



# Recirculation Aquaculture Systems (RAS)

Your Aquaculture Technology and Service Partner

**AKVA**GROUP™



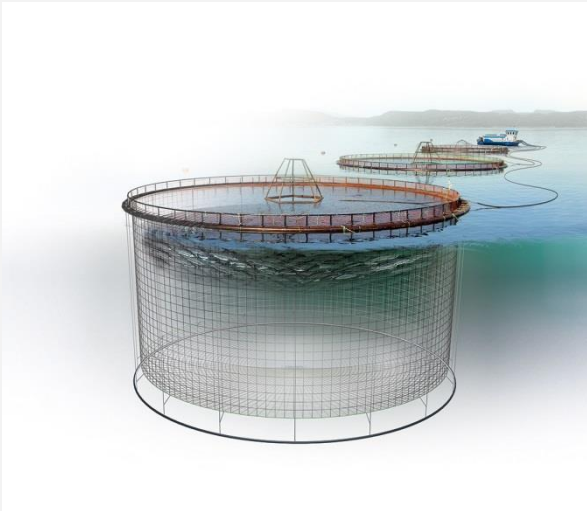
# Jens Jensen - background



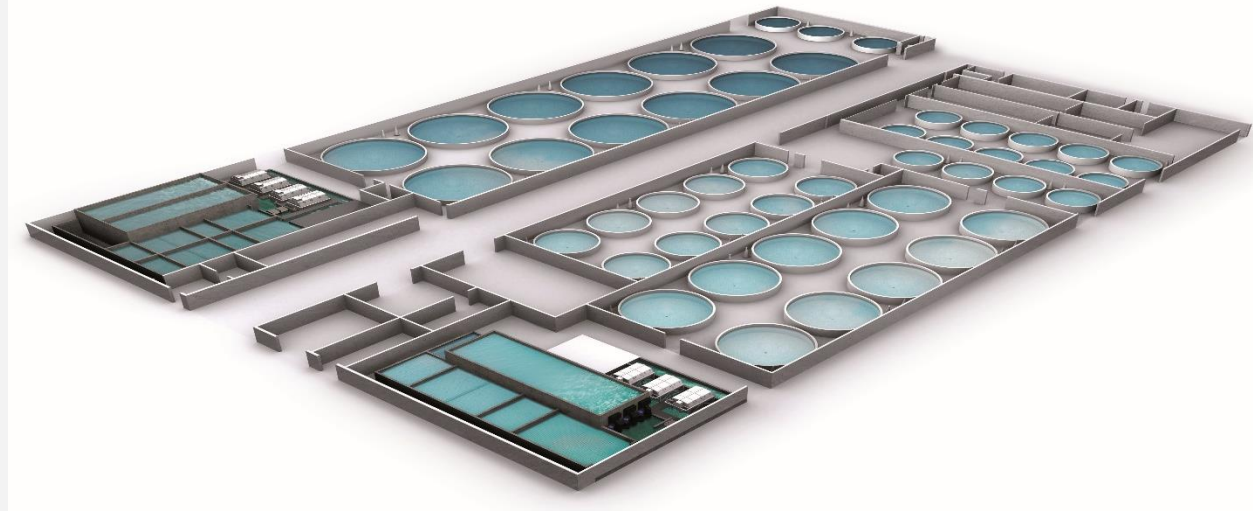


# AKVA group: Leading in aquaculture innovations

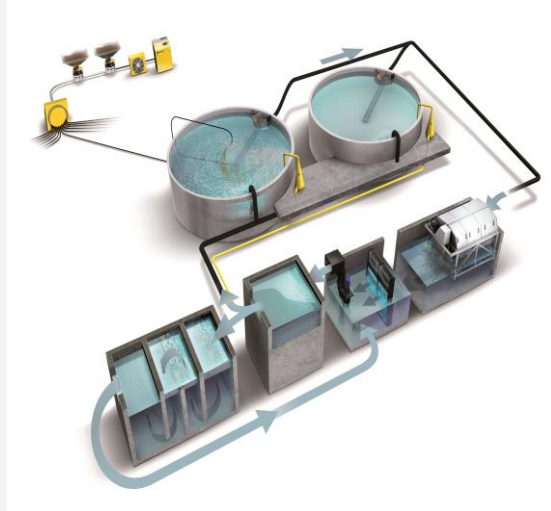
Cage farms



Land Based Aquaculture



Recirculation



Feeding Barges



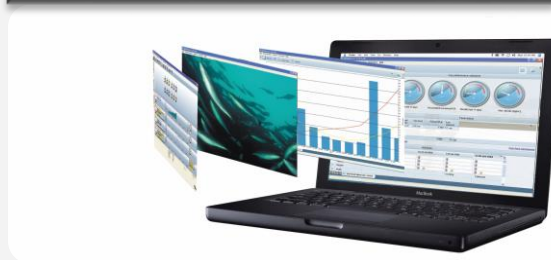
Feed systems



Sensors & operational

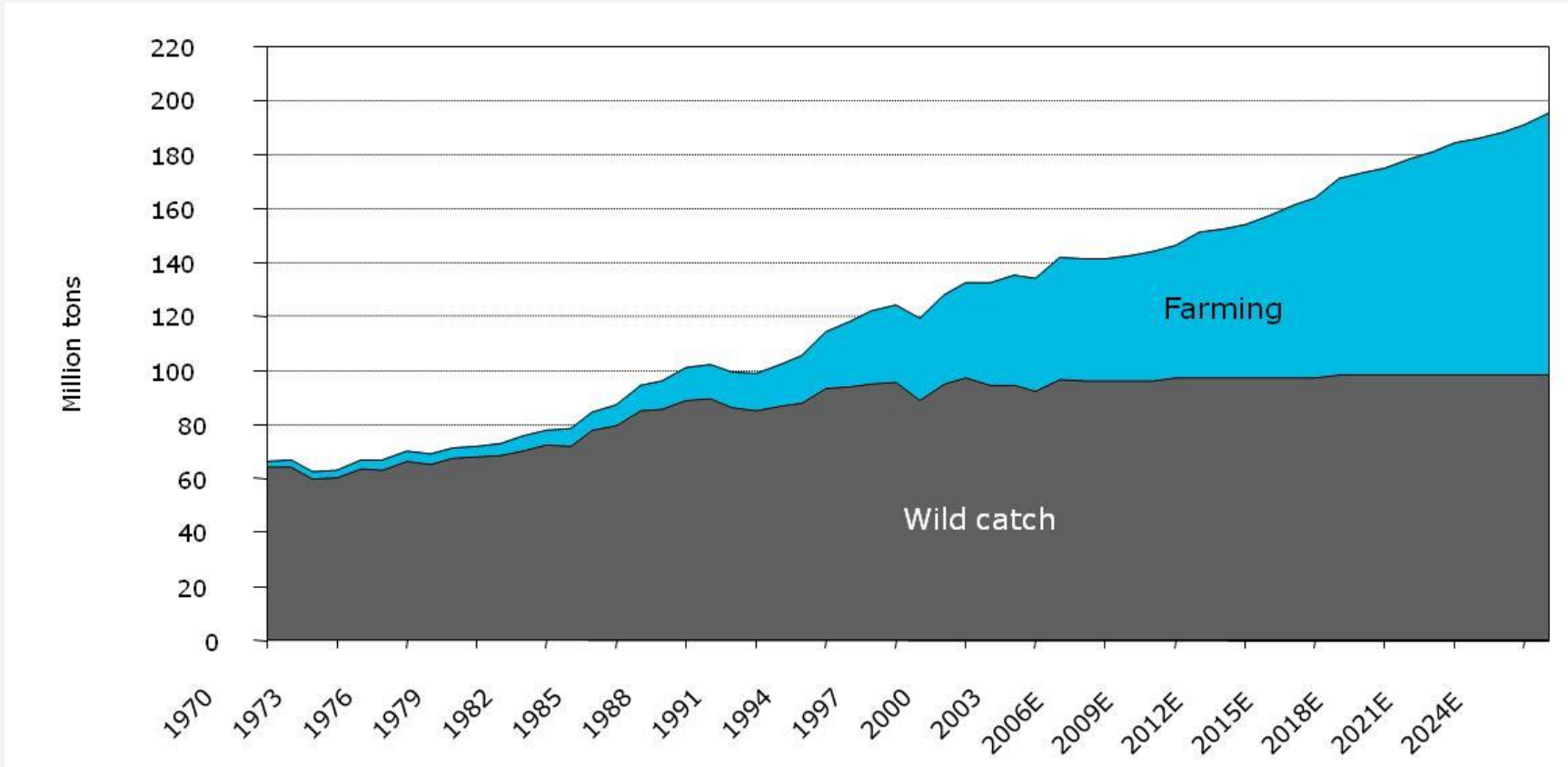


Software





# Aquaculture the only solution ....



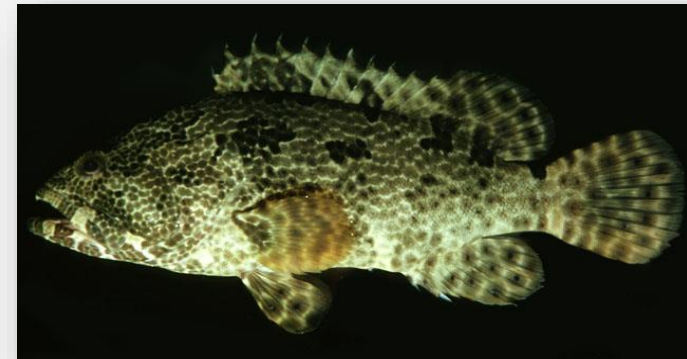


## Why RAS ?

- Optimal water temperature
- Optimal oxygen saturation
- Stable water parameters
- Bio-secure system
- Saves water
- Environmentally friendly



Yellowtail Kingfish



Tiger grouper

FISH TANK



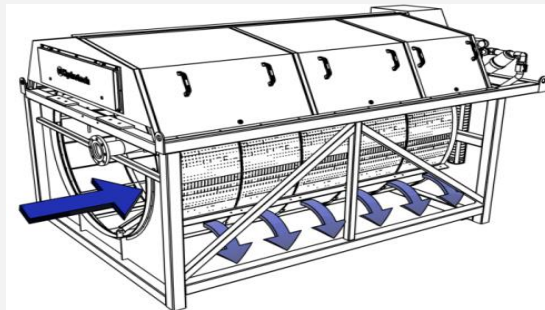
FISH



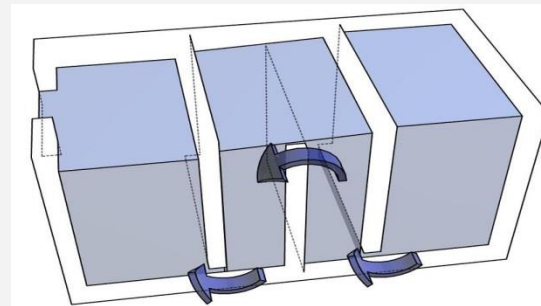
FISH FEED



- SOLID EXCRETIONS: Suspended solids (SS), Phosphor (PO<sub>4</sub>), Nitrogenous compounds (N-)
- DISSOLVED EXCRETIONS: Phosphor (P), Ammonium (NH<sub>3</sub>, NH<sub>4</sub>)
- GAS EXCRETIONS: Carbon dioxide (CO<sub>2</sub>), Nitrogen (N<sub>2</sub>)



MECHANICAL FILTRATION



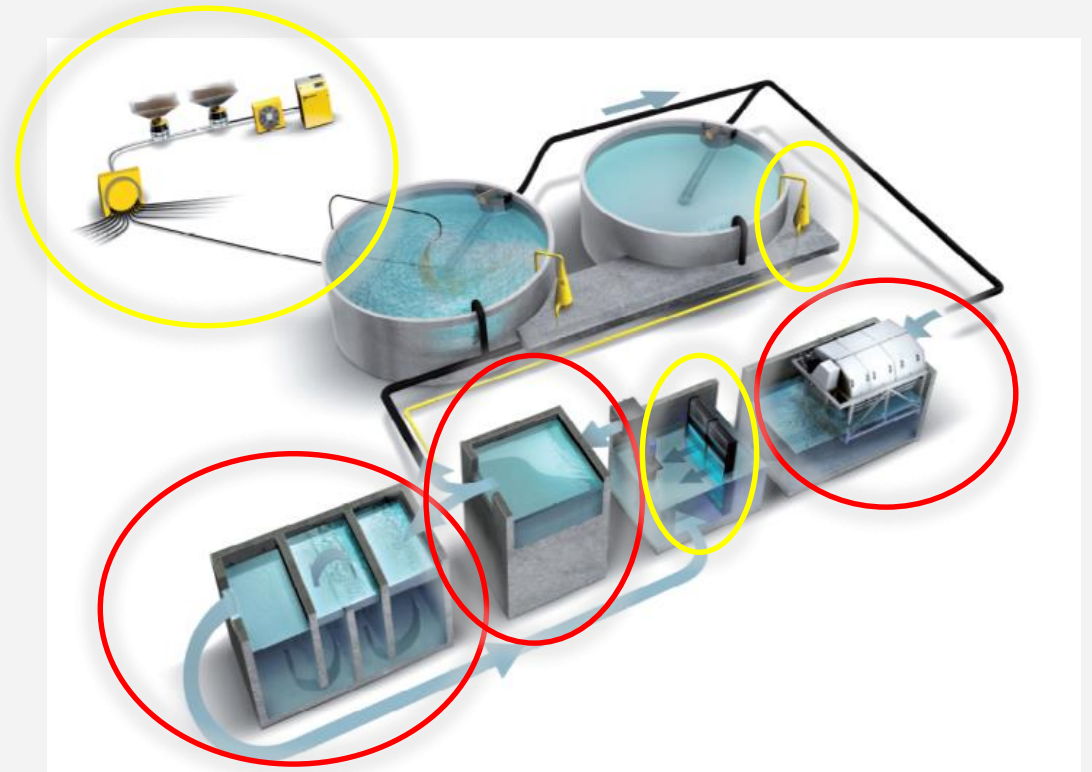
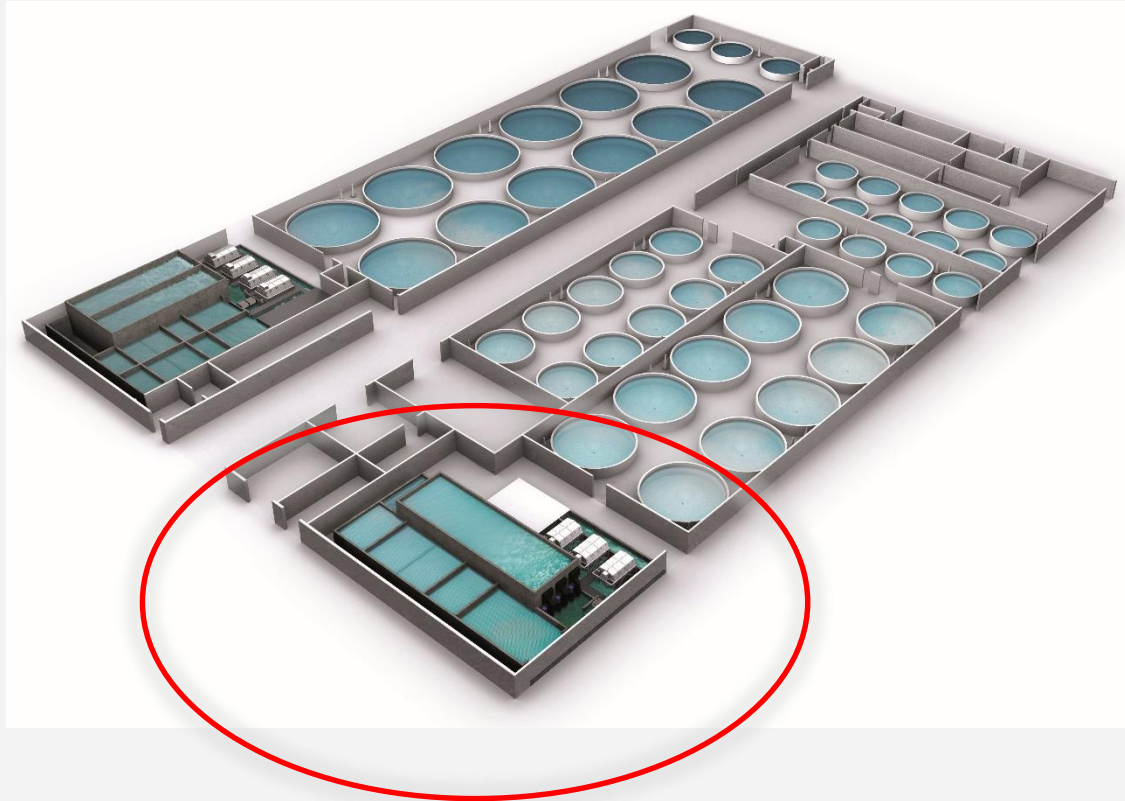
BIOFILTER



DEGASSER



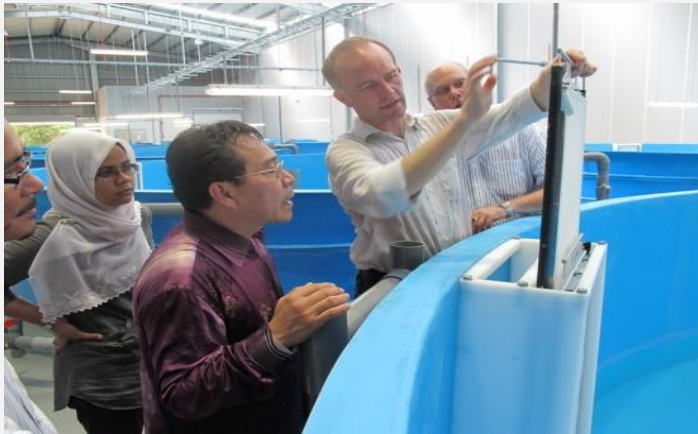
# The Recirculation Aquaculture System (RAS)





## Case: RAS Rompin Marine Hatchery, Malaysia

- Department of Fisheries Malaysia
- Goal to expand marine cage farming
- Securing sufficient numbers of fish fry
- 5 million fry per year – seabass, barramundi, grouper etc.







# Case: RAS Salmon smolt farming, Chile

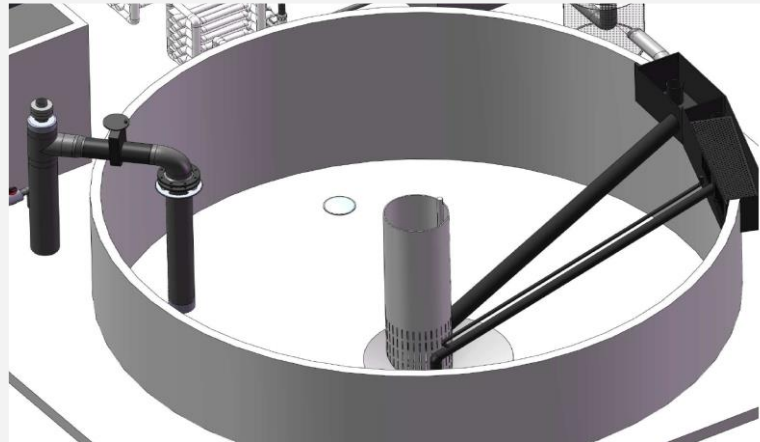
- Sealand SA, Puerto Montt
- Producing 12 million smolt per year
- All year round production
- Complete smoltification control





# Case: RAS Recirculation Shrimp farming, Thailand

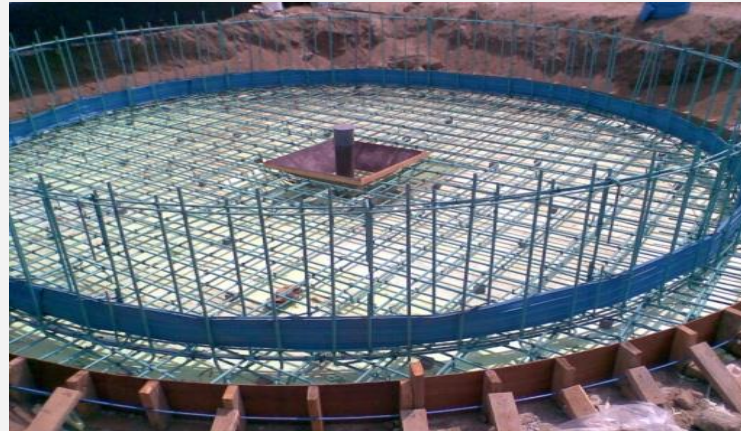
- The Charoen Pokphand Foods Co. Ltd. (CP), Thailand
- Bio-secure super intensive indoor shrimp production system
- Harvest output of 25 kg per m<sup>2</sup> per harvest
- Pioneering systems up and running





# Case: RAS National Prawn Company, Saudi Arabia

- Land based aquaculture expansion
- Greater Amberjack, Barramundi etc.
- Broodstock and Hatchery
- Nursery and Fry





# Case: RAS Bluefin Tuna farming, Australia

- The Stehr Group, Clean Seas Ltd., Australia
- Worlds 2.nd best invention 2009 by TIME Magazine
- Realization of production of Bluefin Tuna fry
- Fry transferred to ocean farming cages





## Case: RAS Danish Salmon, Denmark

- Saltwater recirculation
- Large salmon 4-5 kg
- 2000 tons per year
- 22 months to reach 4,5 kg





# Sheikh Khalifa Marine Research Centre, UAE

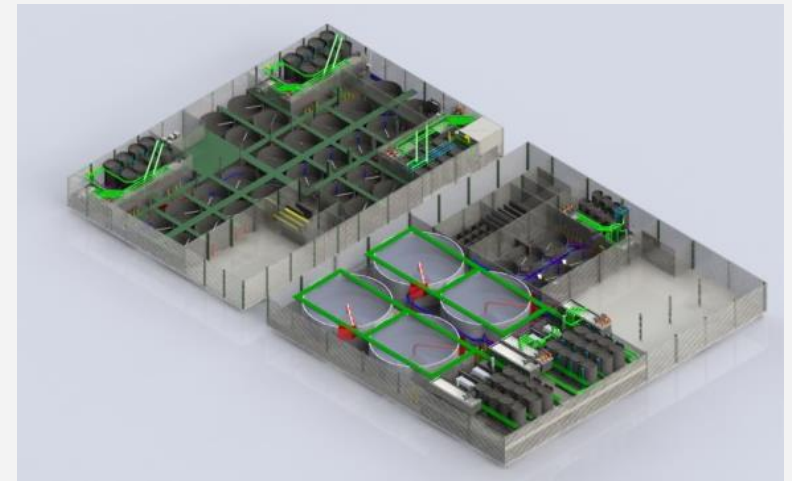
- Umm al-Quwain
- Mass production of marine fry
- Construction 2014 - 2015





# Fish Farm LLC, UAE

- Dubai
- Multi species marine production
- Construction 2015





# Fifax

- Finland, Åland
- 3200 ton Trout production pr. year
- Construction 2015 - 2016







# Neptun

- Norway
- 600 kg. feed pr. day or production for 4 mill. smolt
- Construction 2014 - 2015





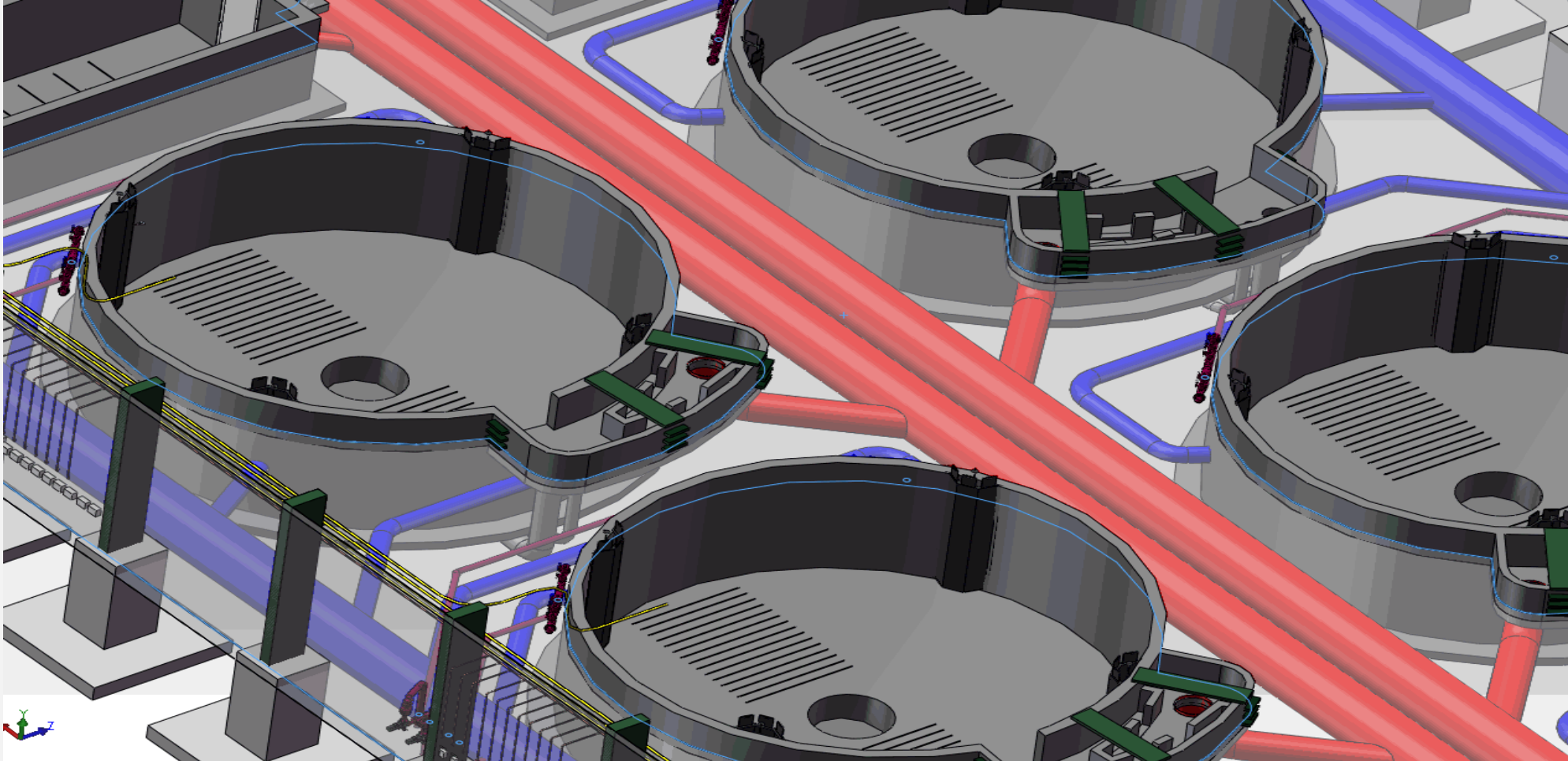
# Nord Norsk Smolt, Hasvik

- Norway
- Smolt production. 12 mill. Pr. year
- Construction 2015





# Tank room



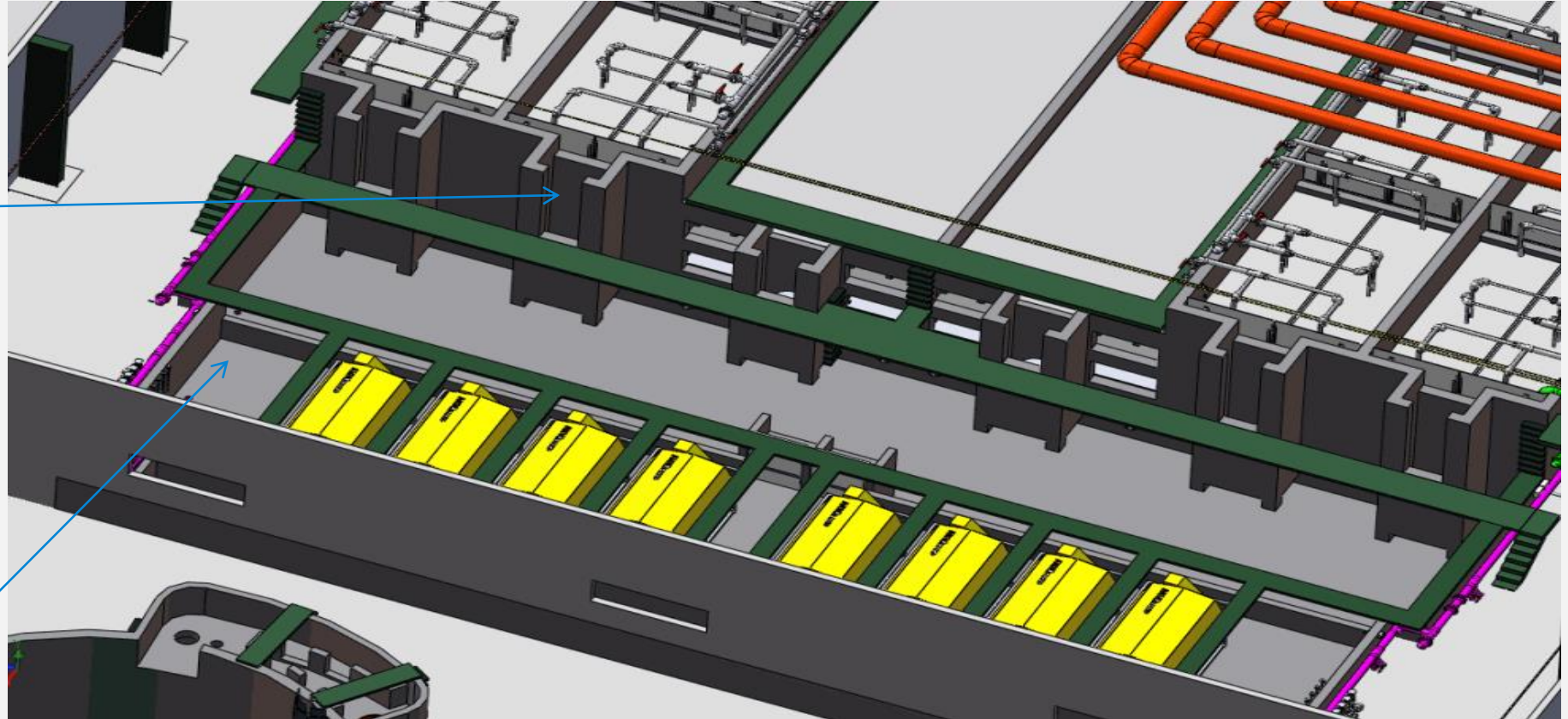
Shown with  
hidden floor



# Water treatment system

Easy access to the high efficiency lift pumps.  
To reduce the height of the building, knock-out panels for easy pump service are introduced

Room for extra drumfilter

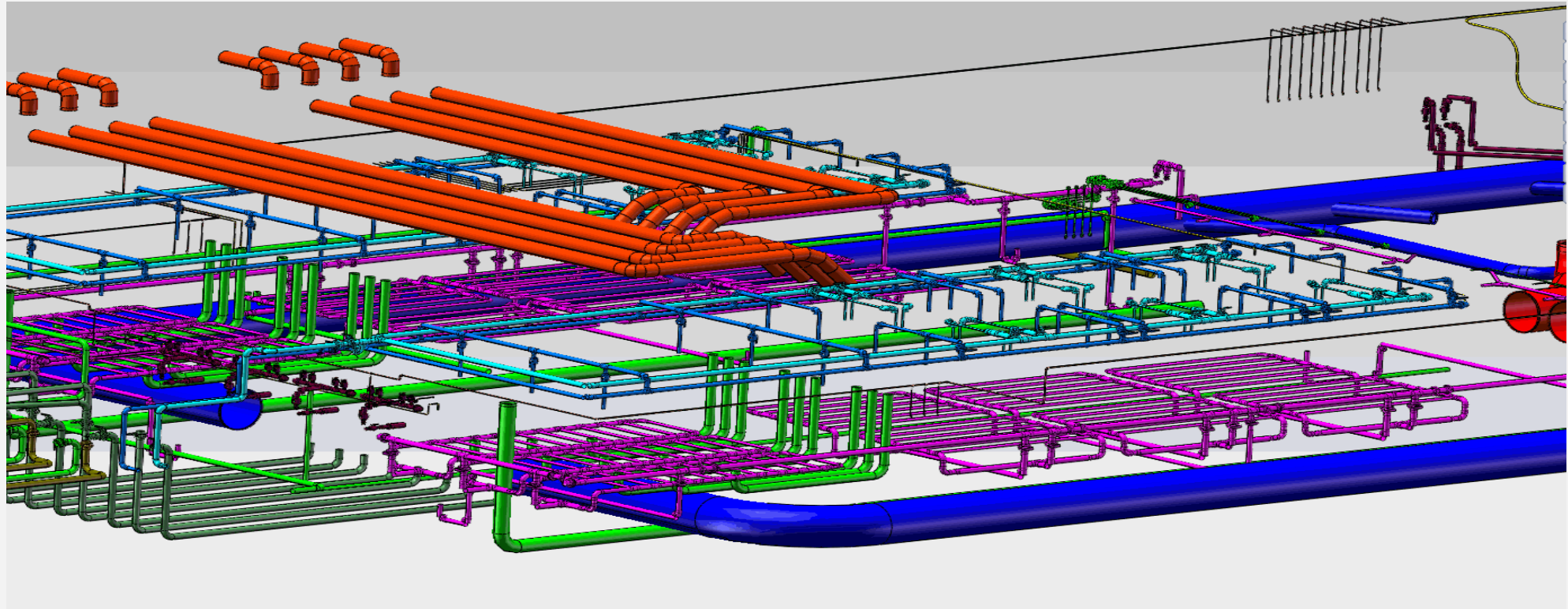




# Pipe system in WTS

Pipes for chillers, sludge, aeration, ventilation, oxygenation, microparticle filters and several other pipes.

Designed with as few fittings & bends as possible to reduce head loss and costs.





# Desktop and mobile Client



Desktop Client



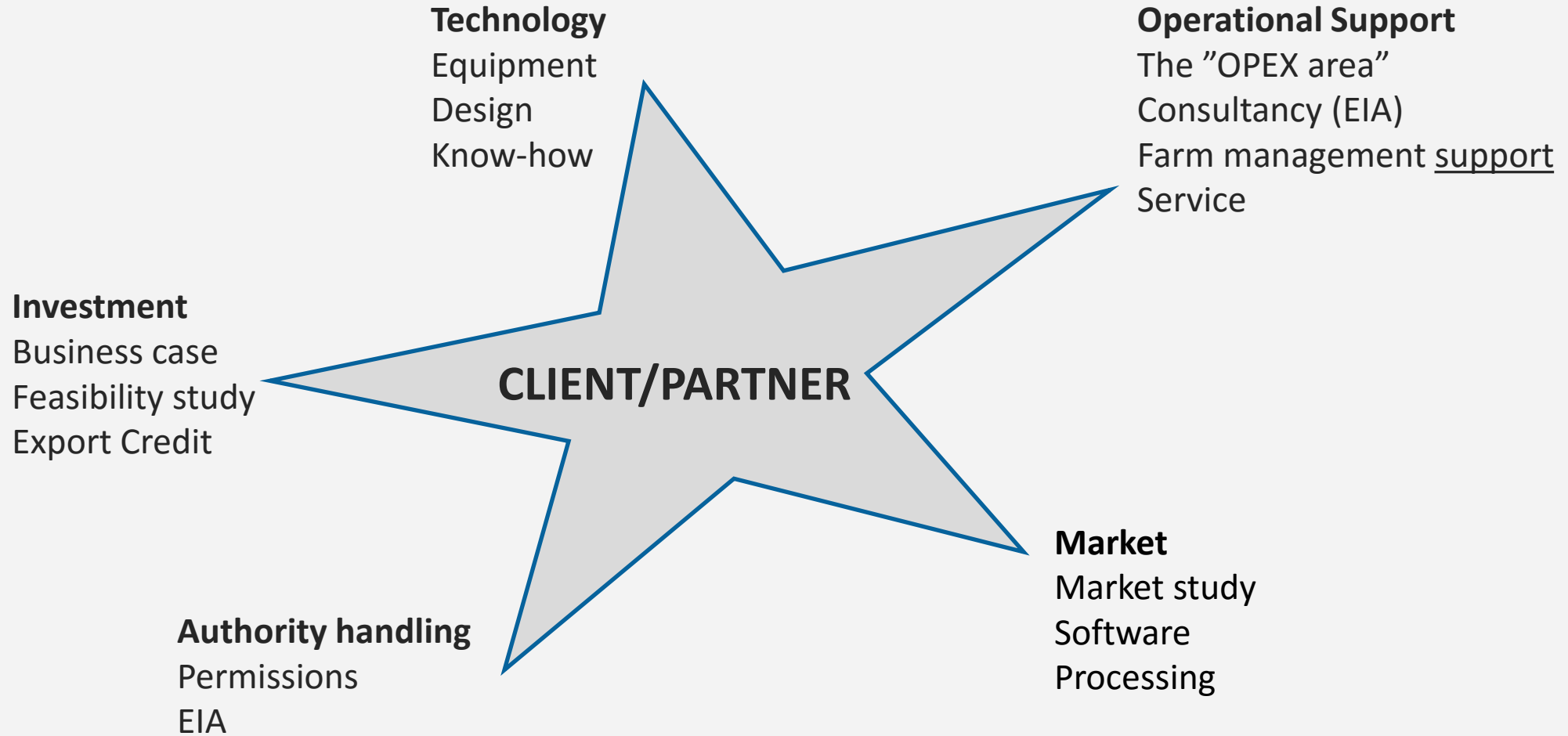
Mobile Client

Fast overview of the essential processes



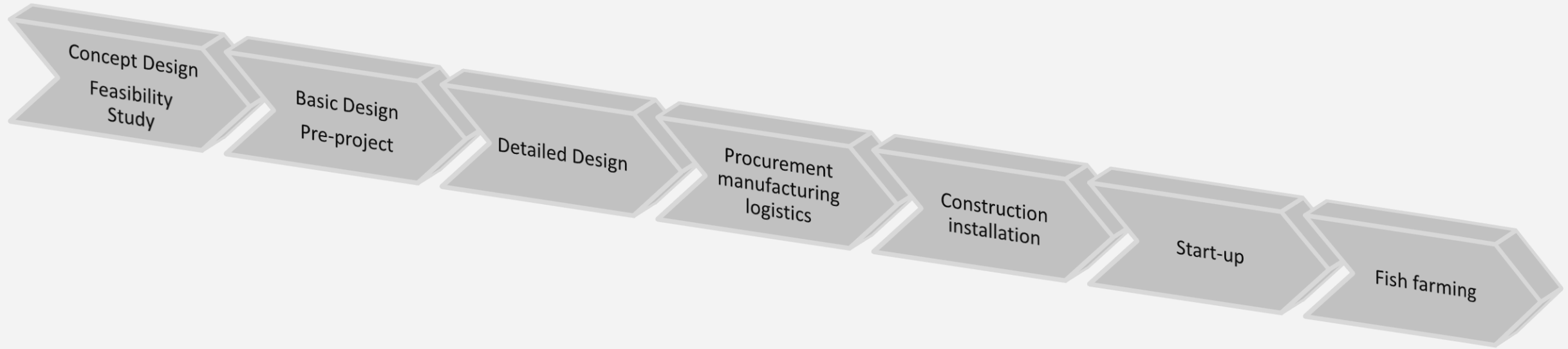


# Selling to Clients in the Global Market





# Working through the project



**Preparatory work is imperative!**





Thank you for your attention

