

# Advance Membrane Separation Solutions for Fish Stick Water

Produce high quality meal, save energy and produce more meal in fish processing and fish oil production

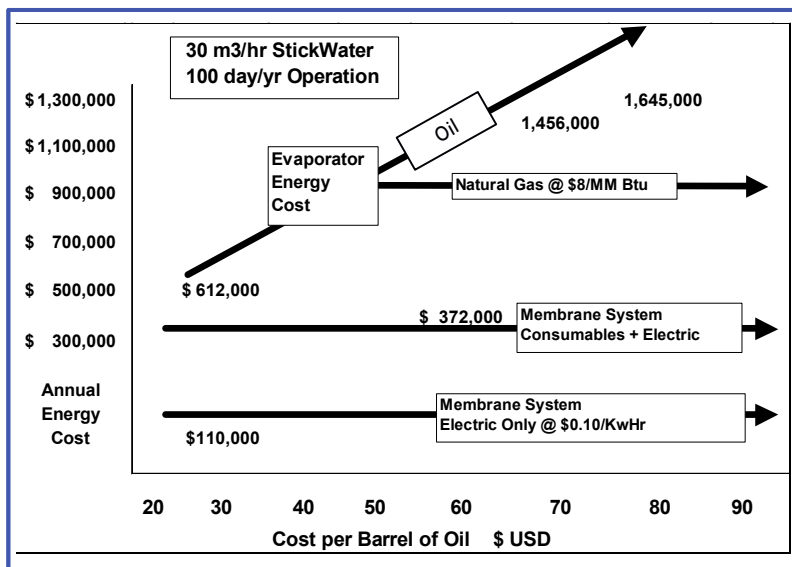
## Description & Use

The fish processing industry can benefit using the GE Advanced Membrane Separation (AMS) solution to address many challenges to increase profitability: Today the fish processing industry faces many challenges. The challenges vary depending on site location but can include:

1. **Energy Costs** are driving record high plant energy demands. The GE AMS can eliminate the evaporators or greatly reduce the size of evaporation needed. See Figure 1 for details on the energy economics.



Fish Processing and Fish Oil Production Plant



NOTE: This chart demonstrates the economics of separating stick water solids in a liquid phase rather than through evaporation with Petroleum based fuels. In the \$372,000 membrane system operating cost, the chemicals required to clean the membranes, as well as annual replacement of filters/membranes have been added to the electrical cost this gives the best comparison of total Annual costs versus evaporation techniques.

Figure 1 Energy Economics of Fish Stick Treatment Solutions



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e-mailing [custhelp@ge.com](mailto:custhelp@ge.com).

**Global Headquarters**  
Trevose, PA  
+1-215-355-3300

**Americas**  
Watertown, MA  
+1-617-926-2500

**Europe/Middle East/Africa**  
Heverlee, Belgium  
+32-16-40-20-00

**Asia/Pacific**  
Shanghai, China  
+86 (0) 411-8366-6489

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2. **Ability to Treat more waste material** For example in Norway the fish quota regulations have been reduced by more than 50% to meet a sustainable marine environment. Limited on the amount of fish a processor can obtain Viscera and waste trimmings to meet Fish Meal Demands. Figure 2 shows the advantage of using a GE membrane system vs. an evaporation system to process trimmings.

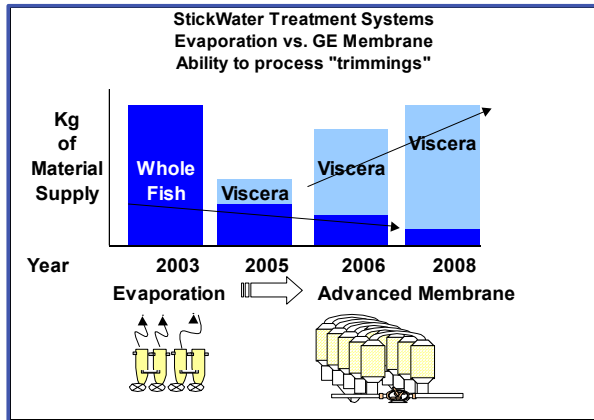


Figure 2: Benefits of processing trimmings with membranes vs. evaporation

Note: Plants which use evaporation for the treatment of stick water are limited in the amount of "Viscera" which can be processed. Utilization of Evaporators for the Treatment of stick water limits the amount of alternate raw fish materials which can be processed in the fish meal plant.

3. **Quality** The GE Advance Membrane solution improves fishmeal quality by removing salts and Biogenic Amines. Exact Fishmeal specification can be met for example LT70. See Figure 3 for a comparison of the evaporation method vs. GE Advanced Membrane Solution.

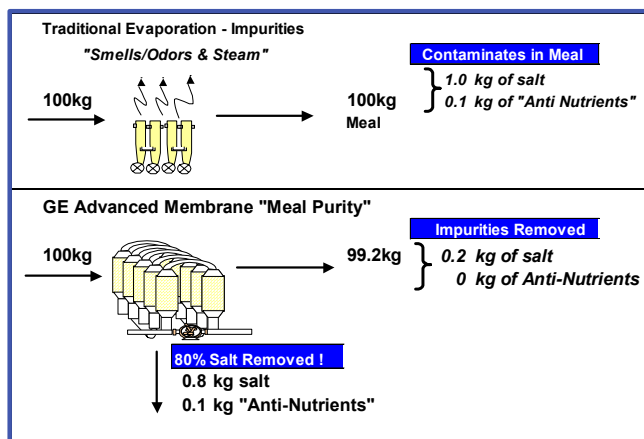


Figure 3: Purity Quality of Traditional Evaporation vs. GE Advanced Membrane Systems

4. **Environmental** – Discharge of fish stick water has been addressed in parts of the world by building discharge pipes miles into the ocean or paying to have the stick water hauled by ships several miles out into to be disposed. With the GE AMS solution this waste can be turned into a revenue stream and increase the overall profitability of the fishmeal processor.

5. **Evaporator Condensate** – Reduce or eliminate evaporator condensate discharge from evaporators.

6. **Bilge/Fluming Water** – eliminate or minimize waste treatment problems due to Bilge/Fluming water from fish handling and the need for DAFs or other wastewater treatment systems.