

Tillaga að verkefni á nýjan vegvísi um rannsóknarinnviði 2025

**Titill verkefnis: Þörungum kjarni - an Algae center
Developing state of the art facilities for future of algae research and
innovation in Iceland**

**Heiti stofnunar: Hafrannsóknastofnun, Háskólinn á Hólum,
Landbúnaðarháskóli Íslands, Háskóli Íslands, Matís, Breið þróunarfélag
and Gleipnir nýsköpunar og þróunarsetur**

Vinsamlegast hafið eftirfarandi atriði í huga við gerð tillögunnar

Umsækjandi þarf að svara öllum liðum hér að neðan. Þar sem stendur „Texti“ er hægt að skrifa texta, setja inn myndir eða töflur.

Tillögum að innviðum á vegvísi um rannsóknarinnviði skal skilað á þar til gerðu eyðublaði. Ekki er leyfilegt að eiga við uppsetningu eyðublaðsins.

Skjalið „Tillaga að innviðum á vegvísi um rannsóknarinnviði“ skal að hámarki vera þrjár blaðsíður, auk forsíðu, eða samtals fjórar blaðsíður. Nota skal leturgerð og leturstærð eins og stillt er í eyðublaðinu, þ.e. 11 punkta Calibri (body). Ekki er leyfilegt að breyta breidd spássíu eða breyta fyrirsögnum í eyðublaðinu. Umsókn skal senda inn sem PDF-skjal.

Festur til að skila inn tillögum er til 12. september 2024, kl. 15.00.

Nánari upplýsingar er að finna á [heimasíðu Innviðasjóðs](#) og hjá sérfræðingum Innviðasjóðs hjá Rannís í gegnum tölvupóstfangið innvidasjodur@rannis.is

Lýsing á tillögu til birtingar á heimasíðu Innviðasjóðs

1. Samantekt: Stutt lýsing innviðum

Algal research and innovation initiatives are rapidly advancing both in Iceland and internationally. We propose developing infrastructure to support the future growth of algal research and innovation in Iceland. The aim is to establish a research center for studies on both macro- and microalgae (Algae center). The members of the Algae center will share access to existing infrastructure and enhance it with cutting edge facilities for algal research in Iceland. Currently, Iceland lacks the foundational infrastructure needed for early-stage research, such as establishing algal cultures and preparing materials for research and innovation. Existing resources are limited and dispersed across various institutions. The Algae center will establish a general-purpose lab facility for isolation, cultivation, identification, and small scale biomass production for further analyses. In addition to the establishment of the research facilities the participating institutes in the Algae center will further expand their infrastructure through the Algae center roadmap. Such as experimental set ups, equipment for upscaling, chemical analysis, genetic analysis and advanced microscopy. In a changing world, archiving is a crucial strategy for saving biodiversity, to preserve genetic, species, and ecosystem diversity. The long term goal of the Algae center is to establish a collection of microalgae cultures, a seed collection and an herbarium for macroalgae, and cryostorage for algal strains and seeds. The planned infrastructure will be a part of Hafrannsóknastofnun Grindavík Research Center and Matís' Icelandic Strain Collection and Records (ISCAR). The joint laboratory facilities of the Algae center will be housed by Breið Innovation Center in Akranes, with Hólar University establishing an algae lab in the north, and universities in the western and capital regions utilizing the Algae center for research, innovation, and education.

2. Meginmarkmið með uppbyggingu innviða?

In recent years, research on both macro- and microalgae has gained significant traction due to their vital role in the environment, such as oxygen production, carbon sequestration, and their foundational position in aquatic food webs. Algae are increasingly recognized as essential to the circular economy, offering sustainable solutions for environmental challenges. Algae farming and innovations are closely tied to several United Nations Sustainable Development Goals, making them crucial for a greener, more sustainable future such as renewable energy, food security, and pollution mitigation. Their potential extends into the development of new food products, chemical and cosmetic ingredients, and other innovations. Expanding local knowledge of algal biology is critical for advancing research and education in environmental conservation, biotechnology, and sustainable industry practices. Algal innovations, particularly in Iceland, are essential for addressing global challenges like climate change and pollution while boosting the blue economy. To meet the growing need for algae expertise in Iceland, enhancing research infrastructure and fostering collaboration among universities, research institutions, and innovation centers is vital. This includes educating students and supporting entrepreneurs who need access to facilities for testing and developing new ideas without the burden of building infrastructure from scratch. As technology in this field has advanced significantly enabling breakthroughs in genotypic diversity, genetic engineering,

reliable identification, and algal biotechnology it is crucial to create access to these technologies for research and innovation.

3. Hvernig mun innviðaupbyggingin stuðla að nýliðun og leiða til aukins samstarfs og betri nýtingar innviða?

There has been a generation shift from it being sufficient for Iceland to have just a few trained experts working as scientists, towards a growing demand for trained people with a solid knowledge in the biology of algae. The Algae center is a joint initiative among the several institutions, including institutions of higher education, and will act as national research infrastructure for algal research. The infrastructure will provide new opportunities for collaboration between researchers, educators and entrepreneurs in this field, in an interdisciplinary manner. Currently all institutes joining this roadmap are all involved with algal sciences either as basic research, for aquaculture or new innovations. By sharing the available instruments, we will improve the collaboration between the associated stakeholders. By establishing a joint laboratory and facilities for basic algal work the Algae center will develop an opportunity for cooperation in science and education. Educating phycoecologists, food and nutrition scientists, engineers etc. in Iceland is strongly needed for effective and sustainable utilization of both micro- and macroalgae. Housing the laboratory in Breið will supplement collaboration as Breið not only offers a first class research facility but also a co-working space, Fab Lab, meeting rooms, classrooms and rooms for lectures and all kinds of events. Breið used to be a fishing factory, but is today a melting pot of entrepreneurs and innovation. Changing working practices, Breið has already caused a definite break in the connection of younger generations offering a chance for outreach and recruitment. Several innovation startups and established companies in algal production have already expressed support, interest for collaboration or would be interested in the use of the Algae center facilities. They are: **Algalíf, BIOPOL, BIODICE, Blue Lagoon, Háskólinn í Reykjavík, Hyndla, Iceland Ocean Cluster, Icelandic Kelp, ISEA, Lava Seaweed, Thorverk, Samtök Þörungafélaga, Vaxa, og Þörungamiðstöð Íslands.**

4. Hverju munu innviðirnir breyta miðað við stöðuna í dag?

The basic infrastructure needed for the initial steps for algal research and innovations does not exist in Iceland. The available research infrastructure is insufficient, and equipment is divided among institutions. Consequently, scientists, educators and inventors interested in algal research have to invest in expensive equipment to initiate experiments on algae. In Iceland the ongoing focus of innovation in relation to algae is on nutritional supplements as a source of proteins, vitamins, and minerals, or cosmetics e.g., for their potential hydrating, anti-inflammatory, and antioxidant properties. Research on algae in Iceland is currently focused on ecology, evolution, biodiversity, population structures, responsible processing, and responses to climate change. The laboratory facilities both at Breið and at Hólar will include multiple algal growth cabinets to accommodate cultivation under various temperatures and light regimes. They will also include a media preparation area and cleaning and wastewater disposal, as well as facilities for preservation of material for long-term storage and conservation. There will be a possibility for minor upscaling of biomass production. By collaborative initiatives and by supplying access to shared laboratories having an Algal center

will contribute to increased reliable scientific knowledge and possibilities for education as well as innovation. Currently, Iceland does not have facilities for archiving algae specimens, for conservation purposes this is crucial. Having a herbarium of macroalgae and a culture collection of microalgae available in Iceland will supply both archives and research material. Iceland has a unique nature and ecosystems that are undergoing rapid changes due to climate risk. Mapping and archiving current biodiversity is important for our understanding of coastal marine ecosystems and is a crucial preliminary step to research and development on Icelandic algae. The Algae center will therefore include possibilities to archive and conserve the biodiversity of macro- and microalgae around Iceland.

5. Framtíðarsýn uppbyggingar og reksturs

The operation of the Algae Center will be overseen by Hafrannsóknastofnun in close collaboration with the institutes involved and welcome others to join the project. Our aim is to establish the facilities at Breið in Akranes, a location already providing top-tier conditions for algal research and development with ample research space and equipment. The site offers the ability to pump seawater directly into the research areas, with easy access to collect algae for both research and educational purposes. The initial steps will be to purchase instruments needed to improve the ongoing projects at the institutes. The majority of equipment will be placed at the shared laboratory. To develop the laboratory and to ensure fair sharing and decision making we will have a scientific board with at least one member from each institute and international consultants from established algal research institutes. We will make use of models of similar facilities in other countries, such as the excellent algae laboratories at CCAP (<https://www.sams.ac.uk/facilities/ccap/>) and the Cawthron Institute (<https://www.cawthron.org.nz/>). With time, when the facilities are ready, innovation companies can rent space for experiments, and algal cultures can be sold for research and innovation. The Department of Aquaculture and Fish biology at Hólar University is developing new research facilities for sustainable research in the field of aquaculture and ecology in Sauðarkrúkur, North Iceland. This new research facility will include a dedicated space for microalgae rearing as part of the Algae center. This will allow fine control of environmental parameters for rearing of both fresh- and saltwater algae, creating excellent experimental conditions for both research as well as hands-on teaching.

6. Áætluð fjármögnunarpörf næstu ár

To ensure the successful establishment of **Pörunga kjarni, an Algae Center**, this consortium is seeking funding of **400 M ISK** for the period 2025-2031. The funding will cover the costs of setting up laboratories at Breið, including a 35 million ISK rental fee to Breið. For essential equipment—such as microscopes, culture chambers, growth tanks, autoclaves, inoculation chambers, and climate chambers **200 M ISK** will be allocated. Additionally, **100 M ISK** will go towards improving institutional infrastructure, and **100 M ISK** will cover operating expenses. Hafrannsóknastofnun will contribute **60 M ISK**, representing more than 50% of the required counterpart funding, with the majority dedicated to the establishment and equipping of infrastructure at Breið. Hólar University, the Agricultural University of Iceland and University of Iceland are seeking funding of approximately **70 M ISK**, **45 M ISK**, and **25 M ISK** respectively, and will provide 25% of the required counterpart contribution. Matís, Gleipnir, and Breið will also support the initiative with their expertise, manpower, and 25% of the counterpart contribution for minor institutional equipment.