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Blue **bioeconomy**

Research | Statistics

Blue bioeconomy digital publication – summary

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According to the Finnish Bioeconomy Strategy, bioeconomy refers to an economy that relies on renewable natural resources to produce food, energy, products and services. The bioeconomy seeks to reduce dependence on fossil fuels, prevent depletion of ecosystems, promote economic development and create new jobs that are in line with the principles of sustainable development.

The bioeconomy accounted for 12% of Finland's GDP in 2014. It's share of exports was 22%. The bioeconomy provides jobs primarily in the agriculture, construction, nature tourism and recreation sectors.

Blue bioeconomy refers to business activities based on the sustainable use of living aquatic resources and intelligent competence related to them.

The main characteristics of growth in the blue bioeconomy are a market focus, added value, resource efficiency, cross-sectoral thinking and promotion of a healthy aquatic environment.

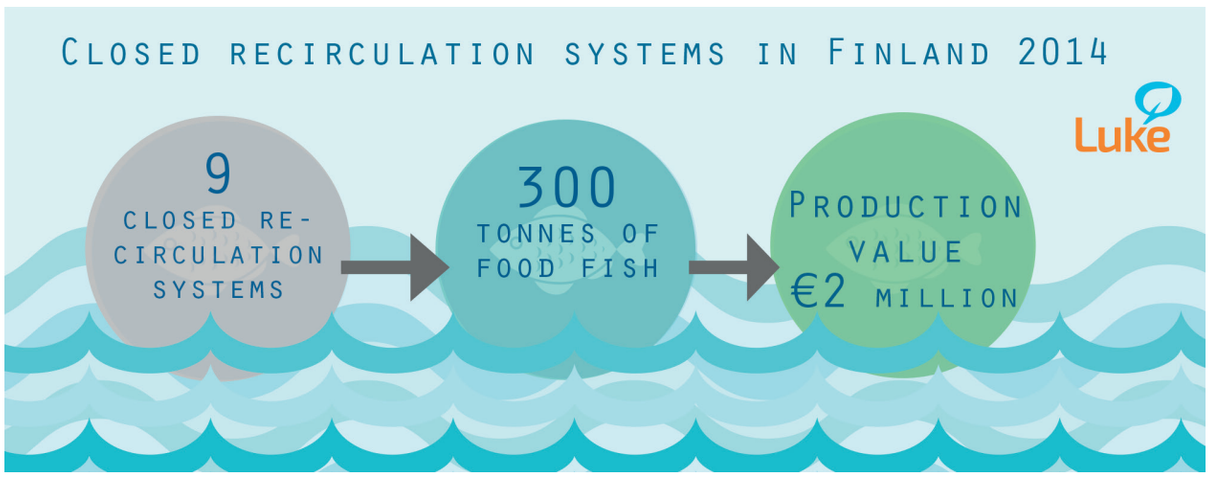
The core of the blue bioeconomy is the fisheries. The combined profits of fisheries sector companies were €950 million in 2014. The Finnish fisheries sector has almost doubled its profits in the last decade.

Aquatic bio-based production

Offshore-fish farming and fish feed recirculating Baltic Sea nutrients are investigated as new solutions to expand sustainable marine aquaculture in the Baltic Sea.

Appreciation for fish products has grown and the demand for fish is increasing faster than that for other food products. The growth in demand has been met primarily through fish farming, as the supply from fishing operations is not increasing on a global level.

New fish farming permits have been granted in inland water areas to closed recirculation aquaculture systems. The total production of recirculation aquaculture systems is comprised of many different fish species. In the Åland Islands, one of the world's largest recirculation systems is cur-



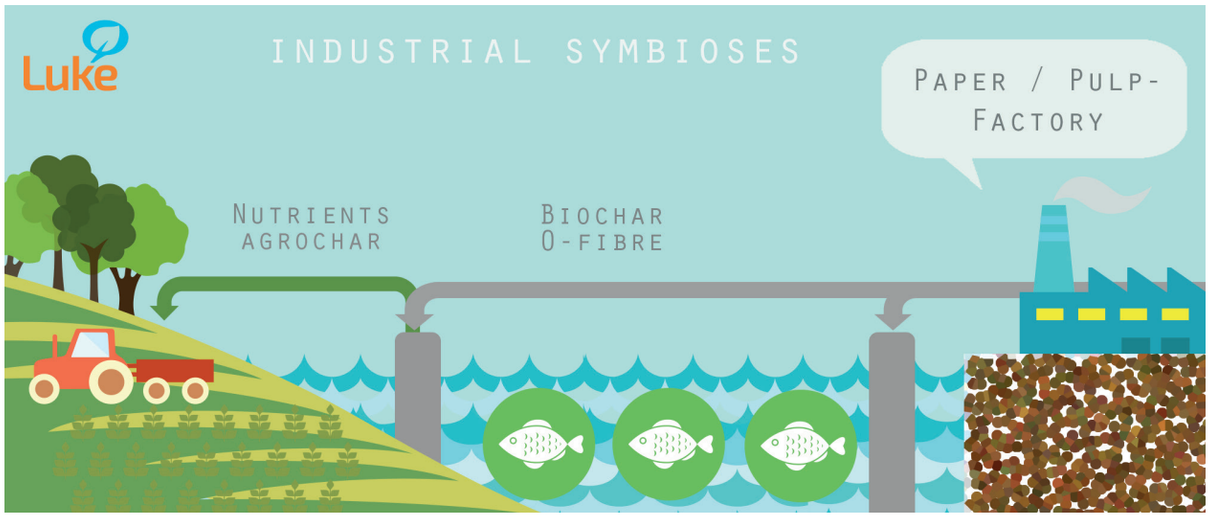
rently starting production. However, the costs of recirculation aquaculture are high and the technology is demanding.

In 2015, 112 million kg of fish and fish products were imported into Finland, of which 72 million kg were intended for human consumption. The total value of the imports was €374 million. Of this total import value, 91% comprised of fish intended for human consumption. Of these consumable fish products, the largest share was comprised of fresh fish and filleted fish, among which salmon and rainbow trout were the most important species.

Salmon, both whole and filleted, was imported into the Finnish market primarily from Norway, with total imports approaching 30 million kg. Rainbow trout was imported primarily from Sweden (nearly 9 million kg). Finland's domestic production in 2014 comprised slightly over 12 million kg of rainbow trout, just under 1 million kg of whitefish, and several hundred tonnes of other farmed fish such as sturgeon, pikeperch, Arctic char and trout.

2014
The fishing industry in Finland provided employment amounting to 2,900 persons (full-time equivalent).

Nutrient recycling and industrial symbioses



Industrial side streams can be processed using a variety of procedures that make them more suitable for reuse. Biochar, which is produced from different kinds of biomass, can be used as a filtering substance which can be recycled or mixed into the soil as agrochar to improve the soil quality for agricultural production.

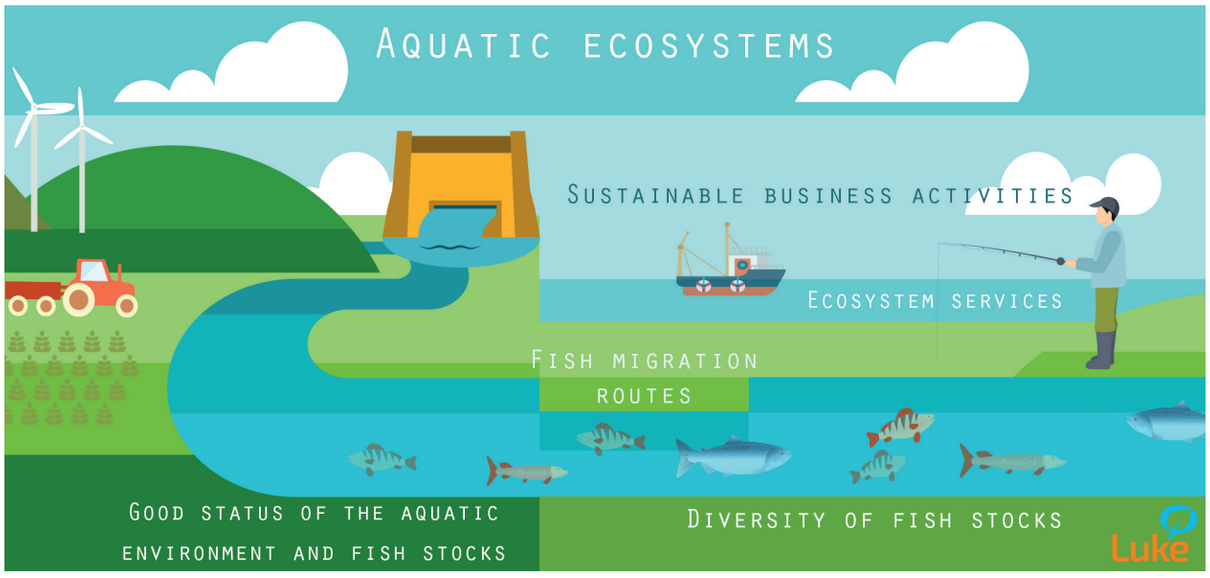
Nutrients can also be extracted, for example, from the waste water created by production processes, and these nutrients can be bound into recyclable substances. This is of particular importance for fish farming, where the nutrient load is one of the largest obstacles to increased production.

Fish farming has become more environmentally friendly. The nutrient load per tonne of fish is around a third of the level prevailing in the 1980s.

Sustainable use of water ecosystems

The growth of business activities based on water and living aquatic resources is a central goal for the blue bioeconomy. In order to achieve this economic growth, resources need to be used more efficiently and new concepts need to be developed that diversify resource use and produce added value.

Growth must be sustainable so that the vitality of the aquatic ecosystems and services produced by these ecosystems can be secured in both the short term and the long term. The good status, functioning, and diversity of aquatic flora and fauna form the foundation for a sustainable blue bioeconomy.

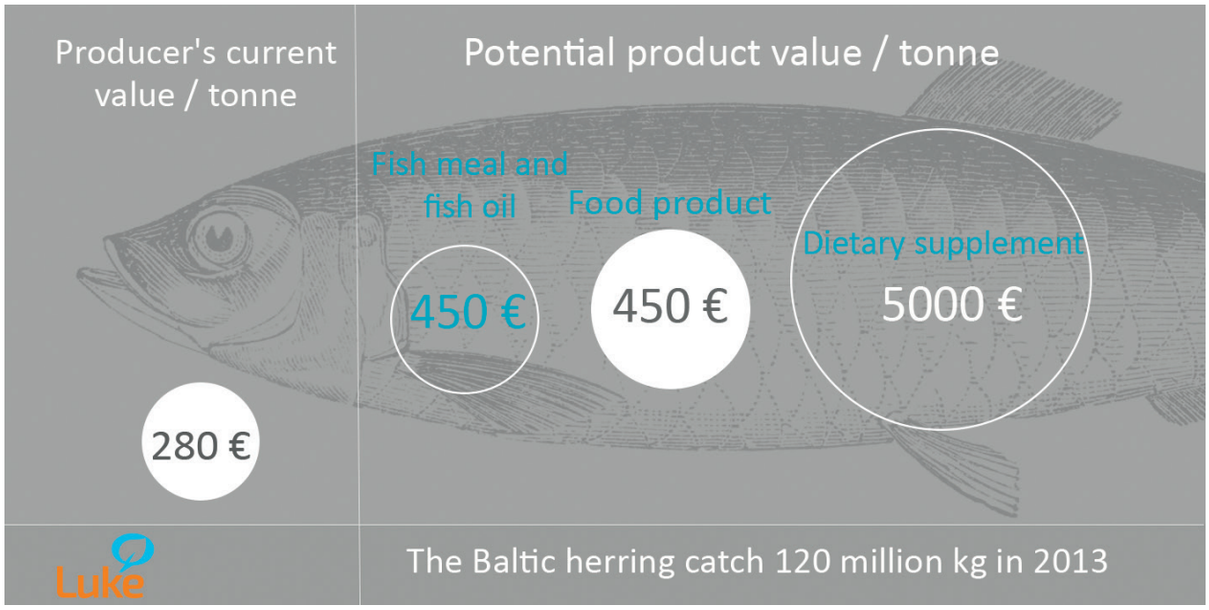


Added value from aquatic biomass

The added value in the blue bioeconomy is normally generated through the processing of the different fish products. Added value is basically generated in every stage of processing, starting from gutting the fish. Significant new added value is obtained also when side streams of the production or low value catches are utilized.

In addition to fishing and fish farming production, added value and value added products in the blue bioeconomy can also be obtained from algae, scallops, shellfish and aquatic plants. A new promising area of the blue bioeconomy is the utilization of the algae. Algal species are recognized especially promising raw material for pharmaceutical, cosmetics, nutraceutical, food, feed and fertilizer industries.

Algae are effective producers of biological raw materials.
They can double the biomass in as little as four hours.



Current value of a Baltic herring catch if the catch were used entirely as a food product or as fish meal or fish oil (€/tonne as estimated by current fish market prices). The largest sphere represents the potential value if the whole catch were to be used as dietary supplements.

Refreshing waters – Aquatic well-being and tourist services

Different ways of utilising and developing the aquatic environments' intangible value occupy a key place in the sustainable use of aquatic environments and the well-being provided by them. This intangible value is utilised in aquatic recreational activities, tourism which either uses or is connected with the waterways, and in the production of different kinds of well-being services.

Around 40% of the adult population in Finland either owns or otherwise has access to a holiday home. The majority of these are located next to lakes, sea shore or rivers. Around two-thirds of Finns spend time each year at a holiday home. Of the adult population, around 70% go swimming in natural water bodies and 1 in 10 engage in ice-hole swimming. People take excursions on the waterways in boats, canoes, or other forms of transport. 49% of Finns go boating in one form or another.