

SIEMENS

Pioneering Healthy & Sustainable Food Technologies

Siemens AG (Berlin and Munich) is a global technology powerhouse that has stood for engineering excellence, innovation, quality, reliability and internationality for more than 170 years. The company is active around the globe, focusing on the areas of electrification, automation and digitalization. One of the largest producers of energy-efficient, resource-saving technologies, Siemens is a leading supplier of efficient power generation and power transmission solutions and a pioneer in infrastructure solutions as well as automation, drive and software solutions for industry.

In 2020 the Siemens Group generated revenue of €55.3 billion and net income of €4.2 billion. As of September 30, 2020, the company had around 293,000 employees worldwide.

PIONEERING AQUACULTURE TECHNOLOGY IN SINGAPORE

PARTNERING WITH SINGAPORE AQUACULTURE TECHNOLOGIES

First Aquaculture 4.0 closed containment system for tropical fish was launched in Singapore in February 2020. The containment systems combine Siemens cutting edge technologies and Smart Recirculating Aquaculture System for sustainable tropical sea-farmed fish. The systems also optimizes operations with Artificial Intelligence and cloud-based open IoT operating system MindSphere ensures reliable fish production with increasing yield.

On 17 February 2020, Singapore Aquaculture Technologies (SAT), a pioneer in utilizing closed containment systems for tropical fish, launched its commercial Smart Floating Fish Farm at a cere-



mony officiated by the then Minister for the Environment and Water Resources Mr Masagos Zulkifli.

The 3000 square meter offshore farm, located off Pasir Ris Coast, is the first known Aquaculture 4.0 floating closed containment fish farm using Recirculating Aquaculture System (RAS). It creates a controlled environment through a multi-level water treatment process. In addition, the farm integrates a high degree of automation, self-regulated control cycles and artificial intelligence within a Farm Management Information System to achieve a productive and environmentally friendly operation.

SAT has been using closed containment systems since 2012. This means the water where fish are kept is separated from sea water, allowing the farm to have more control of environmental factors that may harm the fish, such as pathogens, algae blooms, oil spills and effects of climate change.

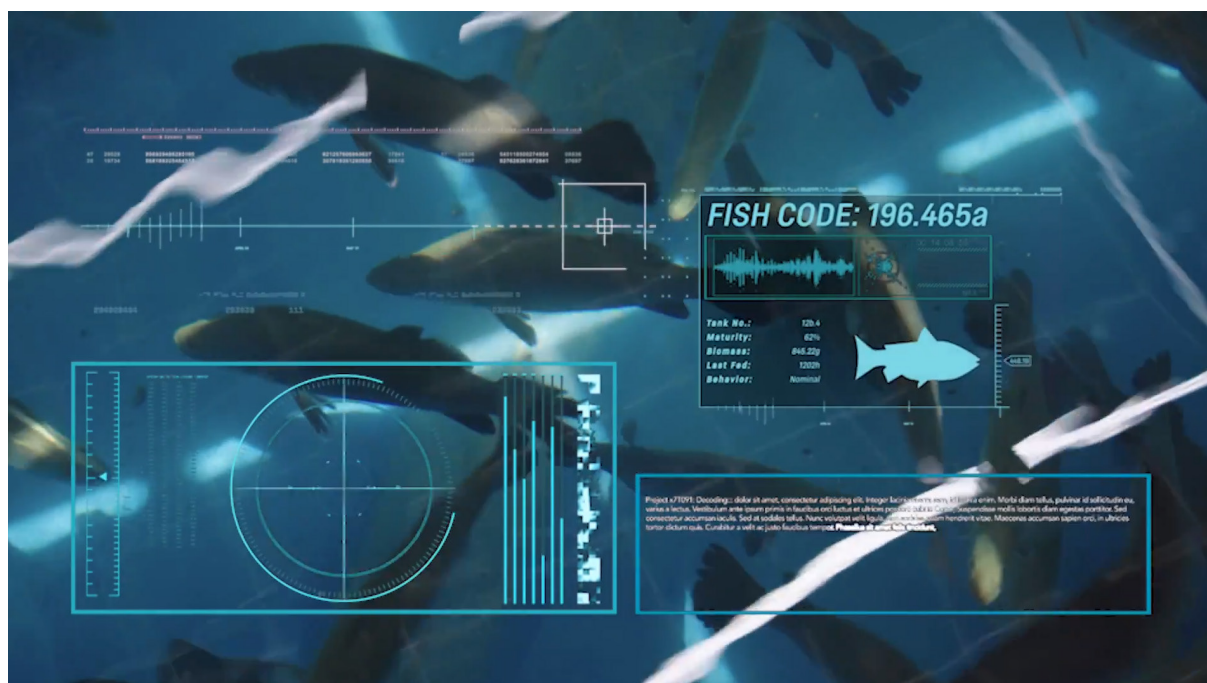
In addition to state-of-the-art water-treatment systems and on-site solar energy generation, SAT has now also integrat-

ed connectivity, artificial intelligence and a data management solution that provides the company with predictive analytics and helps them to monitor the quality and health of the fish. The end result yielded ensures a consistent supply of healthy fish, grown in a low-stress environment.

THE KEY ROLE OF SIEMENS' DIGITAL SOLUTION

Siemens, SAT's technology partner, implemented an end-to-end digital solution which included the IoT operating system MindSphere that provides a central repository and monitoring of critical sensor and process data across a secure network. As a result, the quality of the fish and potential savings for resources such as energy, oxygen and feed has already been improved with the knowledge derived from collected and visualized data.

By integrating cutting-edge technologies like artificial intelligence, edge computing and blockchain, Siemens is helping SAT to continuously optimize their operations. The use of innovative advanced



predictive analytics such as machine learning and video analytics helps to predict potential biomass growth and prevent the outbreak of diseases, hence reducing fish mortality. With this, SAT and Siemens are paving the way for scalable, highly flexible and above all environmentally efficient aquaculture across the entire value chain.

AQUACULTURE TECHNOLOGY A RESPONSE TO SINGAPORE'S 30-BY-30 VISION

An additional benefit of high-technology farming is food safety and traceability. As the fish is cultivated in a controlled environment free from contamination, there is minimal use of antibiotics and chemicals. As consumers increasingly demand to know the source of their food and whether it is sustainable, this enables them to better understand the journey of food from farm to table. At the launch of the Smart Floating Fish Farm, SAT and Siemens signed a Memorandum of Understanding (MoU) for enhanced collaboration in commercializing and scaling Aquaculture 4.0 technologies in Singapore and Southeast Asia.

The Smart Floating Fish Farm is a good example of a sustainable, scalable and innovative farming solution that can help increase yield and productivity, and boost Singapore's local fish supply. With Singapore's limited space and resources, there is a need for an even greater number of local farms to leverage technology to grow more with less, in a climate resilient and sustainable manner. This is crucial as Singapore works towards its "30-by-30" vision to produce 30 percent of the nation's nutritional needs by 2030."

Developed with support from Singapore Food Asia's Agriculture Productivity Fund, the Smart Floating Fish Farm, together with the existing floating steel-structure fish farm, can produce up to 350 metric tons of fish when it is operating at full capacity in 2021.

FINANCING SUSTAINABLE FOOD PRODUCTION IN SINGAPORE

On 6 August 2021, SAT announced the finalization of a Series A financing round totalling S\$9.2 million.

The main part of this equity investment comes from Siemens Financial Services (SFS) via Siemens Project Ventures GmbH - the financing arm of global technology company, Siemens AG. As SAT's first institutional shareholder, the investment from SFS accounts for a significant minority stake in the company.

Founders Dirk Eichelberger and Michael Voigtmann view Siemens' entry as a validation of their strategy to become the leading supplier of data - and artificial intelligence (AI)-driven aquaculture solutions, in addition to producing premium fish products under their BluCurrent label.

It also serves to further highlight Siemens' commitment to supporting sustainable food production and helping Singapore achieve its "30 by 30" goal of 30% local food production by 2030. Siemens recognizes that the commitment to sustainability needs to be reflected through both their technologies and their investments.

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