Innovation Fund Denmark

Call for:

Roadmaps for mission-driven green research and innovation partnerships (Innomission-roadmaps)

Application deadline: 12 May 2021 at 12:00 CET

Innovation Fund Denmark (IFD) calls for Innomission-roadmaps to be used as a basis for mission-driven green research and innovation partnerships within four areas:

1. Capture and storage or use of CO_2
2. Green fuels for transport and industry (Power-to-X, etc.)
3. Climate- and environment-friendly agriculture and food production
4. Circular economy with a focus on plastics and textiles

Denmark is committed to act on and reduce climate changes and has set very ambitious goals in relation to climate and environment. These goals must be reached within a very short time frame. To fulfil the ambitions the government has set aside approximately DKK 700 million in 2021 covering investments in mission-driven green research and innovation partnerships (Innomission-partnerships) within the four areas mentioned above. The partnership investment duration is expected to cover a five-year period, but it is expected that the partnerships sustain to ensure that the goals are reached.

The government's green research strategy "Green Solutions of the Future" (September 2020) points out that the four mission-driven green research and innovation partnerships as described above will: 1) contribute to achieve the target of 70% reduction of greenhouse gas emissions in Denmark by 2030 and net-zero emissions by 2050, and strengthen environment and nature, and 2) contribute to increased competitiveness of Danish business and industry.

Achieving these ambitious goals requires a new type of policy action, also in terms of innovation support. The Innomission partnerships move beyond existing programs offered by IFD, putting the type of individual innovation efforts usually supported into the context of a broader strategic plan based on broad coordination and commitment across the entire value chain. Innomission-roadmaps are therefor likely to cover the entire value chain and collects all driving forces from researchers, investors, existing and new industries, technology providers, education and talents, legislators and authorities to users and customers, and will include description of technical, implementation/regulatory, and business/financial pathways to the vision. The expectation is that roadmaps lay out a pathway to accelerate the development of cutting-edge green solutions through strategic and coherent green research ranging from strategic research to commercialisation.

The selection process for investments in the Innomission-partnerships (phase 2, see below) is based on thorough developed Innomission-roadmaps (developed in phase 1) identifying and selecting strategic initiatives to achieve the ambitious goals on climate and environment.
The selection of the most compelling Innomission-roadmaps in each of the four mission domains is the first phase in developing and selecting the partnerships with the highest impact on the 2030 and 2050 goals.

The developed Innomission-roadmaps must include current challenges, inflections points and gaps within the mission, outline strongholds and potentials and propose goals, milestones and key activities needed to achieve the clearly defined impact. The Innomission-roadmaps content will form the backbone of the second phase that is a call for Innomission-partnerships.

The character of Innomission-roadmaps may be different from mission to mission, reflecting the current maturity of existing technologies as well as the various challenges within each mission. The initial focus of the partnerships is to reach the goals set for 2030 (70% CO_2 reduction), but it is expected that the Innomission-roadmaps will also sketch pathways to reach the vision for 2050. Back-tracking from 2050 and 2030 the Innomission-roadmap should describe key challenges, inflection points and gaps within the specific mission, of which the period leading up to 2030 will naturally be more specific – and being mindful that the pathways to fulfil both the 2030 and 2050 vision lie outside the specific timeframe of the investment in Innomission-partnerships (five year time-frame).

Who can apply and what is the process?

IFD encourages adopting a multi-actor approach in the development of the Innomission-roadmaps. A wide variety of stakeholders and disciplines from the innovation system should come together to develop the Innomission-roadmaps. Multiple insights and knowledge of challenges and perspectives are needed as Innomission-roadmaps need to be based on a comprehensive assessment of the initiatives, innovative technologies, solutions, legislation/regulation, behaviour, business models etc. to achieve the transformative impact within each of the mission areas stated above. Consequently, IFD expects actors from multiple fields of research and development areas to be part of developing the Innomission-roadmap. This includes knowledge institutions, Research and Technology Organisations (GTS institutes), companies (start-up, SME, large companies), investors, municipalities, cluster organisations, etc.

As announced in January 2021, the selection of Innomission-partnerships is divided into a two phased call process:

Phase 1: Innomission-roadmaps
Phase 1 Deadline: 12 May 2021 at 12.00 CET (noon)
Phase 1 Decision: In August 2021 the IFD board of directors will select a number of Innomission-roadmaps that will form the basis for the call for Innomission-partnerships in August 2021

Phase 2: Call for mission-driven green research and innovation partnerships (Innomissions)
Based on the board's decision on Innomission-roadmaps a call for Innomission-partnerships will be announced. There may be one or more partnerships within each mission.
Phase 2 Call announcement: August 2021

Phase 2 Deadline: 19 October 2021
Phase 2 Decision: December 2021

For the development of Innomission-roadmaps, there will be no funding, reimbursements or partnership grants (phase 1). In phase 1, stakeholders are invited to define the Innomission-roadmaps that will be used to build Denmark's efforts within each mission area and used as the basis for the phase 2 call for Innomission-partnerships

Applying for the Innomission-partnerships that fulfil the phase 2 call requirements will not be limited to the participants in the phase 1 development of Innomission-roadmaps. The call for partnerships will be open to all consortia which have the potential to make a significant impact on the Innomission-roadmap goals in line with the requirements defined in the phase 2 call.

Based on a thorough evaluation the IFD board of directors will choose the best Innomission-roadmap(s) for each mission and allocate a budget for each mission based on the outlined needs and expected impact. The IFD board of directors reserves the right to edit Innomission-roadmaps, and merge two or more complementary Innomission-roadmaps if needed. Further, the board of directors reserves the right to extract specific elements related to excellence and value creation from the submitted Innomission-roadmaps such as vision; potential impact on green transition (climate, nature and/or environment); technological, economic and societal impact; goals; success criteria; key performance indicators (KPI's); inflection points; critical milestones etc. to be used for the phase 2 call for Innomission-partnerships.

What type of Innomission-roadmap is IFD looking for?

There is no specific template for the Innomission-roadmap, and may build upon existing roadmaps and strategies. A structure of guiding questions in e-grant (Structure for Innomission-roadmap content) forms the overall structure for the Innomission-roadmap proposal. The structure includes a number of elements that each Innomission-roadmap is required to contain, on which the roadmap evaluation will be based. Moreover, the below mentioned set of criteria will be used in deciding which Innomission-roadmap(s) elements will be used for the phase 2 call for Innomission-partnerships.
Roadmaps should be at a relatively overall level and free of details (not a Gantt chart). Innomission-roadmaps need to have a format that makes them useful for managing expectations, communicating plans and coordinating resources. Innomission-roadmaps should be presented in a simple, graphic and visual format, displaying time-bound inflection points and significant milestones and deliverables, and be accompanied by some more detailed written documentation that is describing various elements of the Innomission-roadmap and specifying the expected impact. The total material should not exceed 30 pages.

Innomission-roadmaps should identify existing Danish strongholds and leverage them in proposed actions. They should draw on knowledge from e.g., the Danish climate partnerships, and the work performed by the Ministry of Higher Education and Science in connection with the formulation of the Green Research Strategy – as well as already existing roadmaps and political decisions in relation to reach climate neutrality and other relevant strategies. Further, the Innomission-roadmaps should refer to relevant international initiatives within the area of the missions in question.

Innomission-roadmap content

The Innomission-roadmap should provide a comprehensive overview of the steps to be taken to achieve the goals outlined by the government, and cover the full range of aspects to be addressed for the vision to be realised. A vision is the proposers' view of a desired future state, and the Innomission-roadmap describes the path to that desired state highlighting the different needs in relation to technology, society, legislation etc. to reach the desired state including subgoals, inflection points etc.

The first part of the Innomission-roadmap must include (a) a description of the global position of the field with regards to the key challenges in this area (national and international State of the Art in relation to technology, society, legislation etc.), (b) Denmark's relevant assets and capabilities, and (c) relevant international efforts that Danish activities should relate to.
Based on this analysis, the second part of the Innomission-roadmap deals with proposed specific paths of action and effort needed (both in regard to technology, implementation and financing) to achieve specific goals, critical milestones and inflection points within the mission. Thus, the Innomission-roadmap may be divided into three specific segments highlighting 1) the technology development roadmap; 2) the implementation roadmap and 3) the financial roadmap.

For activities and efforts that lie both inside and outside the time frame and/or scope of the partnership, covered by the potential investment from IFD, Innomission-roadmaps should include a strategy for attracting additional public and/or private investments to gear the IFD investment (e.g. private investors, business angles, private Danish and international funds and public investments such as EUDP, GUDP, and The Danish Green Investmentfund). Further, they should include a strategy for participation in relevant international networks, including CSA networks under the EU's new Horizon Europe Partnership Programms, The International Energy Agency, IEA, bilateral networks in countries where Denmark has Innovation Centres (ICDK) and European business-oriented networks under the EU and EUREKA. The roadmap sections on external investments as well as participation in international activities must be linked with activities to realise the Innomission-roadmap goals.

See 'Structure for Innomission-roadmap content' for more in-depth information on the content of Innomission-roadmaps.

Evaluation criteria

The Innomission-roadmap should set an overall pathway toward the desired vision, which identifies and selects strategic alternatives that can be used to achieve objectives – the aim is to develop/combine Innomission-roadmap(s) for each mission in order to align all activities to gain the necessary traction.

The Innomission-roadmaps will be evaluated on their overall potential to provide a realistic and robust path towards achieving the climate goals, while strengthening environment and nature. Moreover, Innomission-roadmaps will be evaluated on their overall impact and value creation potential for the Danish businesses and society including their potential for securing existing- and creating new jobs and export of green solutions.
Pathways towards the desired goals must include specific barriers in society that must be overcome, and not least what it takes to create and communicate a vision that attracts new investments. As mentioned

above, the new investments can be partners' gearing and own-financing, new public and private funding or international investors.

Specifically, Innomission-roadmaps will be evaluated on their ability to reach the Danish strategical goals based on the framework described in the "Green Solutions of the Future", the visions and recommendations described in the "13 climate partnerships" reports as well as the "Climate plan for Waste, water and circular economy". Evaluation of Danish strategical goals for strengthening nature and biodiversity will be based on the overall "EU Biodiversity strategy 2030". See the appendix: Structure for Innomission-roadmap content for more detailed description of the strategic goals:

Overarching goals for climate

- 70% reduction of carbon emissions by 2030 compared with 1990 levels
- Carbon neutrality no later than 2050

Strategic goals for climate

- The strategic goals for climate is mainly centred around reduction of emissions from livestock and agricultural soils to contribute to the overall climate objective.

Strategic goals for environment

- The strategic goals for environment is centred around reduction of emissions, improved air quality and reduction of discharge to the aquatic and marine environment

Strategic goals for waste, water and circular economy

- The strategic goals for waste, water and circular economy is for Denmark to become world leading within circular economy as well as reaching energy- and- climate neutral water and waste handling sector.

Strategic goals for Nature and Biodiversity from the "2030 EU Biodiversity Strategy":

- The strategic goals for Nature and Biodiversity includes among others increased protection of land and sea.

See 'Structure for Innomission-roadmap content' for more a more detailed description of the strategic goals.

For the purpose of evaluating the robustness of the Innomission-roadmap as well as the impact and value creation the below criteria are used:

- **Impact** - actual and potential contribution to the abovementioned goals and green objectives as well as the creation of new green industrial strongholds in Denmark:
    - Key points are strength of business model, scaling, strategy for financing, well-argued advancement in Technology Readiness Levels (TRL) and Societal Readiness Levels (SRL) etc.
    - Emphasis on potential impact by the Innomission-roadmap on each mission-goals (climate, nature, environment, sustainable economically green growth), by which method/standard they are measured, which trade-off decisions are made, and on how follow-up on these goals will be carried out.

  - Quantifying the collective impact of efforts, solutions and technologies proposed in the Innomission-roadmap on specific objectives – climate, nature, environment and growth.
  - Highlighting pathways to reach the overall aim minimising/considering negative side-effects or trade-offs along the entire proposed value chain.
  - Strengthen green transition competencies, capacity and interplay across the innovation ecosystem.
  - Addressing society challenges and engagement in the green transition.
  - Actions undertaken to ensure that beneficiaries implement the results or take the results to the next step and highlighting the economic, regulatory, technical and societal barriers for implementation and a strategy for overcoming these barriers.

- **Innovation** - moving beyond existing thinking:
  - Special emphasis on the degree of innovation, and what the Innomission-roadmap proposes in order to retain and build upon existing ideas while being open for developing new ideas and approaches that give Denmark a competitive edge.
  - The composition, strength, diverse and agile nature of the expected partnership is devoted special attention in the evaluation, and likewise the effective use of invested resources, risk management and effective decision-making.

- **Excellence** - challenges, needs, gaps, key questions met by Danish strongholds that cover the area of each mission:
  - Quality of research in the Innomission-roadmap is expected to be based on current and future Danish strongholds, with a clear global perspective and outlook.
  - Quality in relation to unmet needs, State of the Art and competing scientific, behavioural or technological solutions.
  - Emphasis is on prioritising efforts across the value chain back-tracking from a desired future vision, including description of possible trade-offs. The Innomission-roadmap should not be specific to one technology, but rather creating a playground where several technologies can compete.

Measuring value and impact

Although the overarching goal for all missions is related to the government's targets of a 70% reduction of greenhouse gas emissions in Denmark by 2030 and net-zero emissions by 2050, the character and goals of the Innomission-roadmaps are expected to be very different from mission to mission. IFD expect a quantifiable assessment of value creation based on accepted standard methods. For example description and argued assessment of CO_2-emission reduction incl. reference values at project activity start, cost reduction and efficiency improvement incl. reference values at project activity start. Net number and types of jobs created in Denmark; estimated growth numbers for potential partners involved and new start-ups/spin-outs; expected number of patents pending/granted; predicted change of current behavior/incentives/mindset; and of current directives/regulations to accelerate green transition. Attracting and developing talents needed to carry out the Innomission-roadmap activities (Danish as well as international researchers within Innomission-roadmap challenges). Potential for attracting additional national and international funding to the activities described in the Innomission-roadmap (private, public funding potential).

In addition to these assessment criteria, the Innomission-roadmap will be assessed in relation to the "Green Research Strategy" from September 2020, the "Agreement on the Research Reserve 2021", "Danish Climate Partnerships" and the Danish Climate Act (Klimalov).

Decision process for Innomission-roadmaps (phase 1)

The IFD board of directors makes the final decision, based on input from national and/or international peers, on which Innomission-roadmap(s) will form the basis for the phase 2 call for Innomission-partnerships within the area of each mission. The IFD board of directors reserves the right to edit Innomission-roadmaps, and merge two or more complementary Innomission-roadmaps, as well as selecting only elements from the submitted Innomission-roadmaps to be used for the phase 2 call for Innomission-partnerships. Applying for Innomission-partnerships is not exclusive to the participats in preparation of the Innomission-roadmaps, it is open for all relevant partnerships.

Phase 2 call for Innomission-partnerships

In august 2021 a call for Innomission-partnerships will be announced. The selected Innomission-roadmap(s) for each mission will be at the core of the call outlining vision, KPIs, milestones and inflection points for the mission.
The overall call process will be identical across the missions, but each mission may be treated differently in terms of number of partnerships, structure and level of ambition according to the maturity and key challenges in each mission.

The investments in Innomission-partnerships are split into two steps. First step focuses on the foundation of the partnership, including management, governance, capacity-building, infrastructure, communications, relations and the primary research workstreams (activities within the first year). Second step describes specific research and development activities and efforts that are aligned with the overall vision and goals of the partnership. IFD expect broad, strong and agile partnerships that comprise the whole value chain, a short- or mid-term result focus, a five-year partnership period, and a partnership that is centred around fulfilling the ambitious mission goals.

The detailed model for financing across the missions will be decided when the Innomission-roadmaps for the missions have been selected. The decision will be driven by excellence and impact on goals for green transition as well as the maturity level and investment needs in each mission. Financing will follow the EU rules on state-aid, and will be based on the nature of the activity and the status of the partner.

Evaluation criteria will reflect the criteria outlined in the Innomission-roadmap elements published with the phase 2 call for Innomission-partnerships.

The decision process will be described in detail in the call for Innomission-partnerships, and is the responsibility of the IFD board of directors. The cornerstones in the process are a two step evaluation. An initial assessment of the proposal that will result in decision for invitation to the second step of the evaluation process. The second step consist of an interview with a panel of national and/or international experts and possibly IFD board members and other relevant stakeholders. A final assessment based on the

first and second step will be comprised in a proposal for investment, which will form the basis of the final decision.
IFD will hold collective information meetings (webinars and Q &A) and will be available for questions of a general nature.

Instructions - links

- Structure for Innomission-roadmap content
- Guidelines for roadmaps for mission-driven green research and innovation partnerships (2021)
- Instructions for eGrant

Contact:

Mission 1: Capture and storage or use of CO_2
Lars Denning
M: 6190 5069
E: Lars.Denning@innofond.dk

Mission 2: Green fuels for transport and industry (Power-to-X, etc.)
Sune Dalgaard Ebbesen
M: 6190 5030
E: Sune.Dalgaard.Ebbesen@innofond.dk

Mission 3: Climate- and environment-friendly agriculture and food production
Connie Benfeldt
M: 6190 5061
E: Connie.Benfeldt@innofond.dk

Mission 4: Circular economy with a focus on plastics and textiles
Bo Frølund
M: 6190 5043
E: Bo.Froelund@innofond.dk