Ministry of Food, Agriculture and Fisheries of Denmark
Department

Danish responses to climate change

- Fisheries and aquaculture

Henry Damsgaard Lanng
Chief Advisor
Ministry of Food, Agriculture and Fisheries

Joint NMTT-ICES Workshop
launching the
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Priorities for scientific research and state funded projects

- A brief overview with examples

The Danish Ministry of Food, Agriculture and Fisheries has a framework contract with the National Institute of Aquatic Resources (DTU Aqua)

- and for economy related issues with the Department of Food and Resource Economics (IFRO) at Copenhagen University

The services to the Ministry from DTU Aqua in relation to fisheries and aquaculture are targeted at the following focus areas:

1. Commercial fishing
2. Aquaculture
3. Recreational fishing
4. **Climate adaptation and environmental effects**

In 2019
the Ministry of the Environment and Food, together with DTU Aqua, Copenhagen University (and Aarhus University),

decided to prepare a roadmap of research efforts for the research-based government service to support core challenges regarding environment and food production in the period up to 2030

including especially climate change nationally and internationally.

Research priorities in the field of fisheries in Denmark in relation to the

reduction of climate impact:

- Fuel efficiency
- Life Cycle Assessment (LCA) for fish and fish products.
- Use of marine protein sources (blue biomass) as an alternative to meat.
- Strengthening and maintaining the ocean's ability to absorb and store CO2
- Holistic climate adaptation solutions that take into account vulnerable landscapes, habitat types and landscape interests across efforts

Research priorities in the field of aquaculture in Denmark in relation to the

reduction of climate impact:

- Energy efficiency
- Life Cycle Assessment (LCA) for fish and fish products
- Climate-friendly breeding and purification technology for aquaculture
- Alternative raw materials for feed production and recycling of residual products
- Sustainable and innovative aquaculture production with a focus on animal welfare and environmentally and climate-friendly fish farming on land
- Genetic improvement of fish breeds with increased resource efficiency, health and less environmental impact
- Development of marine aquaculture with a low CO2 footprint and reduced environmental impact.

Research priorities in Denmark in relation to

climate adaptation:

- Research into fish stock changes and fisheries.
  - changes in production for different populations (including invasive species) as well as their interaction
  - knowledge of future changes regarding different life stages of stocks
- Research into climate effects on biodiversity and the environmental status of ecosystems

Through the national and state funded

Green Development and Demonstration Programme (GUDP)

a green transition of the Danish food sector is promoted.

GUDP covers the value chain from primary production over food processing to retail.

Budget: +185 million DKK per year.

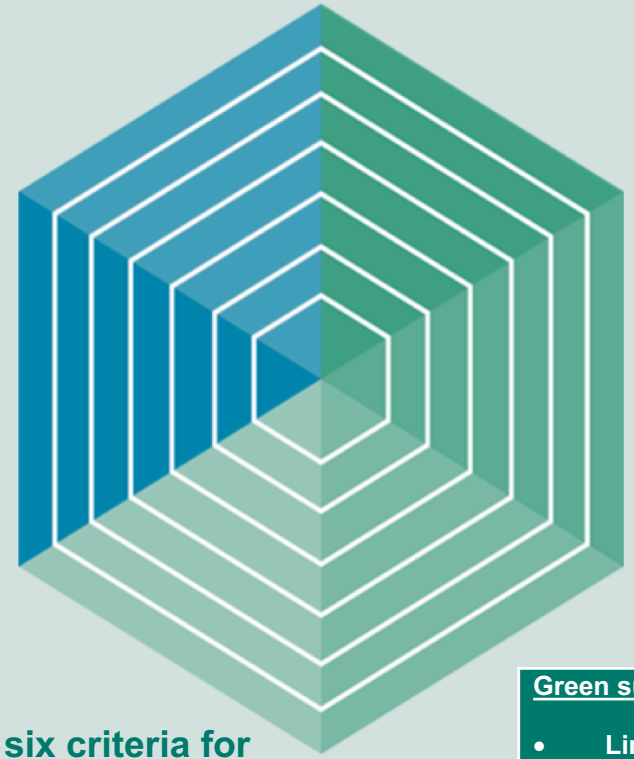
Since the start in 2010 GUDP has funded more than 500 projects with in total approximately 2,5 billion DKK.

GUDP's beneficiaries are farmers, fishermen, enterprises, organizations, researchers/universities.

GUDP's 'spiderweb' – Criteria for Green and Economic sustainability

GUDP is designed to motivate the applicants to cooperate in order to ensure growth and at the same time address crucial challenges facing society and the Danish food sector.

GUDP has defined the challenges and the applicants are encouraged to identify the required solutions.



GUDP's spiderweb shows six criteria for Green and Economic sustainability that are used to prioritize the applications.

Four are about green sustainability and two are about economic sustainability:

Green sustainability:

- Limited impact on the environment from nutrients (N and P), pesticides and greenhouse gasses
- Food safety and -quality, human health and nutrition
- Sustainable use of resources
- Sustainable animal production

Economic sustainability:

- Project proceeds
- Further financial impact

Examples of GUDP projects within fisheries with focus on reducing the impact on the climate.

1. **Steerable trawl doors that reduce sea bottom contact and improve fuel efficiency**

    - Development of a patented steerable trawl door that can be used in both pelagic and demersal fisheries.
    - Reduced fuel usage, reduced seabed impacts and decrease of greenhouse gas emissions.
    - The applicant estimates that the use of MLD steerable trawl will reduce CO2 emissions by 10-12 percent per vessel. It gives in average a reduced emission of 334 tons CO2/vessels.

Examples of GUDP projects within aquaculture with focus on reducing the impact on the climate.

2. UV-based advanced oxidation technology to improve water quality in Recycled Aquaculture (UVOXiRAS)

- The overall aim of the project is to minimize purging time in tanks as well as minimize overall geosmin* occurrence in RAS, additionally the project evaluate on UV desinfection and effects on larval and juvenile fish physiology and welfare.

- The applicant expects a reduced emission of CO2 as a result of the minimized purging time. Less water must be pumped around and heated. The applicant estimates that the reduction will be 116 kg CO2 / tons of fish.

*Geosmin are naturally occurring compounds that are commonly found in the fish production of RAS (Recirculating Aquaculture Systems). Both substances accumulate in the fat tissue of the fish which can lead to a muddy taste from the fish, which is not attractive for the buyers

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Thank you!

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