

Reducing carbon emissions in the shrimp aquaculture supply chain

April 2022



The whiteleg shrimp aquaculture supply chain presents a clear opportunity for environmental organizations

2 kg

Volume of shrimp consumed per person annually in the US, greater than any other seafood



~50k Ha

Land area expected to be converted to shrimp ponds by 2026 in India alone to meet growing demand

13 kg

CO2 emissions per kg of shrimp produced in South Asia

There is a compelling sustainability and business opportunity to improve the carbon efficiency of whiteleg shrimp aquaculture



Market significance

- Whiteleg shrimp represents **54% of global farmed shrimp production** by volume
- **Demand is growing** at 9% p.a.
- Heavily exported to and **consumed in developed end-markets**
 - Most consumed seafood in U.S.
- Used in **mass market** frozen shrimp



Sustainability challenges

- **A top GHG emitter** among aquaculture species
 - Emissions are concentrated in feed and on-farm practices
- **Contributor to mangrove deforestation**¹
 - May be responsible for ~30-50% of mangrove loss in 1970s-1990s
 - ~240k Ha of mangroves converted to shrimp farms in last 20 years
- Often **low traceability** and transparency throughout supply chain



The opportunity

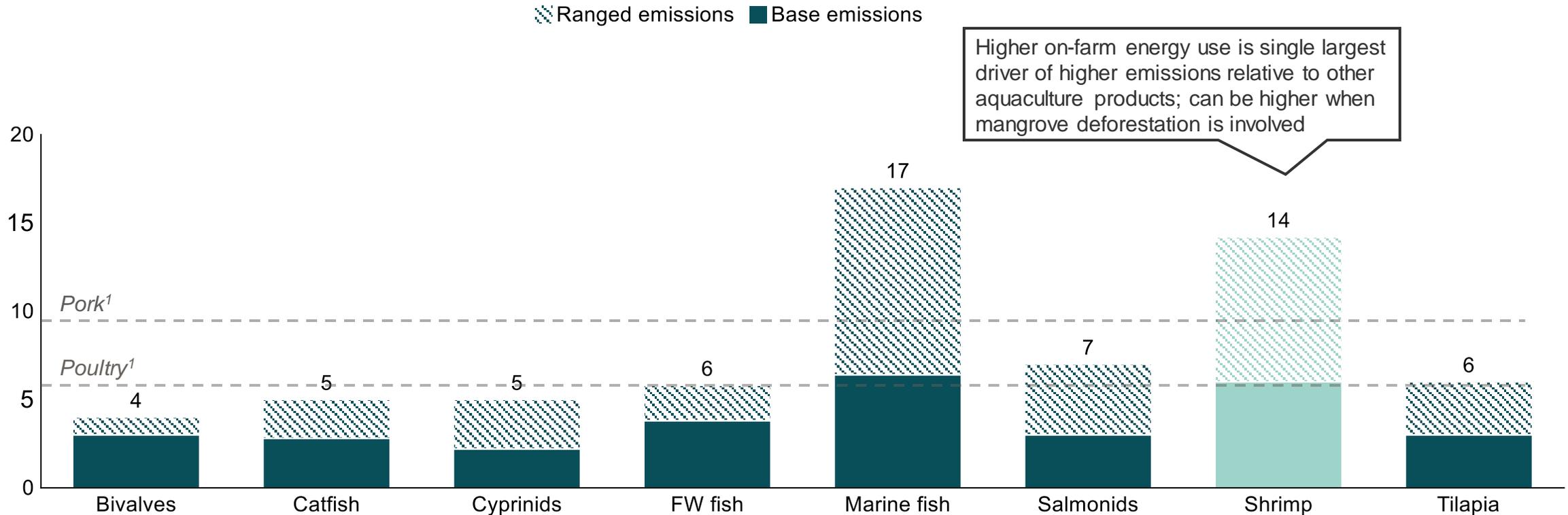
- **GHG emissions can be significantly reduced** by improving feed and on-farm practices
- **Multi-stakeholder engagement** model can align incentives and deliver value across the supply chain
- **Existing sustainability standards** can be **leveraged as a foundation**

The value chain has persistent challenges and is ripe for food system transformation

Challenge	Detail	UN Sustainable Development Goal
GHG Footprint	<ul style="list-style-type: none"> Emissions from feed, fertilizer, energy, on-farm N2O Mangrove deforestation 	
Water Quality	<ul style="list-style-type: none"> Waste, organic matter and saline levels impacting local waterways 	
Feed	<ul style="list-style-type: none"> Upstream overfishing for fish meal production Upstream soy production practices 	 
Disease Burden	<ul style="list-style-type: none"> Disease outbreaks lead to economic loss and waste Use of antibiotics 	 
Land Use	<ul style="list-style-type: none"> Local habitat clearing, including mangroves, wetlands, & mudflats 	
Transparency	<ul style="list-style-type: none"> Lack of transparency and traceability throughout value chain 	
Labor Issues	<ul style="list-style-type: none"> Use of exploitive labor practices, particularly upstream in feed value chain 	

The shrimp value chain has a high GHG footprint among aquaculture categories

Emissions intensity (kgCO₂e/kgCW)²



Source: ¹Reducing food's environmental impacts through producers and consumers, Science 2018; ²Quantifying greenhouse gas emissions from global aquaculture, Nature 2020

Current industry standards don't yet address GHG footprint in shrimp aquaculture, presenting an opportunity to further build on existing certifications

Attributes				Gaps in standards
Emissions	Overall GHG footprint	⊗	⊗	No GHG efficiency standard*
Water quality	Waste discharge, chemical measurement, stages measured, settling basins	☑	☑	No specific waste disposal requirements; No net neutral impact on water (is included in SSP)
Feed	Ingredient declaration, FMFO ¹ standard, fishery traceability	☑	☑	Trace ingredients (≤2%) do not need to be declared
Growth, survival, & disease	Post-larvae limits, SPF or SPR PL use ² , biomass limit, medical treatment, disease response	☑	☑	No standard biomass limit/ratio; No mandatory SPF/SPR sourcing; No specific biosecurity plan requirements
Land use	Land assessment, protected areas, mangrove land, grandfather clauses	☑	☑	No specific restoration maintenance standards
Transparency	Traceability throughout the value chain (hatchery to consumers)	⊗	☑	No traceability / transparency into feed ingredients
Labor & community	Labor standards, community development initiatives	☑	☑	Audits do not ensure community relations standards are continually enforced

Legend	
 Covered	 Not covered

Note: *Standards for GHG emissions for aquaculture projects are being considered by BAP and ASC; (1) – Fishmeal and fish oil; (2) Specific pathogen free or specific pathogen resistant post-larvae
Source: ASC & BAP websites as of Dec. 2021

Shrimp aquaculture presents a compelling opportunity for change

1 It presents a carbon challenge that *can be mitigated* with existing tools

2 It could *create significant value* for players across the value chain



Farmers

Premium / Higher-value product
Higher yield & lower disease risk
Higher & more stable income



Processors

Stronger partnership with retailers
Higher margins



Retailers

Greater consumer traction
Greater transparency, upstream
visibility & surety of supply
Higher margins



Regulators

Higher volume & value exports
Position as a sustainability leader
in industry

3 Acting quickly offers a *first mover advantage* to position as an industry leader

Carbon emissions can be reduced across the supply chain through improvements to feed, on-farm practices, and habitat protection

Sustainable, Low-Carbon Feed

- 1 Source **deforestation free soy**
- 2 Develop upstream partnerships to develop & source **regenerative soy**
- 3 Develop upstream partnerships to develop & source **responsibly-caught fishmeal**
- 4 Collaborate with start-ups for **alternative feed inputs** (e.g., insect meal, seaweed, etc.) to reduce use of fishmeal and soy

Sustainable Farming Intensification

- 5 Deploy improved **water quality management** systems and testing
- 6 Improve **pond infrastructure** (e.g., settling ponds, pond structure, and pond liners / center drains)
- 7 **Improve feeding practices** to reduce feed waste and improve productivity
- 8 Deploy **aeration technologies** to reduce energy use and improve oxygenation

Habitat Protection

- 9 Protect critical habitats through **conservation** programs
- 10 Develop **mangrove and wetland restoration** programs to further offset carbon-impact

Leverage existing BAP / ASC standards as a foundation

Maintain robust standards & monitoring to mitigate labor issues

Maintain robust traceability & compliance across the value chain

The Nature
Conservancy

