

Energy demand and GHG emissions in the Swedish fishing sector

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Sustainable Food Production

Past experiences from SIK..

- Swedish fisheries (Baltic cod, *Nephrops*), Norwegian seafood products, Senegal artisanal/industrial shrimp fisheries
- Fishing phase dominates the life cycle of the product
- Transport mode important, not distance
- Stock status and gears important components to energy use in fisheries
- Cooling agents
- Energy intensity as a sustainability indicator not universal

...management matters!



Example: Gear matters

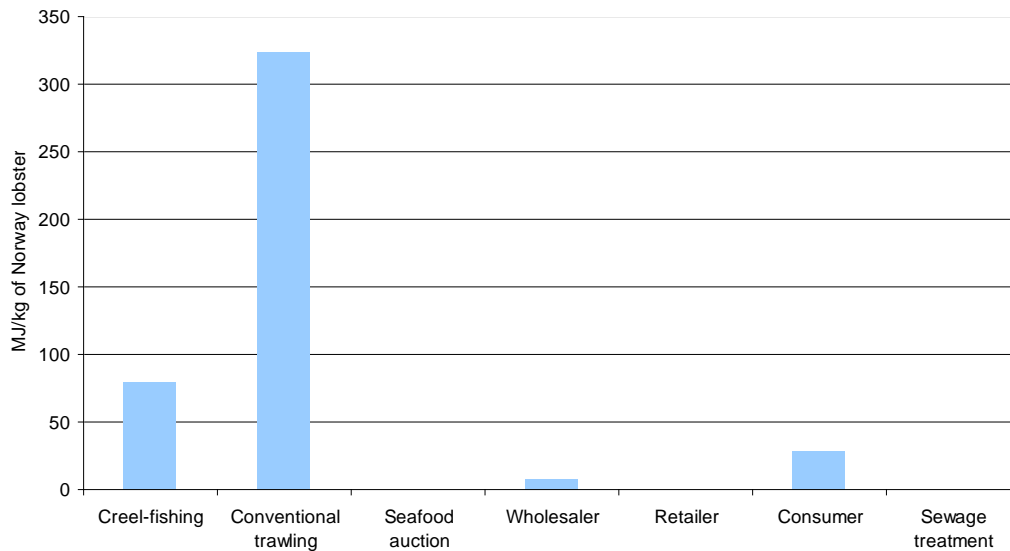
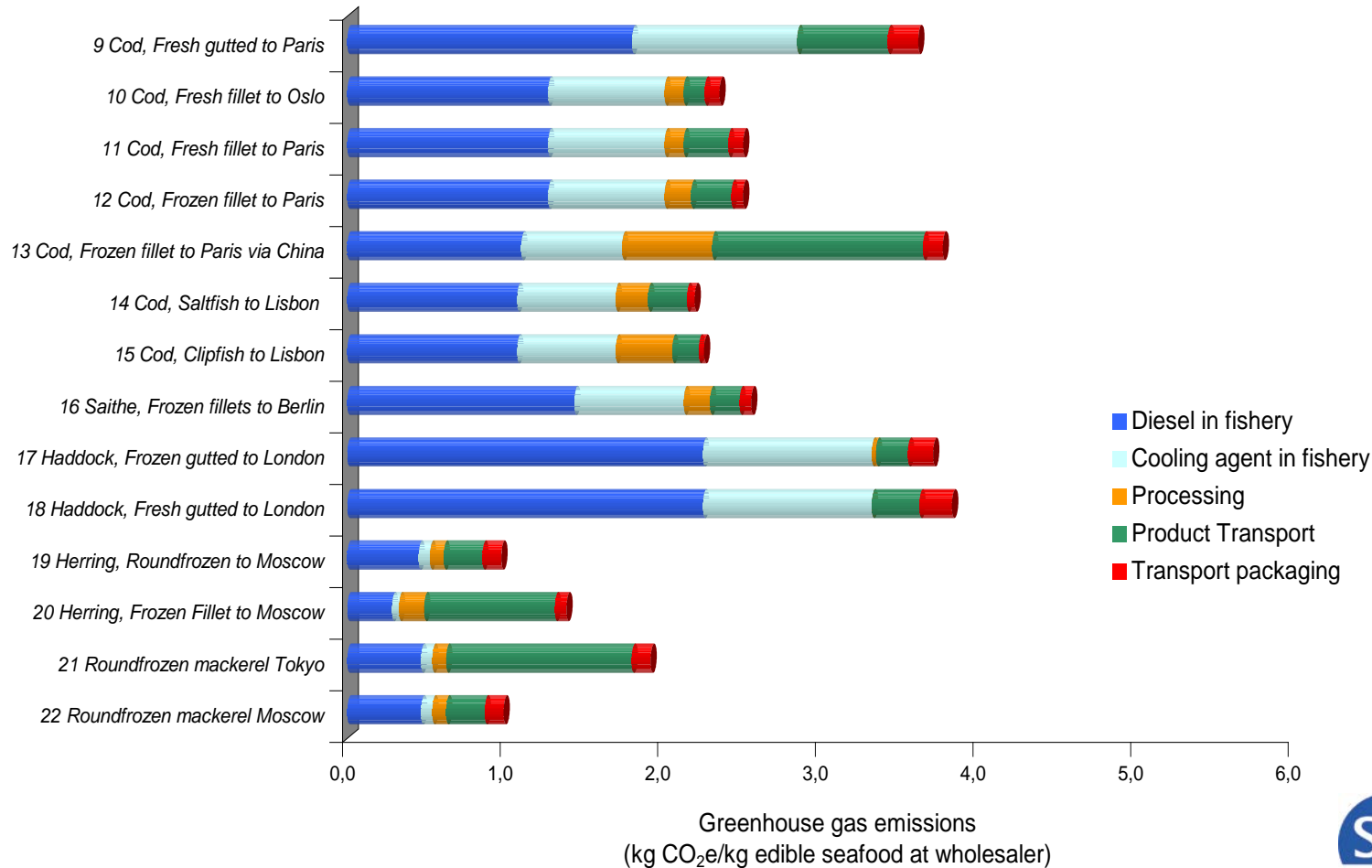


Photo: Therese Jansson

Ziegler & Valentinsson, 2008

Cooling agents: Norwegian seafood products



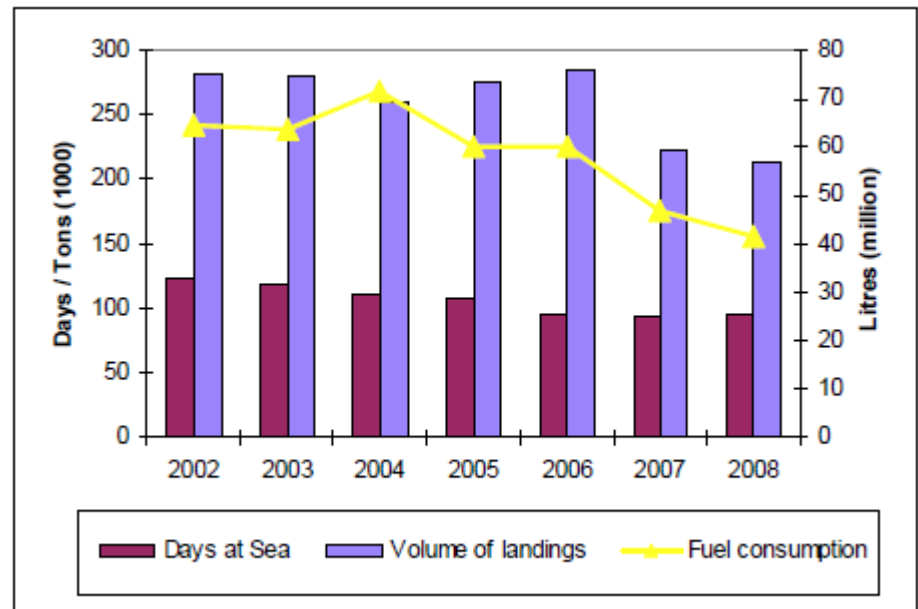
Present work at SIK

- Evaluation of fisheries management using an LCA approach (Swedish Research Council Formas, OECD)
- Simplified key performance indicators for the industry on a batch level (WHITEFISH)
- Expanding LCA methodology to cover biological impacts (LC IMPACT)



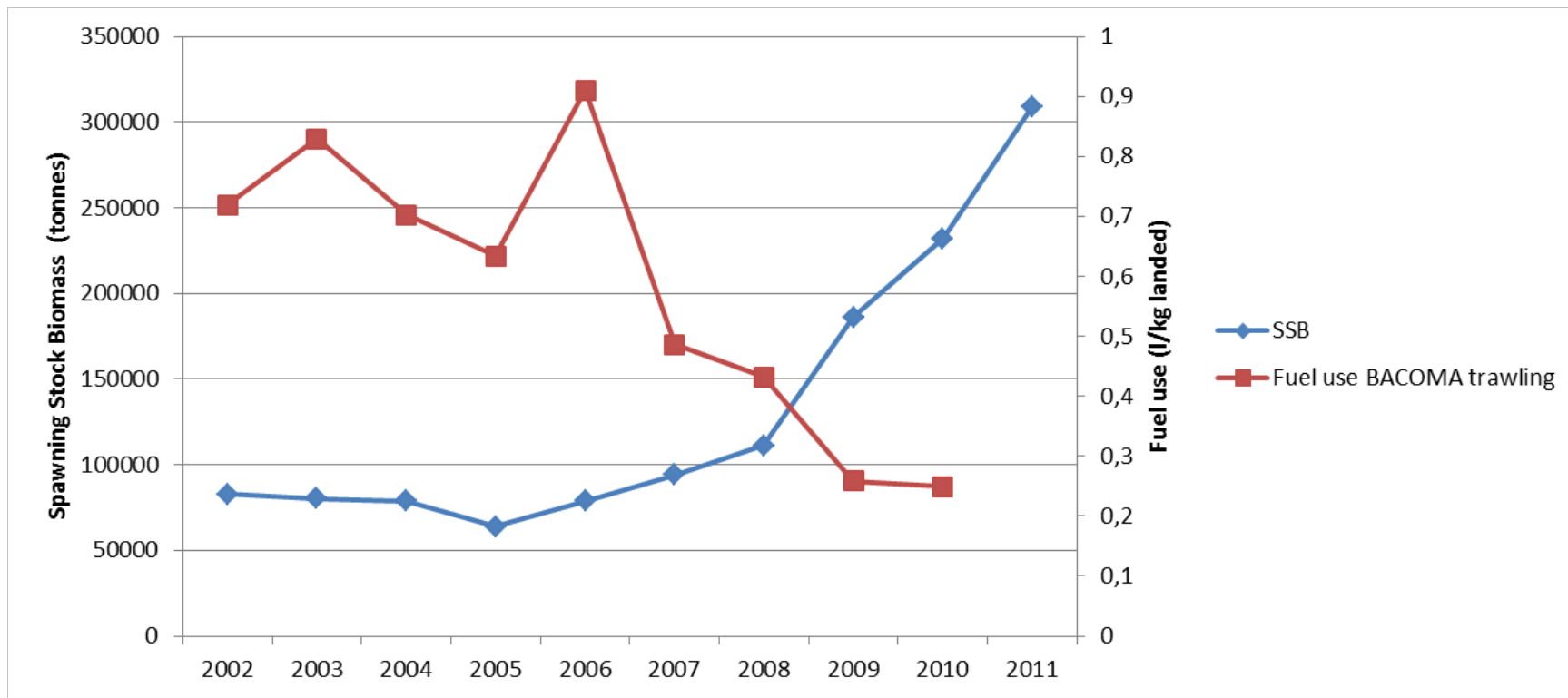
Swedish fisheries

- Top three species by volume: herring, sprat & cod
- Around 1100 active boats (mainly vessels under 12 m)
- Development towards dominance of industrial fisheries
- Price of fuel doubled 2002-2008, fuel use halved since 2004
- Reduced days at sea/TAC and scrapping incentives
- In 2010: Total landings 205 000 tons using 34 000 m³ fuel
- Import of seafood increase



From JRC, 2010

Stock size matters: cod trawling in the Baltic

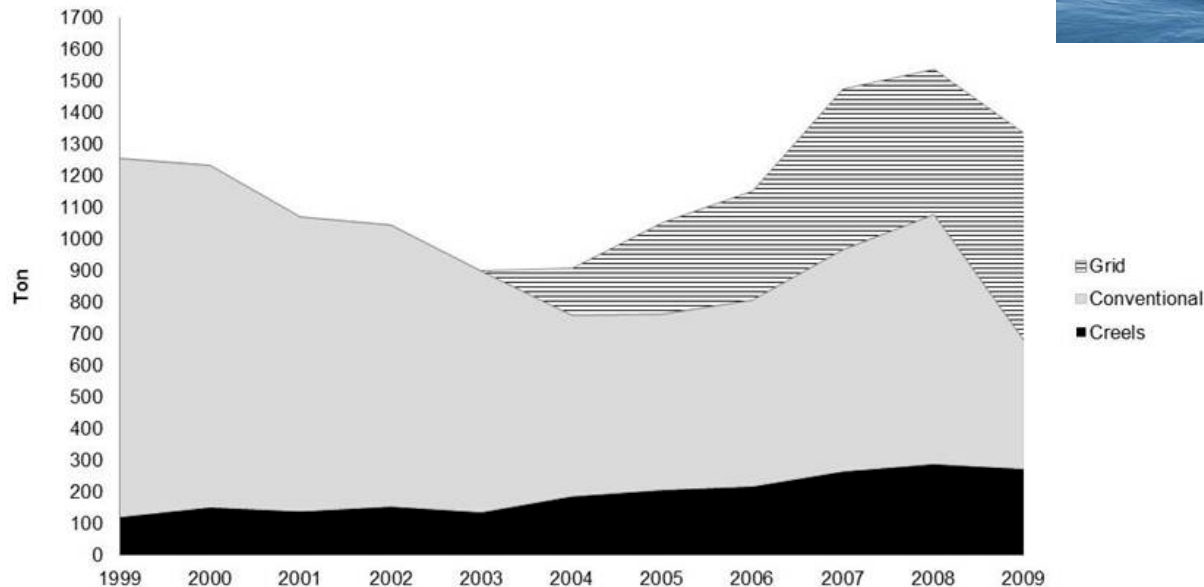


Ziegler & Hornborg, *submitted*

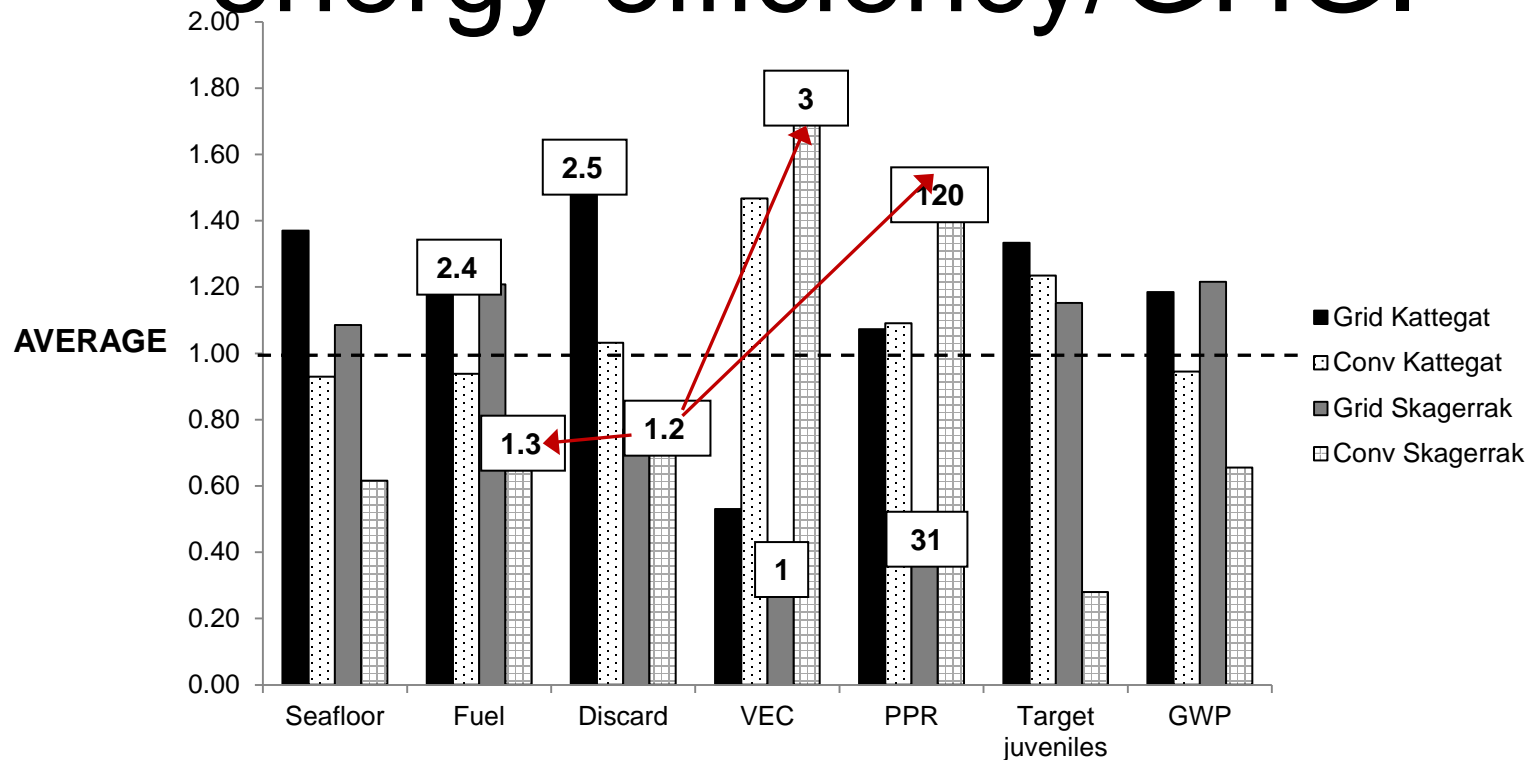
...but the path towards rebuilding matters...



**Norway
lobster**
*Nephrops
norvegicus*



...if to avoid trade-offs in terms of energy efficiency/GHG.

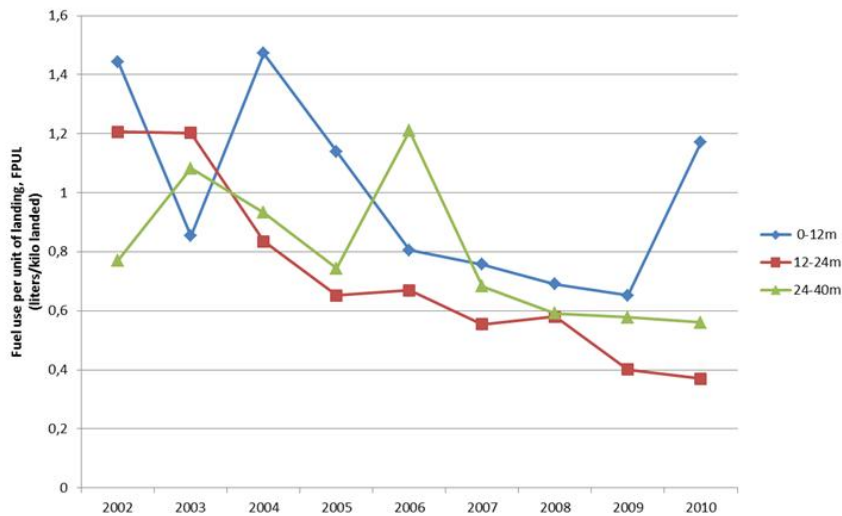


VEC: Threatened fish (IUCN Categories & Criteria) in discards

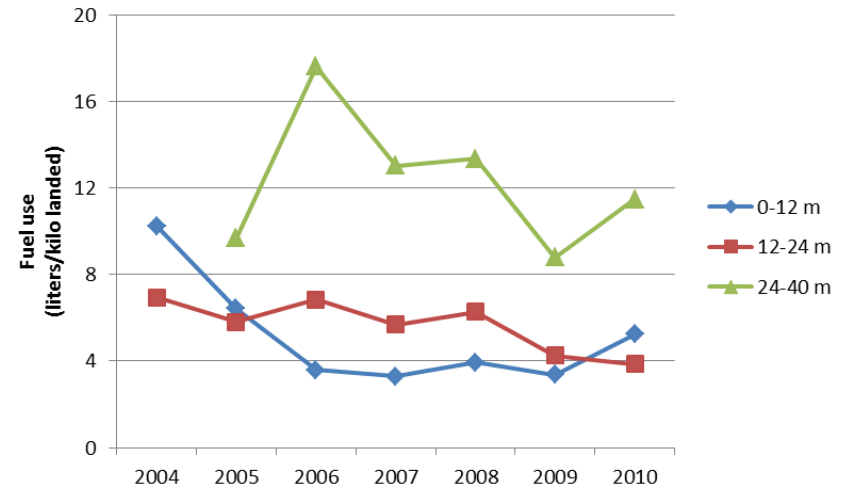
PPR: Primary Production Required from discards



Vessel size: Some improvement potentials

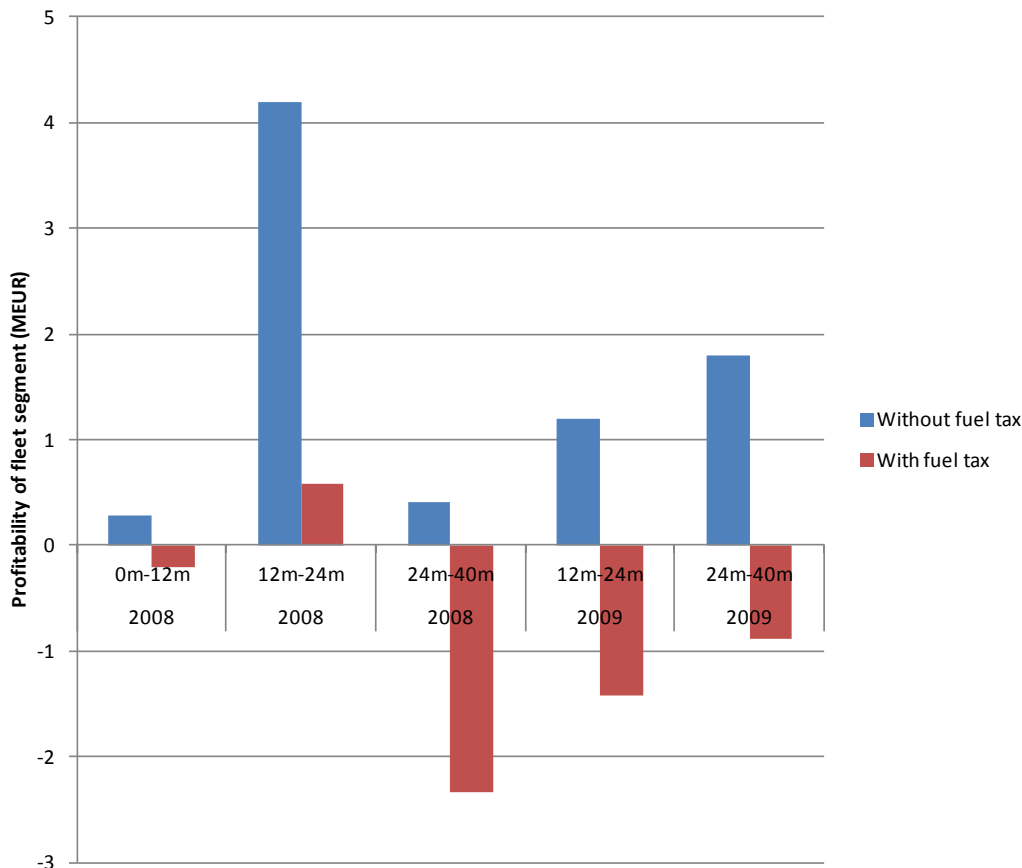


Small difference in fuel per kilo landing...



...unless selective trawling is proposed.

Impediments for development of fuel efficiency: demersal trawling



Ziegler & Hornborg, *submitted*

Conclusions: GHG mitigations

- Integrated perspective on management decisions
- Reduce overcapacity
- Subsidies impedes transitions
- Initiate increased data collection on fuel
- Phase out harmful cooling agents
- Careful considerations of fuel demand with increased selectivity



Policy areas: Sustainability in a broader perspective

- Selective fisheries already criticized^[1]...GHG perspective?



[1] Zhou *et al.*, 2010; Garcia *et al.*, 2012; Steneck *et al.*, 2011