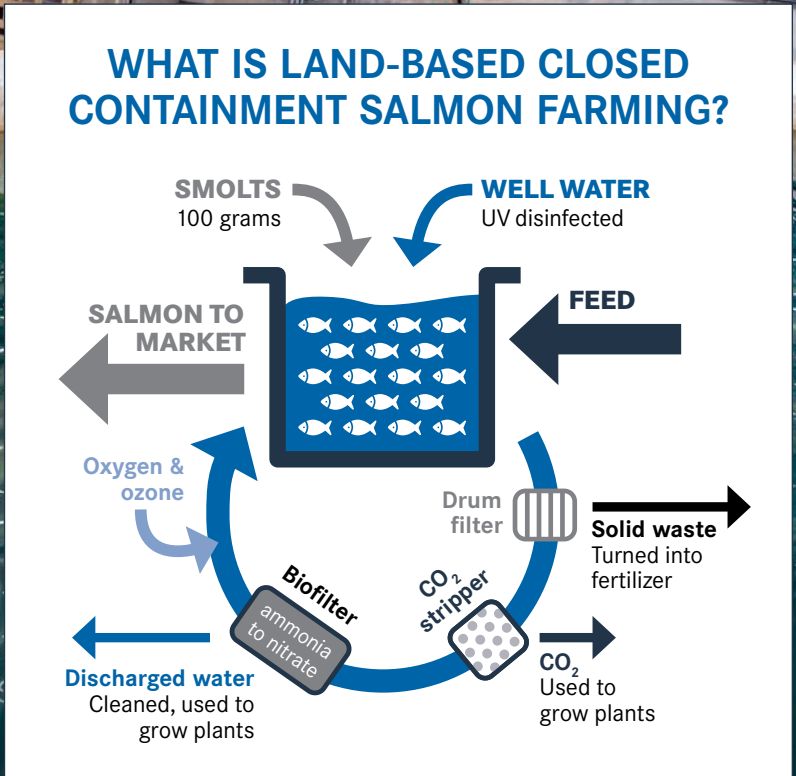


SALMON ON LAND: INVESTING IN A MULTI-BILLION DOLLAR FUTURE



The world is speeding towards a future of land-based, closed containment finfish farming.

The land-based salmon aquaculture industry is growing at a remarkable pace around the world, with land-based closed containment (LBCC) technologies using recirculating aquaculture systems (RAS) advancing dramatically in recent years. Egg-to-market facilities under a single roof are both technically feasible and economically viable. While LBCC developments do not promise a reduction in the wild fish used to feed carnivorous farmed species like salmon, these clean technologies can eliminate many of the ecological risks associated with sea-based open net-pen salmon farms. As net-pen operators face mounting costs related to feeds, disease, parasites and a lack of social licence, large-scale investors are pumping billions into massive land-based salmon production facilities. Canada's international fish farming competitors are leaving our 40 year-old net-pen industry in the dust.



SALMON GROWING IN A LAND-BASED AQUACULTURE TANK
photo: Tom Cheney



WHY LBCC AQUACULTURE HAS ENVIRONMENTALISTS EXCITED



Treated, recirculating facilities keep free-flowing waste products **out of the ocean.**



Water conditions can be closely monitored, **preventing the mass die-offs** that are common during periods of extreme temperature at sea^{1,2}.

Water filtration and segregated fish tanks means that **disease and parasite outbreaks** are **virtually eliminated.**



LBCC facilities can house farmed salmon **from egg to packaged product**, greatly reducing life cycle travel and fuel consumption relative to sea-based farming.



Grid power on land can mean a **vast reduction in fossil fuel resources** required to tend net-pens at sea.



Farms can produce **species more sustainable than salmon**, like basa, char or tilapia; these fast-growing omnivores require comparatively little wild fish in their diets.



WHY LBCC AQUACULTURE HAS INVESTORS EXCITED



The cost-per-kilogram for the production of LBCC fish has **plummeted to \$7-10**, attracting money from major banks and investment funds.



LBCC projects are increasingly designed to deliver **economies of scale.**



LBCC is expected to account for about **25 percent of global salmon production** by 2030⁵



Premium price points for seafood recommended by major ranking and endorsement programs like **Seafood Watch** and **Ocean Wise**



Over **one million metric tonnes** of *fully* LBCC production has been announced by developers in **over 20 countries**³

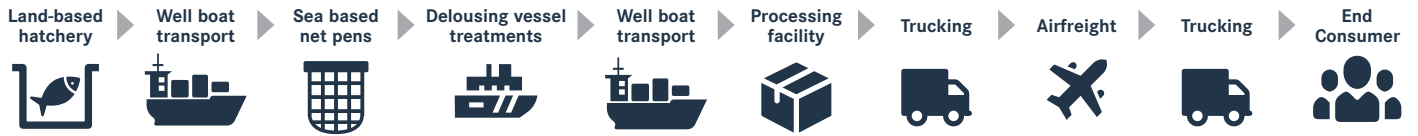


Ease of logistics and simplified supply chain

A single **project in Florida** is planning a phased development that will surpass the entire production of farmed Atlantic salmon in Canada with an anticipated **220,000 metric tons**⁴



TYPICAL CONVENTIONAL SEA BASED SALMON FARMING VALUE CHAIN



TYPICAL LBCC SALMON FARMING VALUE CHAIN



NUMBER OF PUBLICLY ANNOUNCED LBCC SALMON PROJECTS AS OF 2020



HOW CAN CANADA CAPITALIZE ON LBCC SALMON FARMING OPPORTUNITIES?

For LBCC aquaculture to flourish in Canada, a regulatory environment that both enables land-based systems and sets out clear provisions to phase out open net-pen farming will be required. Open net-pen operations allow companies to externalize the cost of pollution at the expense of ecosystems. This environmental cost, permitted due to inadequate regulation, is a market failure and undermines the competitive potential of cleaner, more responsible RAS projects by providing a de facto subsidy to pollutive industry.

“ In our view, RAS will disrupt aquaculture trade flows, supply chains, and the marketing of salmon within the next decade. ”

(Rabobank, 2019⁷.)

“ Production costs... are starting to converge as biological costs for sea-based [fish] farming increase and technological advances reduce land-based [fish farming] costs. ”

(DNB Markets, Deep Dive into Land-Based Farming, 2017⁶.)

HOW CAN WE ENSURE RESPONSIBLE DEVELOPMENT AND A TRANSITION TO CLOSED CONTAINMENT?

- ✓ Develop financial incentives for closed containment.
- ✓ Incentivize job creation and skill-building for LBCC projects.
- ✓ Develop clear environmental regulations:
 - Coordinate between federal and provincial jurisdictions;
 - Putting environmental assessment and licensing requirements in place;
 - Regulate fresh and saline water supply as well as effluent discharge requirements;
 - Adopt regulations on the sourcing and transport of finfish stock; and
 - Adopt regulations on the administration of medicines, therapeutants and pesticides at LBCC facilities.

THE IMPORTANCE OF PROVIDING ALTERNATIVE AQUACULTURE JOBS FOR COASTAL COMMUNITIES AND WORKERS IN THE SALMON FARMING INDUSTRY

Most importantly, Canada should develop and support a plan to transition workers in coastal communities into new aquaculture jobs in LBCC.



Arguments from the net-pen industry suggest land-based facilities would have to be located near large urban markets to be feasible, but this is not the case where domestic air and road transportation allow access to urban centres. We have already seen success stories where land-based salmon works in small, coastal communities, including at Cape d'Or and Sustainable Blue in Nova Scotia and at Kuterra in B.C.

WHY COASTAL COMMUNITIES MAKE GREAT LOCATIONS FOR LBCC INVESTMENT:

- Affordable land relative to urban areas
- Greater access to fresh and saline water
- Skilled workforce in areas where aquaculture is already taking place
- Processing infrastructure and supply lines already in place for aquaculture production

SEACHOICE IS CALLING ON THE GOVERNMENT OF CANADA TO TAKE ACTION

- 1** Incentivize a transition towards LBCC in rural and coastal communities, away from open net-pen aquaculture.
- 2** Hold open net-pen finfish farmers accountable for the cost of pollution through regulation and “polluter-pays” fees.
- 3** Develop a transition plan for workers currently employed at open net-pen sites

Open net-pen aquaculture gives rise to a number of well-documented, negative consequences for marine ecosystems and the health of wild fish populations^{8 9 10}. As the environmental and operational costs pile up, land-based salmon farming represents an opportunity for Canada to play a leading role in an emerging industry.

IT'S TIME TO MAKE THE TRANSITION AWAY FROM OPEN NET-PEN AQUACULTURE AND SUPPORT THE DEVELOPMENT OF CLEANER AND MORE RESPONSIBLE LAND-BASED AQUACULTURE INSTEAD.

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photo: Tom Cheney