss, mainly explained by autolytic changes, is significantly slowed down.

**“Tests have confirmed that by using the Super Chilling technique the shelf life of products can be up to doubled.”**

While temperature mapping of chilled supply chains has underlined the importance of thermal protection of packaging during transport and storage, especially in air transportation chains, a rising demand for fresh seafood products has presented local seafood processing companies with a

challenge. The sheer distance from Iceland to its most important markets presents a major logistical hurdle. Acknowledging the importance of the initial cooling process at sea in maintaining product quality, this was a challenge eagerly embraced by Skaginn's team of specialists. The result is the company's Super Chilling technique that is now taking the seafood industry by storm.

### **Added product value**

Driven by the ingenuity and innovative vision of its co-founder and now pioneer CEO, Skaginn's Super Chilling solutions offer a range of benefits. Through highly automated features, Super Chilling increases yield, preserves quality and adds to product value. The efficient processing – now with a revolutionary high speed, gentle handling, quality controlled weighing and packing system – eliminates all unnecessary product transport.

## Reduced carbon footprint

Skaginn's Super Chilling technique makes a significant contribution to product quality and shelf life. As a consequence, the rigor process onboard is slowed down resulting in firmer flesh. By using the Super Chilling technique, the desired temperature of  $-1^{\circ}\text{C}$  is reached in just one hour, whereas chilling down to  $0^{\circ}\text{C}$  by traditional cooling methods with ice can take up to 48 hours.

Moreover, the technique reduces carbon footprint through various beneficial factors. With the Super Chilling technique on board, vessels do not need to store ice for cooling. A lighter vessel subsequently saves fuel. The technique also means fishing vessels can extend their stay at sea up to 72 hours and double their catch. Fewer trips to the fishing grounds contribute to a significant reduction in the use of fuel while optimising the investment in the vessel and the equipment on board.



*Traditionally chilled fish (left) and Super Chilled fish (right) after cooking. The photos highlight a clear visual in colour, texture and drip.*

## The Super Chilling technique

Through a patented technology, the Super Chilling technique on land involves superchilling the skin side of fillets through a freezer tunnel on a Teflon coated aluminium conveyor belt at a temperature of approximately  $-8^{\circ}\text{C}$  and simultaneously blasting cold air over the fillets, allowing for a

rapid lowering of fillet temperature down to  $-1^{\circ}\text{C}$ .

Prior to Super Chilling the fillet goes through fluid-ice with about 2.5% salt content to avoid freezing of the flesh in the tunnel. This process facilitates further handling of the fillets, in particular deskinning and effective cooling prior to



*A Skaginn technician makes final adjustments to ensure the production line delivers to its capacity.*

packaging. A report by Mátis, Icelandic Fisheries Laboratories, confirms tests have revealed that the Super Chilling treatment of fillets contributes to a slower quality degradation rate at early stage, extending the freshness period of the product and its shelf life.\*

### Tailor made solutions

Already an industry leader in Iceland when it comes to efficient pelagic processing, freezing and chilling solutions, Skaginn's growing reputation for its adaptability to tailor make solutions to individual assignments if needed, is fast establishing the company as a key player in a fiercely competitive international environment. Skaginn's recent acquisition of an 80% stake in 3X Technology – another leader in its field in Iceland – has further fortified its position, coupled with an 1800 square metre expansion of its manufacturing facilities. The two companies, established in traditional Icelandic fishing towns, have a history of co-operation on a range of projects, making closer ties between them a logical progression.

### Volumes replaced by values

Iceland's fishing industry has been



*Pelagic products packed following automated processing, ready for transport or freezer storage.*

through some tough years, emerging as not only one of the most modern in existence, but also one of the most progressive. When quotas are tight, values replace volumes. In an industry where there are no state subsidies and no safety net to fall back on, you have to push hard, break with convention, sometimes forgo tradition and break new ground. These are exactly the values that have driven Skaginn's innovative approach.

### About Skaginn

Founded in 1998, the company's roots lie in the fishing industry, initially as a specialised department of the local shipyard in Akranes in West Iceland. Groundwork for the the development of sophisticated hi-tech solutions within the seafood industry simultaneously opened up channels into the meat and poultry industries. Skaginn's products include Pelagic Processing Solutions, IQF Freezers, Automatic Box Freezers, Fluid Ice Systems, Top Tippers, Ice Clean cleaning systems and more.

**“...Super Chilling increases yield, preserves quality and adds to product value.”**

Skaginn's co-founder and now principal owner and CEO is Ingólfur Árnason. The company and its affiliates currently employ a staff of around 170.

*\* Mátis: Overview on fish quality research. Impact of fish handling, processing, storage and logistics on fish quality deterioration. (Mátis Report 39-10)*



*A line of hi-tech freezers from Skaginn and affiliates at a modern pelagic processing plant in Eastern Iceland.*

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