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Revision
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SIP BioInnovation

Doctoral and post doc projects for resource-smart industrial processes

A call within the strategic innovation program BioInnovation.

The strategic innovation program **BioInnovation** is a part of a joint venture by **Vinnova, Swedish Energy Agency and Formas** on strategic innovation areas. The purpose of the effort is to create conditions for international competitiveness and sustainable solutions on global societal challenges.

For more information about the program, see www.bioinnovation.se.

Initierat av:
Skogs Industrierna IKEM TEKO SVERIGES TEXTIL- & MODEFÖRETAG BIOINNOVATION

Med stöd från
VINNOVA Sveriges innovationsmyndighet Energimyndigheten FORMAS Strategiska innovations-program

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1 The offer in short

All BioInnovation’s calls start from an overarching mission to increase the added value in the Swedish biobased sector and thereby create a more sustainable society.

The call invites applications for doctoral and post doc projects in an industrial research school with the following expected effects.

- **Strengthened competitiveness** through research results – through new fundamental knowledge for the development of resource efficiency in the processes of the bio-based industry, as well as through increased innovation in the transition to a circular bioeconomy
- **Competence provision** through education and rejuvenation – through education of new researchers for employment in industry, as well as through new supervisors and research leaders for rejuvenation in academia
- Deeper **personal competence networks** at all levels – between industry and academia, and between branches of industry

The projects in this call are part of a larger whole together with two other projects, one for coordination and one for strengthened conditions for education at master's level. The approved projects must collaborate with them to form a functioning whole according to the expected effects of the call. Applicant projects must cooperate with the coordination project already during the application period.

The call is primarily directed to universities and university colleges with doctoral education in collaboration with market actors in the form of manufacturers, suppliers and users of bio-based materials, products and services. Research institutes and other relevant actors are also included in the offer.

The call has an indicative budget of SEK 34 million. Funding is granted with a maximum of SEK 2.6 million and a maximum of 40 percent of the budgeted eligible costs per project. Company partners must finance the project's eligible costs to a total value that at least corresponds to Vinnova's contribution. In addition, university partners must finance the project's eligible costs to a total value that at least corresponds to half of Vinnova's contribution. A typical project could then have a volume of SEK 6.5 million, where SEK 2.6 million is Vinnova's contribution, SEK 2.6 million is from company partners and SEK 1.3 million is from university partners. The expected project time for a project in this call is around 5 years.

Time plan for the call

Call opens:	**2020-11-05**
Deadline for applications:	**2021-05-04 at 2 pm**
Decision date:	**2021-06-16**
Earliest date for project start:	**2021-08-01**

Latest date for project start: **2021-12-01**

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Current information about the call and link to Vinnova´s application service is at www.vinnova.se.

2 What does BioInnovation want to achieve with the funding?

All BioInnovation’s calls start from an overarching mission to increase the added value in the Swedish biobased sector and thereby create a more sustainable society. Cross-sectorial cooperation that creates competitiveness and new business opportunities is sought. Great emphasis is placed on the companies’ interest and engagement. Products and services shall fill a clear marked need, be based on resource efficiency, and fulfill relevant environmental requirements.

The background to the call is a need to secure the competence provision to the bio-based process industry. Today, there is an alarming situation regarding future expertise in the area's basic processes. Process research in certain areas risks disappearing when existing expertise is retired and the inflow of new skills is

limited. A rejuvenation process is needed to provide new professors in the process area, as well as new senior researchers, supervisors and teachers.

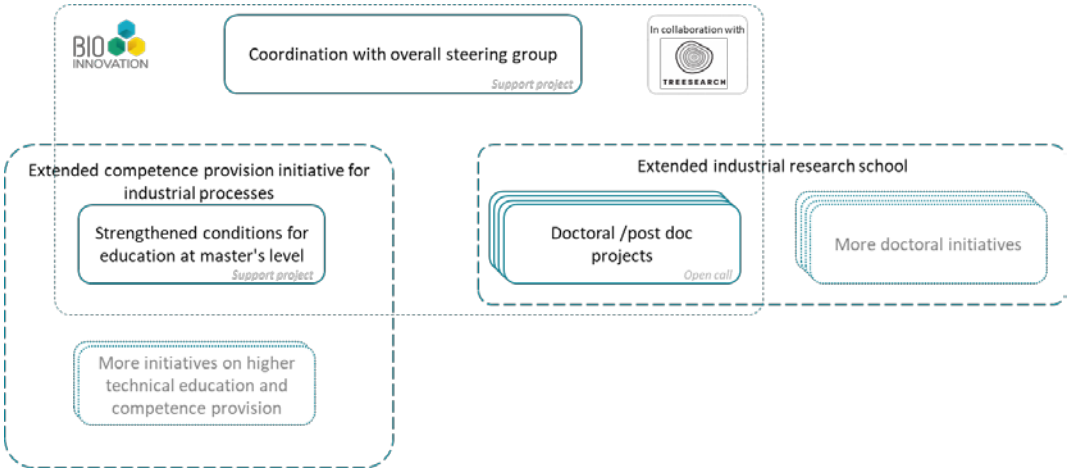
The call invites applications for doctoral and post doc projects in an industrial research school with the following expected effects.

- **Strengthened competitiveness** through research results – through new fundamental knowledge for the development of resource efficiency in the processes of the bio-based industry, as well as through increased innovation in the transition to a circular bioeconomy
- **Competence provision** through education and rejuvenation – through education of new researchers for employment in industry, as well as through new supervisors and research leaders for rejuvenation in academia
- Deeper **personal competence networks** at all levels – between industry and academia, and between branches of industry

The most important delivery from the industrial research school is the **educated people**. The industry needs innovation capacity in the form of people who can implement process-oriented research in a conversion from an industrial perspective.

The projects in this call are part of a larger whole together with two other projects, one for coordination and one for strengthened conditions for education at master's level. The approved projects must collaborate with them to form a functioning whole according to the expected effects of the call. Applicant projects must cooperate with the coordination project already during the application period. The approved projects are then expected to have regular contact with the coordination project. Approved projects must also ensure that doctoral students and post docs participate in compulsory courses (approximately 15 credits) according to the course program produced by the coordination project.

With this call, BioInnovation creates an industrial research school on resource-smart industrial processes. With this as a starting point, the trade organizations IKEM, Swedish Forest Industries Federation and TEKO intend to create an even broader collaboration in the form of an extended industrial research school with more doctoral initiatives and an extended competence provision initiative for industrial processes. The steering group in the coordination project is intended to include this entire broader collaboration. Applicant doctoral / post doc projects are expected to collaborate openly in this context.



BioInnovation will deepen the collaboration with the Treesearch platform. Treesearch will assist with resources for communication, seminars, exchanges of experience, course activities, research infrastructure etc. Applicant doctoral / post doc projects must participate in this collaboration.

The project will be part of and contribute to BioInnovation's work with external communication, portfolio analysis, dissemination of results, and systematic learning. BioInnovation wants its projects to create development within the aspects technology, market and sustainability in the area of the call.

Scientific publication must be made with open access[1].

With the call, BioInnovation wants to get more people to collaboratively develop their innovation capacity and create new solutions that contribute to the sustainable development goals in Agenda 2030, within the framework of the call's priorities.

The projects are expected to contribute to an equal development of society by both women and men utilizing the funding in an equal manner, influencing the project and participating actively in its implementation.

3 To whom is the call directed?

The call is primarily directed to universities and university colleges with doctoral education in collaboration with market actors in the form of manufacturers, suppliers and users of bio-based materials, products and services. Research institutes and other relevant actors are also included in the offer.

[1] See further information in section 8.2 Specific terms and conditions for grants

The actors shall have ability to and interest in cooperatively contributing to the objectives for BioInnovation[2].

The project consortium must consist of at least two partners, of which at least one is a company. A partner must have its own budget with its own costs, and not just finance another partner in cash. The project consortium must include companies with operations in Sweden. Funding is only granted to Swedish organizations. Swedish organizations also mean foreign organizations that have a branch or place of business in Sweden. The costs of the project must be attributable to the branch's or place of business's operations. An organization that is not Swedish can, however, be a project partner that does not receive funding.

It is a clear ambition from BioInnovation to capture the concrete opportunities that different market actors see. This can be both manufacturers and suppliers as well as users of bio-based materials, products and services.

4 What is funded?

4.1 Activities applicable for funding

The title of the call contains the key words "resource-smart industrial processes". This means that the projects must have an industrially realistic context and relevance, and that they must aim to increase resource efficiency in a broad sense. The latter may involve more efficient utilization of the raw material, higher selectivity and yield, higher energy efficiency, optimized processes and process control, more efficient replacement of fossil raw material with forest-based raw material, improved material properties, faster industrial upscaling or the like.

The call is open for doctoral and post doc projects in an industrial research school with expected effects according to section 2.

The project's activities must fall into one of the following categories, according to the European Commission's definitions[3]:

- Fundamental research
- Industrial research
- Experimental development

The call includes various applications and technologies, from individual process steps to integrated processes, from raw material to finished products and recycling, as well as efficient use of raw materials and knowledge of the behavior of bio-raw materials in industrial processes. The call refers to industrial process

[2] See the BioInnovation Application Guide
[3] https://www.vinnova.se/en/apply-for-funding/rules-for-our-funding/state-aid-to-companies/

technologies for bio-based *bulk* materials in liquid form or mixtures of liquid and solid phase where production naturally takes place continuously or in batches.

The project shall address issues in one or more of the areas below.

- **Chemical processes for biobased raw material**
  - Develop and optimize industrial processes for the extraction of chemical components from bio-raw materials through efficient integration with existing processes and infrastructure, with the aim of replacing fossil raw materials currently used in the chemical and refining industry
  - Develop more selective industrial chemical processes for the production of bio-chemicals, with the aim of increasing yield and energy efficiency
- **Selective and efficient separation processes**
  - Develop the fundamental understanding of industrial processes for pulp cooking through new knowledge of the kinetics of transport of reaction chemicals and reaction products in fiber wall and wood materials, with the aim of increasing the precision in optimizing and controlling the cooking process to increase cooking yield and improve fiber properties
  - Develop knowledge of separation processes in pulp and paper production through improved methods of filtration, pressing, washing, drying and evaporation, with the aim of increasing energy efficiency without compromising the quality of pulp fibers and subsequent products
  - Develop knowledge of efficient ways to scale up new processes to industrial scale by combining separation processes such as crystallization technology, extraction, membrane separation with digital models, with the aim of facilitating faster industrial upscaling and associated investment decisions
  - Develop knowledge of pulp cooking and bleaching with associated chemical processes on an industrial scale through improved methods for chemical recycling and material extraction, with the aim of increasing material and energy efficiency and enabling extraction of new materials and components
- **Catalysis and synthesis for bio-based chemical products**
  - Develop highly selective catalysts through parallel development of reactor models for kinetics and mass transport, with the aim of optimizing the reaction and upscaling of the reactor on an industrial scale
  - Develop new catalytic reaction pathways for industrial production of chemicals from biomass through the development of catalysts that are stable for long-term operation of the processes, with the aim of cost-effectively replacing today's petroleum-based raw material
- **Fiber modification and fiber characterization in integrated processes**
  - Develop knowledge of industrial processes for mechanical and chemical change of properties of fibers and fiber streams through new methods of fiber modification and / or characterization, with the aim of improving and controlling the properties of paper and board materials
- **Characterization and modeling of material and sheet forming**
  - Develop knowledge of the forming process in paper and board production through new methods for characterizing and modeling chemical and physical mechanisms, with the aim of increasing energy efficiency, reducing variability and improving product properties

- **Process control and process characterization for increased resource efficiency**
  - Develop the control possibilities in industrial processes through new methods for high-resolution characterization of process states and process and material flows, with the aim of increasing resource efficiency and improving product properties
  - Develop alternative designs of industrial processes through new knowledge of how process dynamics and reactions are affected by new pressure and temperature profiles along the process, with the aim of drastically increasing energy efficiency
  - Develop the recycling of process water and chemicals through improved methods of purification and recycling, with the aim of increasing resource efficiency

Examples of activities that can be funded:
- Research and development work
- Industrialization of processes and upscaling of research results
- Development of new methods for evaluation and validation
- Preparation of a roadmap for the use of the results and further upscaling
- Supervision activities

Possible constructions for an application[4]:
- A doctoral project of a maximum of 5 years, which aims for a doctoral degree or two licentiate degrees
- A doctoral project of a maximum of 2.5 years, which aims for a licentiate degree
- A post doc project of a maximum of 5 years that engages one or more individuals employed as post docs
- Other reasonably equivalent constructions

This call does not fund the establishment of pilot facilities or the establishment of new professorships. The call also does not finance work with solid fuels, sawmills and house construction.

BioInnovation has made the strategic choice not to fund projects that primarily aim to develop animal feed, food or pharmaceuticals, nor projects that primarily work with raw material supply.

4.2 Eligible costs

Vinnova funding is made through grants. Grants to organizations engaged in economic activity, like companies, are subject to state aid rules[5]. The rules cover,

[4] Scholarships are not an eligible cost, see Vinnova's general terms and conditions
[5] Read more about state aid on our website: https://www.vinnova.se/en/apply-for-funding/rules-for-our-funding/state-aid-to-companies/. There you will also find our general terms and conditions for grants and a guide to the terms and conditions for eligible costs: https://www.vinnova.se/en/apply-for-funding/rules-for-our-funding/terms-and-conditions-for-our-funding/

among other things, what type of costs and the percentage of those that may be funded by grants. This is stated in the document "Guide to Vinnova's conditions on eligible costs".

5 What size of funding is granted?

The call has an indicative budget of SEK 34 million. Funding is granted with a maximum of SEK 2.6 million and a maximum of 40 percent of the budgeted eligible costs per project. Company partners must finance the project's eligible costs to a total value that at least corresponds to Vinnova's contribution. In addition, university partners must finance the project's eligible costs to a total value that at least corresponds to half of Vinnova's contribution. A typical project could then have a volume of SEK 6.5 million, where SEK 2.6 million is Vinnova's contribution, SEK 2.6 million is from company partners and SEK 1.3 million is from university partners. The expected project time for a project in this call is around 5 years.

Companies must be limited liability companies (“aktiebolag”) or economic associations (“ekonomiska föreningar”) with active business operations. Research institutes in company form, university holding companies and incubators are in this context excluded from the category of companies.

Vinnova's funding is granted per partner. The size of the funding that can be granted to organizations that conduct economic activities depends, among other things, on the size of the organization. The document "Table of aid intensities and definitions for Vinnova funding" clarifies what applies to organizations of various size that conduct economic activities.[6]

6 Prerequisites for the application to be assessed

Only applications that meet the following formal requirements will be assessed:

- The project leader must be employed by one of the project partners
- The project consortium must consist of at least two partners, of which at least one is a company
- Company partners must finance the project's eligible costs to a total value that at least corresponds to Vinnova's contribution
- University partners must finance the project's eligible costs to a total value that at least corresponds to half of Vinnova's contribution

[6] Read more about state aid on our website: https://www.vinnova.se/en/apply-for-funding/rules-for-our-funding/state-aid-to-companies/. There you will also find our general terms and conditions for grants and a guide to the terms and conditions for eligible costs: https://www.vinnova.se/en/apply-for-funding/rules-for-our-funding/terms-and-conditions-for-our-funding/

- The project consortium must have companies with operations in Sweden, according to the definition in section 3
- The project partners must be legal entities
- The application must contain all mandatory attachments according to section 9

Applications that do not meet one or more of these requirements will be rejected.

7 Assessment of applications

7.1 What is assessed?

Decisions on funding are based on an overall assessment of the project regarding Potential, Feasibility and Consortium according to the following criteria.

Potential
- The project has potential to contribute to and benefit from the conversion to a bio-based economy
- The project has potential to clearly contribute to the expected effects of the call according to section 2
- The project has industrial relevance and the approach is linked to an industrially realistic context
- The project has potential to strengthen Swedish competitiveness
- The project has scientific potential related to the international research front
- The project has potential for innovation in the research area in general

Feasibility
- The project's activities are clearly described and motivated
- The project plan is realistic in relation to budget and objectives
- Planned activities contribute to achieving expected results
- The project has access to relevant pilot or full-scale processes
- The project plan describes relevant working methods for managing gender equality in the project, for example in recruitment and project management

Consortium
- Individuals in the project have ability and credibility to complete the project
- The project partners and the relationships between them have been well organized for the project's implementation and goal fulfillment
- The project collaborates with the coordination project to form a functioning whole according to the expected effects of the call according to section 2
- The project has a plan for staffing and recruitment
- The project team (key persons) is well composed with regard to gender distribution and distribution of power and influence between women and men

Applicant projects must cooperate with the coordination project during both application and implementation to form a functioning whole according to the

expected effects of the call according to section 2. The assessment process for doctoral and post-doc projects is decoupled from the coordination project.

7.2 How is the assessment done?

The applications will be assessed in competition with each other, and the assessment will be done based on the electronic application and the submitted project description (see section 9).

Schematically, the decision process is as follows:
1. The application is submitted through Vinnova's web portal (see section 9 for instructions on how to apply).
2. Applications fulfilling the formal requirements will be assessed with respect to the assessment criteria by external international experts. This results in a funding recommendation.
3. Decisions is made by Vinnova and are announced to the applicants and to the BioInnovation program management.

8 Decisions and conditions

8.1 About Vinnova's decisions

How much each project partner is granted is stated in the decision. Grants to project partners engaged in economic activities will be based on Commission Regulation (EU) No 651/2014, Article 25 - Support for research and development projects for:

- Fundamental research
- Industrial research
- Experimental development

For more information on the maximum allowable grant levels within this regulation, see the state aid tables.[7] The basis for support is stated in the decision and also governs which costs are eligible.

Vinnova´s decision to grant or decline an application cannot be appealed.

[7] https://www.vinnova.se/sok-finansiering/regler-for-finansiering/statligt-stod/

8.2 Specific terms and conditions for grants

Vinnovas general terms and conditions apply for grants.[8] The terms include rules on project agreements, conditions for payment, follow-up, reporting and utilization of results.

The fact that results from publicly funded research and development are freely available to all is an important basis for innovation. Scientific publication of results from projects with funding from this call must be made with open access in accordance with Vinnova's instructions, which will be available on Vinnova's website[9] no later than 2021-01-01.

Since the call is within the framework of the strategic innovation program BioInnovation, the following special conditions apply:

- The project leader must be employed by one of the project partners.
- The project must participate in the meetings organized by the coordination project.
- The project must be represented by at least one project partner at the conferences and other activities organized within the strategic innovation program BioInnovation.
- The following conditions replace § 7.3 in the general terms and conditions. When informing about the project and at each publication of project results, it must be stated that the work has been carried out within the “Strategic innovation program BioInnovation - a joint venture by Vinnova, Formas and the Swedish Energy Agency”. This applies to publication regardless of medium and to oral presentations.
- At final reporting to Vinnova, a summary of project results must be submitted to BioInnovation via e-mail to info@bioinnovation.se. A template for this is available at the BioInnovation web page.

Additional special conditions can be decided for individual projects.

If you do not comply to the terms, you may be liable for repayment. This also applies if the grant decision was incorrect or with an excessive amount.

9 How to apply

Applicant projects must collaborate with the coordination project and with other doctoral student / post doc projects to form a functioning whole according to the expected effects of the call in section 2. The coordination project will be available during the application period to provide advice on applications in the open call in

[8] Current terms and conditions can be found on our website, together with help to understand and fulfill the conditions: https://www.vinnova.se/en/apply-for-funding/rules-for-our-funding/terms-and-conditions-for-our-funding/

[9] https://www.vinnova.se/en/apply-for-funding/rules-for-our-funding/terms-and-conditions-for-our-funding/

order to secure issues with an industrially realistic context and relevance according to the expected effects of the call. The coordination project is neutral and will treat all projects equally. Contact person for the coordination project is Hans Theliander, professor at Chalmers, +46 31-772 2992, hanst@chalmers.se. Information meetings (equivalent) will be arranged.

The right people – both doctoral students and post docs as well as supervisors – are a success factor. A clear plan for staffing and recruitment therefore needs to be set already in the application phase.

The BioInnovation Application Guide[10] is available at Vinnova's webpage for the call. It aims to define certain key concepts so that they can be interpreted and used in a similar way in applications and by assessors, and it provides suggestions for tools for describing the application's ambition regarding technology, market and sustainability. Read it carefully to create as relevant an application as possible.

To apply for a grant, fill in a web-based form in Vinnova´s application service ("Intressentportalen"), which is accessed through the web site. There you also upload the following attachments:[11]

- Project description in English according to template
- CV annex in English according to template for the project leader and key persons in the project team

The templates for the mandatory attachment must be used. No other attachments, apart from the above, shall be uploaded in Vinnova's application service.

At application, the attachment Project summary ("Projektreferat") in Swedish should be sent to BioInnovation via e-mail to info@bioinnovation.se. Template for the project summary can be found on the call's website. It should be possible to freely disseminate and publish it, and it must not contain confidential or otherwise sensitive information. BioInnovation needs this information for project follow-up and statistics. This is the reason why this is in demand.

Keep in mind that it takes time to make an application. You can start filling in information, save and continue at a later time. When the application is complete, mark it as ready. You can at any time unlock the application and make changes, right up to the last application day.

Mark the application as ready well in advance before the call closes.

When the call is closed and the application is registered with Vinnova, a confirmation will be sent by e-mail to the manager of the user account, the project

[10] The BioInnovation Application Guide is published on the call website
[11] Templates for the attachments are published on the call website

manager and the signatory / head of department. It may take a few hours for you to receive the email.

When the application deadline has expired, additional information concerning the application can only be requested from Vinnova.

10 Who can read the application?

Applications submitted to Vinnova will be public documents, but we will not disclose information about business or operating conditions, inventions or research results if it can be assumed that any individual may suffer damage.

Documents sent to BioInnovation are not covered by Vinnovas privacy statements.