

BioFuel Region BFR AB
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Beslut om stöd

Stödmottagare: BioFuel Region BFR AB
Org. nr: 556664-1592
Projektnamn: Boost Nordic Biogas
Ärendeid: 20357957
Diarienummer:

Beslut om stöd

Region Västerbotten beviljar BioFuel Region BFR AB stöd för att genomföra projektet Boost Nordic Biogas enligt ansökan inkommen 2022-08-30. Stödet uppgår till 8,33 % av faktiska kostnader och 8,33 % av total finansiering, dock med högst 427 871 kr.

Beslutet har fattats med stöd av förordningen (2003:596) om bidrag för projektverksamhet inom den regionala tillväxtpolitiken.

För stödet gäller allmänna villkor enligt Bilaga 1.

Beslutet kan inte överklagas.

Motivering till beslut

Region Västerbotten beviljar stöd av följande skäl:
Projektansökan ligger i linje med Västerbottens regionala utvecklingsstrategis prioritering 1 Västerbotten - en nytänkande och smart region samt delprioritering 1.3 Utveckling av innovationer. Projektansökan uppfyller kraven fastställda i Region Västerbottens Agenda för hållbar finansiering och bidrar i mycket hög grad till prioritetshöjande aspekten Sammanhållen region och i hög grad till den prioritetshöjande aspekten Hållbar regional tillväxt.

Projektperiod

2023-01-01 - 2025-12-31

Projektbeskrivning

Syfte: Biogasset systemet ingår i många delar av samhället och producerar många samhällsnyttor. Biogasen bidrar till att uppfylla flera av FN:s globala hållbarhetsmål och är en viktig pusselbit i omställningen till ett klimatsmart samhälle. Den kan bidra till en hållbar avfallshantering, hållbar livsmedelsproduktion, lokala kretslopp av näringsämnen, cirkulär ekonomi, resurseffektivitet och försörjningstrygghet vad gäller energi och livsmedel. Dessutom bidrar den till företagande och lokala arbetstillfällen.

Den biogasmärknadsutredning som gjordes 2020 pekar på potentialen att öka produktionen av biogas i Sverige med upp till 10 gånger. I norra Sverige används biogasen idag främst till värme, el och fordonsgas, men den behövs också i den framtida gröna

omställningen av industrin. Med projektet vill vi skapa förutsättningar för en livskraftig biogasproduktion i den norra regionen.

Norra Finland och Sverige har en lång historia av att producera biogas av organiskt avfall, medan implementeringen bara har börjat i Nordnorge. Detta projekt handlar om kunskapsöverföring, men också samverkan över gränsen och framförallt mellan biogasproducenter och forskare. Den norra regionen har gemensamma utmaningar, t ex kallt klimat och långa avstånd. Det behövs anpassade lösningar och teknologier för biogasproducenterna i regionen. I regionen finns också en outnyttjad potential av organiskt substrat som kan bidra till ökad produktion och affärsmöjligheter. Efter utvinning av biogas ur avfallet återstår rötrest och den innehåller värdefulla näringsämnen. Biogasproduktionens lönsamhet kan förbättras genom att utveckla kommersiella användningsområden för rötresten, till exempel ett gödselmedel som bygger på lokala, förnybara resurser och detta bidrar till ökad självförsörjning och ett minskat behov av att importera fossilbaserad handelsgödsel.

Utifrån tidigare projekt har vi insett att det behövs ett helhetsperspektiv som innefattar hela biogaskedjan för att lösa utmaningarna. Det fungerar inte att bara enskilt fokusera på substratet eller själva resten. Den tekniska utvecklingen inom området går dessutom snabbt och skapar nya möjligheter till lösningar. I föreliggande projekt vill vi ta ett helhetsgrepp om hela biogaskedjan och skapa förutsättningar för en ekonomiskt livskraftig biogasproduktionen i norra regionen. Projektparterna innehar stor expertis inom biogasområdet. Både när det gäller tillämpad forskning, praktisk drift av biogasanläggningar och samverkan.

Projektet som syftar till att öka mängden förnybart producerad energi och näringsämnen bidrar till Västerbottens övergripande hållbarhetsmål i den Regionala utvecklingsstrategin en cirkulär plats 2030 och Agenda 2030 målen; 2, 6, 7, 13 och 14. Det passar också väl in i kategorin 4.4 Hållbar konsumtion inklusive energianvändning.

Projektet bidrar till målet i den Regionala innovationsstrategin: Västerbotten ska mobilisera och skapa resurser till innovationsutveckling som driver miljö- och klimatomfattig, social och ekonomisk hållbarhet i Västerbotten och därigenom stärka regionens ställning som en innovationsmotor i ett globalt perspektiv. Detta görs genom att bidra till att utveckla nya cirkulära affärsmodeller utifrån bland annat skogliga bioekonomins restprodukter. Biogas är också en viktig komponent i omställning av transporter och industriella processer för att förädla metaller och mineraler.

Vad projektets aktiviteter ska leda till för målgruppen på kort sikt:

Det övergripande målet (riktningsmålet) för projektet är att:

Skapa goda förutsättningar för en livskraftig biogasproduktion i regionen.

Detta görs genom att biogasproducenterna får ökad kunskap kring nya metoder och tekniker som gör det möjligt att effektivisera biogasproduktionen och utveckla nya cirkulära affärsmodeller utifrån biogasprocessen. Detta bidrar till att öka konkurrenskraften och gör biogasproducenterna mer livskraftiga. Projektet ökar också samverkan och utbyte mellan tillämpad forskning och företag, vilket bland annat bidrar till gemensamt problemlösande och därmed ökad kunskap som gynnar biogasbranschen och forskningsinstitutionerna i regionen. Det gränsöverskridande nätverk som bildas via projektet och som inkluderar norra Norge, Sverige och Finland blir en plattform för kunskapsöverföring, samarbeten och innovation. Den ökade samverkan som projektet bidrar till resulterar också till att fler ansökningar till EU-program, exempelvis Horizon Europe, initieras.

Delmål

1. Projektet har gett målgruppen förutsättningar för att driva och delta i ett inkluderande, jämförbart och gränsöverskridande nätverk kring biogas.
2. Projektet har gett målgruppen kunskap och verktyg för att effektivisera biogasproduktionen och utveckla nya cirkulära affärsmodeller utifrån biogasprocessen.
3. Projektet har gett målgruppen förutsättningar för fortsatt utveckling och innovation genom att stärka samverkan med regionala universitet och högskolor inom viktiga ämnesområden.

Det övergripande målet anses uppfyllt om delmålen uppfylls. Delmålen är kvalitativa och utvärderas genom att enkätstudie som genomförs med målgruppen. Projektet följs dessutom upp utifrån följande indikatorer (AURORA):

Applications submitted to EU programmes

Target value: 1 applications

Research organisations participating in joint research projects

Target value: 3 research organisations

Enterprises cooperating with research organisations

Target value: 7 enterprises

Jointly developed solutions

Target value: 1 system solutions

Vilka effekter ska projektet uppnå på lång sikt:

-Mer organiskt substrat i regionen tas tillvara för biogasproduktion.

-Ökad produktion av förnybar energi (biogas).

-Ökad tillgång till miljömässigt godkänd (certifierade) biogödsel/biogödselprodukter.

-Lönsamma biogasbolag. Ökat företagande och fler arbetstillfällen kopplade till biogasbranschen direkt eller indirekt.

Detta leder till att regionen är mer självförsörjande på energi och näringsämnen. Genom att tillvarata organiskt substrat blir det en tillgång som bidrar till att skapa ekonomiska förutsättningar samtidigt som det på flera sätt bidrar till omställningen mot ökad hållbarhet.

Indikatorer: Namn	Värde	Måttenhet	Kommentar
Antal deltagande organisationer	3	Stycken	

Tid- och aktivitetsplan

Aktivitet	Beskrivning	Startdatum Slutdatum	Kostnad
WP1 - Project management	Lead partner: Yrkeshögskolan Novia (Fin) To ensure a good implementation of the project and efficient use of resources, a separate work package for project management is needed. Novia is the lead partner and responsible for this work package, will lead regular project meetings and be the contact point to Interreg Aurora. The status reports and networking meetings organized by for example Interreg Aurora is covered by this work	2023-01-01 - 2025-12-31	

<i>Aktivitet</i>	<i>Beskrivning</i>	<i>Startdatum Slutdatum</i>	<i>Kostnad</i>
	package. However, all partners will be responsible for the project management within their work packages. All partners will also attend meetings and contribute to required reports. WP1 also covers the work with the steering committee and forming the reference group. The project management is responsible for the project being an inclusive working space including gender equality and anti-discrimination. WP1 will also be responsible for the overall communication regarding project management.		
A1.1 Reporting and contact point to financiers	The lead partner is responsible for coordinating the reporting to Interreg Aurora. The lead partner is also responsible for the information from Interreg Aurora to the project. This activity will ensure an efficient flow of information to, from and within the project. The partners will communicate on a Teams channel and documents will be stored on OneDrive. The activity also includes reporting and contact with the co-financiers.	2023-01-01 - 2025-12-31	226 045
A1.2 Meetings and other project management	Project meetings will be held online regularly (1 meeting/month), and additional meetings will be held as required. The steering committee will convene 2 times per year (online). Physical project meetings will take place one time per year, alternating between the countries. The reference group will be formed within this activity. The goal is that the reference group consists of both representatives from the regions biogas industry as well as end consumers and associations. The goal is that both reference and steering group will be equally representative of genders. It is especially important to have a dialogue with the target group to find cases for enhancing production and introducing technological solutions in WP5.	2023-01-01 - 2025-12-31	226 045
WP2 - External communication & dissemination	Lead partner: BioFuel Region Our communication will be divided into three different phases; Start-up, performing and finalization phase, and at three levels; internal, external, and involvement of projects and people outside the project team. All project personnel in all WP: s will be engaged in dissemination activities, see below. From	2023-01-01 - 2025-12-31	

<i>Aktivitet</i>	<i>Beskrivning</i>	<i>Startdatum - Slutdatum</i>	<i>Kostnad</i>
	<p>face-to-face meetings and lectures to designed meetings in this project including hitch-hiking sister projects and exchanging knowledge and disseminating results in existing networks. The communication group will take responsibility for leading and coordinating outreach work. The project will strive for equal communication starting with a conscious choice of words and image composition when adapting the communication to the selected target groups. The objective is that every encountered reader, listener, and person feels included. Here is also the gender perspective included.</p> <p>Continuously throughout the project WP2 will follow the development of communication, its technology and adapt the dissemination. E.g., developing and utilizing different avenues to communicate with each other and towards our target groups. We will evaluate how to make our content from all WPs accessible, valuable, and interesting for stakeholders and arrange events and workshops to share findings and exchange knowledge between countries a shared learning process. Cross border cooperation is needed as the three countries face similar climatic challenges, but the solutions may differ. These solutions can be incorporated and developed in new ways in neighboring countries.</p> <p>Outputs WP2:</p> <ul style="list-style-type: none"> · Project webpage and communication toolkit · Communication strategy · Project description in three languages · Minimum one designed communication activity for each target group · Minimum 3 workshops · Summarize the project results · Increased understanding of inclusive communication and meeting design. 		
A2.1 - Events and workshops	<p>Events and workshops for results and disseminations. Content will be developed in close dialogue with the project group. Activities will include:</p> <ul style="list-style-type: none"> · One designed communication activity for each target group as a minimum, at least three workshops and a summarization of the project results. 	2023-03-01 - 2025-12-31	968 766

<i>Aktivitet</i>	<i>Beskrivning</i>	<i>Startdatum - Slutdatum</i>	<i>Kostnad</i>
	<ul style="list-style-type: none"> · Summarizing previous projects results and findings towards stakeholders, but also to show the expertise of the region. · Workshop or event with the main objective to benefit cross border co-operation and communication for the sharing of previous experiences, benefits and learned mistakes. We face similar climatic challenges in the three countries but handle them in different ways. Cross-border cooperation is needed to find best-practice solutions. · To raise the advanced research capabilities of the biogas industry in the region, the project needs to participate in and communicate with the global field of researchers. · Stimulate and create a critical mass in the region that can reach out to EU programs such as Horizon Europe. Advocate knowledge and awareness of future possibilities. · Encourage active participation and equalness through meeting design in events and workshops. 		
A2.2 - Production & information packages	<p>Activities will include equal and target group designed communication materials. This includes:</p> <ul style="list-style-type: none"> · Coordination of the internal communication and production of communication materials for all partners. Function as a sounding board for the project group. · Create a project webpage and general communication toolkit suitable for all participants. · Develop a project description in each three languages and in the project-language English. · Continuously prepared materials such as info sheets and newsletters and summarizing the project results in a packaged form. · Design communication materials with emphasis on conscious word choices and equal image composition. 	2023-01-01 - 2025-12-31	871 889
WP3 - New business models for promoting circular economy in the biogas sector	<p>Lead partner: Stormossen Oy (Fin)</p> <p>The market opportunities and the legislations for biogas and digestate is important to understand in order to implement products to the market. This WP3s focus is mapping and investigating different market opportunities for the</p>	2023-02-01 - 2025-10-31	

<i>Aktivitet</i>	<i>Beskrivning</i>	<i>Startdatum - Slutdatum</i>	<i>Kostnad</i>
	<p>biogas sector. For new business segments, new business models might be needed. WP3 aim to examine these different models. WP3 is also responsible for certain communication activities in connection to the work package. For example, to inform the project group about the progress in WP3 (internal communication) and produce content that can be used in WP2 for external communication toward selected target groups.</p> <p>On a regional level, the use of biogas and digestate is important to ensure. In other countries, regional frameworks and goals for nutrient recovery have been created. The aim in this activity is to learn from other regions and together with regional target groups create recommendations and policy advises for promoting biogas usage and nutrient recovery.</p> <p>Outputs WP3:</p> <ul style="list-style-type: none"> Mapping of market opportunities New business models for digestate and biogas Advises on regional policy framework for promoting biogas as a driver for circular economy Input to communication activities toward selected target groups to present relevant findings 		
A3.1 - Market opportunities and conditions	<p>To be able to introduce new products to the market the biogas producers must understand the limitations of the market such as regulations and technical possibilities, but also the acceptance and demands of the procurers. When it comes to general acceptance, pollutants such as microplastics, pharmaceuticals and heavy metals will play a key role in the purity of the product. Therefore, it is necessary to survey what kind of product and product aspects the procurers require. What are the conditions and market opportunities for each kind of product? What type of customer might it attract? Customers can be divided between bulk buyers and smaller enterprises such as farmers, municipalities, and landscaping firms. However, can it exist new unexplored business segments such as metallurgy, wastewater cleaning or in battery industry? WP3 aim to find out.</p>	2023-02-01 - 2025-10-31	322 922

<i>Aktivitet</i>	<i>Beskrivning</i>	<i>Startdatum</i> - <i>Slutdatum</i>	<i>Kostnad</i>
	A parallel working theme in this WP is about anchoring the use of biogas and digestate products on regional levels towards selected target groups. In this aspect legislation on both EU and national level need to be understood, as well as certification processes and demands for fertilizer and biogas products. At a wider level in EU central European countries like Germany and Austria, they already have regional frameworks and goals for nutrient recovery. Our aim is to learn from other regions and together with regional target groups create recommendations and policy advises for promoting biogas usage and nutrient recovery.		
A3.2 - New business models for biogas and digestate	<p>It is necessary to understand what the preferred products are in different market segments and what the different routes means for the biogas producers. Can they sell all the product to one bigger fertilize producer or will the biogas producers have to market and sell their products on their own? Can several biogas plants cooperate in new business models to achieve the needed amounts for an efficient production and marketing? To get a better understanding of the market acceptance the project will carry out interviews, discussions, workshops, and market surveys with the target groups for the end products. Simultaneously, similar analysis will be carried out for the biogas part e.g., what is needed for making liquefied biomethane (LBG) an attractive product in the heavy duty and maritime sector? In the same way the biogas producers are dependent on volumes share to achieve an attractive business model for both the producer and the consumer.</p> <p>To be able to elaborate new business models for digestate and biogas products, flows and masses needs to be surveyed for a deeper look into logistics. These are strongly connected to which kind of technical solution is chosen and selected size (several smaller or one bigger plant) in order to understand if there is a need to upgrade the digestate or liquefy the biogas. In this aspect, other side streams need to be considered as well; for example, waste heat to be utilized, carbon dioxide from biogas upgrading or other relevant sources for recycling. Other relevant</p>	2023-02-01 - 2025-10-31	322 922

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	aspects in need to be mapped out are the potential and feasibility for new plants in the region. The work around business models will be strongly linked to market opportunities and acceptance analyses in order to create an overall review of biogas benefits to circular economy and self-sufficiency. The aim is to showcase how biogas contributes to sustainable development and can contribute to the process of phasing out fossil fuels and mineral fertilizers.		
WP4 - Alternative processes addressing northern challenges	<p>Lead partner: SINTEF Narvik (Nor)</p> <p>Conversion of organic waste to biogas has mainly been achieved with the implementation of wet fermentation, where the organic waste is diluted to the consistency of a thin soup (<4% dry matter) and the bioresidue is spread as a fertilizer on farmland. For various reasons wet fermentation can be difficult to implement profitably in northern regions. This work package examines alternative processing technologies that can be suited to the challenges of the northern regions. One alternative process is so-called 'dry (or solid state) fermentation' where the dry matter content is around 20%. In dry fermentation the liquid phase moves through the solid phase, either by stirring with paddles, or by gravity drainage and recirculation of the liquid phase. There are some advantages, but also challenges to be solved, such as the yield of biogas being typically lower than for wet fermentation. Another alternative is performing the digestion in stages, such as by pretreatment or removing or adding components during the digestion. Antec AS in Norway have developed an alternative process in which the bioreactor is divided into separate zones, optimized for the different stages of the anaerobic digestion. This is claimed to reduce the typical treatment time from 30 to 7 days, which has important impacts on the economics of biogas production.</p> <p>Spreading liquid fertilizer on farmland is difficult during the long winter, so processes for producing a solid soil improvement product that can be stored are needed. This can involve dewatering and maturing, or conversion to biochar.</p>	2023-02-01 - 2025-10-31	

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	<p>The fate of the water-soluble nutrients, and the disposal of the liquid fraction need to be addressed. The desirable properties of biochar are improved with a higher content of lignin, which is low in food waste. Adding woody material can be beneficial both for the permeability for dry fermentation, as well as for the biochar quality.</p> <p>WP4 is responsible for certain communication activities in connection to the work package. For example, to inform the project group about the progress in the work package (internal communication) and produce content that can be used for external communication toward selected target groups.</p> <p>Outcomes & Outputs</p> <ul style="list-style-type: none"> · Due diligence guidance for future installations input for techno-economic analyses. · Process description for production of biochar and loading with nutrients from leachate. · BAT/BREF description of alternative processes, such as dry or staged anaerobic digestion and comparison of 3 alternative implementations (Eneferm, Antec, HEMAB). Identification of pre-requisites for successful operation of dry AD, and which niche applications have potential to succeed. 		
A4.3 - Bioresidue post-processing	<p>Given the long winter and distance to agricultural land for application, it is necessary to store the bioresidue, which in turn requires a reduction of the volume by dewatering and drying. The bioresidue may require maturing (such as by aerobic composting) to reduce organic acid chemicals that are toxic to plants, or to reduce the odour. This activity will investigate the processing alternatives for achieving a stable and storable product, and the characterization of the properties as a soil improvement product. This will be done with lab scale testing (Pak Choi seed germination nutrient analysis and plant pot growth trials). Estimates of the costs and value of the bioresidue as a soil improvement product will be made, in conjunction with WP3 and 6.</p> <p>Another form for post-processing of the bioresidue is to convert it to biochar, by</p>	2023-02-01 - 2025-10-31	290 630

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	<p>heating in the absence of oxygen. This can be done with pyrolysis on dry bioresidue, or hydrothermal carbonization on wet bioresidue. Both require input of energy, which can be obtained from the gas and oil components. The properties of the biochar will depend on both the properties of the bioresidue, and the conversion conditions. Biochar can be used as a soil improvement product (Terra preta), or as an absorbent (similar to activated carbon), or as a reductant for metallurgical processes (such as green steel). This activity will review the techno-economic potential for these different alternatives.</p> <p>Activities will include:</p> <ul style="list-style-type: none"> - Summary of processing technologies for dewatering and drying, with quantification of the capacity and solids retention - Analysis of the fate of the valuable components such as nutrients in the post-processing - Review of the suitability of biogas bioresidue for production of biochar, loading with leachate nutrients and the properties of the biochar that can be obtained. - Report from testing of products for home garden use. 		
A4.4 - Best practice guide and cost estimations	<p>The alternative processes evaluated in this work package need to be compared with the traditional processes, and the extent to which they give improved technical and economic performance for the prevailing conditions of the northern regions. The existing knowledge and experience from operating plants, laboratory and pilot scale testing and literature reviews will be summarized in practically oriented recommendations of best practice.</p> <p>This activity will involve preparation of reports, presentations and input to webpages, as well as interaction with target groups through workshops and study visits. This exchange will take place in connection to the activities in WP2.</p> <p>Activities will include:</p> <ul style="list-style-type: none"> - Preparation of guidelines for when to choose wet, and when dry or staged fermentation, and why. 	2023-09-01 - 2025-10-31	161 461

<i>Aktivitet</i>	<i>Beskrivning</i>	<i>Startdatum - Slutdatum</i>	<i>Kostnad</i>
	<ul style="list-style-type: none"> - Capacity, efficiency and cost estimates for alternative processing technologies - Suitability of bioresidue products for different markets - Summary of experiences in region on dry fermentation and potential for new installations - Knowledge transfer between operators, consultants, suppliers and researchers (HEMAB, Alviksgården, Antec, Eneferm, Jeppo, Macon Oy, Simon Ford (Rå biopark)). 		
WP5 - Challenges in the programme area and technical solutions	<p>Lead partner: Yrkeshögskolan Novia (Fin)</p> <p>The project aims raise the innovation capacity in the target group by finding out the main challenges and potential for development, and work on them together as case studies in this WP with the long-term goal of raising the biogas production in the region. The development in the field is happening quickly and will be made possible by having a continuous dialogue with the target group in WP2 and reference group to find out their current interests and issues. Biogas production plants in the region are usually small or medium sized enterprises, where it is difficult to keep up with or do continuous R&D.</p> <p>Furthermore, WP5 is responsible for certain communication activities. For example, to inform the project group about the progress in the work package (internal communication) and produce content that can be used for external communication toward selected target groups.</p> <p>Outputs:</p> <ul style="list-style-type: none"> · Overview of the biogas plant's common challenges in the programme area · Workshop presenting solutions to the identified challenges · More knowledge about biodegradable plastics in anaerobic digestion systems. The results will be summarized in a report. · Easy method for measurements of quality and process · Input to communication activities towards selected target groups in order to present relevant findings. 	2023-02-01 - 2025-11-30	

<i>Aktivitet</i>	<i>Beskrivning</i>	<i>Startdatum</i> - <i>Slutdatum</i>	<i>Kostnad</i>
A5.3. - Improved measurements of quality and process	<p>The nutrient variability of the produced digestate is a common problem for the biogas plants, especially when food waste is digested. This in turn makes the farmers more hesitant to use the digestate as an organic fertilizer. By introducing an easy method for measuring the most common nutrients in the digestate, it can improve the potential for using digestate as a fertilizer.</p> <p>Near-Infrared (NIR) spectroscopy will be used for this method. A portable NIR spectroscopy instrument will enable the plant to determine the vital properties of the digestate without expensive or time-consuming analyses. This information can be valuable to both farmers (nutrients) and the biogas plants (e.g., ammonium nitrogen). As regards to NIR measurements we will take advantage of the previous results from the project Bothnia Nutrient Recycling.</p> <p>Digestate samples will be collected repeatedly from at least one biogas plant in the Vaasa region. At Novia a Hone Lab Red NIR instrument can be used for these kinds of samples and Novia holds expertise in development of calibration models that is needed for the NIR instrument. Reference data of the nutrient content will be bought by external services.</p>	2023-02-01 - 2025-10-31	161 461
WP6 - Agricultural usage of organic fertilizers from biogas plants	<p>Lead partner: SLU</p> <p>Building on previous projects, the main objective of this work package is optimizing the digestate for its fertilizing properties and finding out its capacity to replace fossil, imported fertilizer.</p> <p>The benefits and risks of using different products from digestate in agriculture and horticulture needs to be evaluated. The nutrient content of digestates is important, but some nutrients such as nitrogen and phosphorous are only partly plant available within one growing season and we will evaluate how much. There are few long-term experiments for other products than sewage sludge in the literature, but in some studies the fertilizer effect of digestate products have increased over the years with repeated applications.</p> <p>The potential risk of addition of pharmaceutical compounds with digestate is also seldom studied. Another potential</p>	2023-02-01 - 2025-11-30	

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	<p>risk that needs to be evaluated is the uptake of heavy metals and abundance of impurities such as microplastics.</p> <p>Biochar made from sewage sludge and other digested wastes is a product that is interesting as a phosphorous fertilizer, soil conditioner and to enhance soil carbon storage. The main advantage is that organic contaminants are destroyed in the pyrolysis process. Compost is an established product that could get more widely used in agriculture in the future if beneficial long-term effects are shown. These two products can also be used alone or in combination as substrate or soil conditioner in home gardens.</p> <p>Liquid and dried digestate products as well as ammonium sulphate can be used to replace mineral nitrogen, potassium and sulphur fertilizers that are now imported. All these products need to be evaluated alone and in combinations in long term experiments to give a basis for advice to the agricultural and horticultural sector.</p> <p>WP6 is responsible for certain communication activities. For example, to inform the project group about the progress in the work package (internal communication) and produce content that can be used for external communication toward selected target groups.</p> <p>Outputs:</p> <ul style="list-style-type: none"> Report on agronomic and ecological value of digestate fertilizers and soil improvers, and strategies for producers to maximize the digestate value. Report on results of pharmaceutical degradation in soil in northern climate Report over literature in the field of microplastics in agricultural settings Recommendations for the safe use of one or several digestate fertilizers to food crops Input to communication activities toward selected target groups to present relevant findings 		
A6.1 Field experiment	Agricultural field experiments are needed to evaluate the true fertilizer potential of digestate fertilizer products under northern conditions. The result from such experiments, however, are dependent on	2023-03-01 - 2025-11-30	1 485 440

<i>Aktivitet</i>	<i>Beskrivning</i>	<i>Startdatum - Slutdatum</i>	<i>Kostnad</i>
	<p>the weather the actual year and fertilizers can also influence yields in the coming years. Thus, long term experiments, conducted in the same place several years are needed.</p> <p>A field experiment with digestate fertilizers to important food crops will be conducted in Umeå, Sweden. The experiment will last three cropping seasons and use digestate products such as raw and pelleted digestate, compost, biochar and ammonium sulphate. Also, combinations of these will be tested to meet the crop demand for both nitrogen and phosphorous. The effect of the biofertilizers will be compared with NPK fertilization. Grain crops, such as wheat and barley, and potatoes will be grown using conventional methods. Yields and effects on crop and soil quality will be evaluated. Interesting products from screening in A 6.4 can also be tested as additional treatments the second or third growing season.</p>		
A6.2 - Persistency of pharmaceuticals in soil in northern climate	<p>In recent years pharmaceuticals have emerged as pollutants in several environmental compartments, such as surface water, drinking water, but also agricultural soils. The application of sewage sludge onto agricultural land is a common practice in many countries. During the different steps of the wastewater treatment process, pharmaceuticals may be degraded completely or partly or accumulated in the sludge fraction (depending on their lipophilicity and other binding possibilities). This is a debated issue with sewage sludge when used on agricultural land. Knowledge about the behavior of pharmaceuticals in our soil conditions (e.g., sorption onto soil particles and degradation) were mentioned by the reference group in the Bothnia Nutrient Recycling project and we wanted to address this further.</p> <p>Our plan is to investigate the occurrence and degradation of pharmaceuticals in biosolids-soil mixtures with outdoor pot experiments. Outdoor settings and biosolids-soil mixtures from our region will be used to mimic our regional conditions with application of annual and perennial crops. To some of the pots a</p>	2023-04-01 - 2025-11-30	96 877

<i>Aktivitet</i>	<i>Beskrivning</i>	<i>Startdatum - Slutdatum</i>	<i>Kostnad</i>
	<p>mixture of pharmaceuticals will be added (the selection of pharmaceuticals will be based on previous results from Bothnia Nutrient Recycling project). The addition of extra pharmaceuticals will assure detection of the pharmaceutical behavior, in case the levels are too low in the used biosolids.</p> <p>Two pot experiments will be conducted: One two-year experiment in Umeå and one (two-year experiment in Vaasa. Each experiment will have five treatments. The soil will be sampled five times for modelling of degradation in soil and the plants will be sampled once or twice each growing season.</p>		

Budget (Kostnads- och finansieringsplan)

Kostnad

Kostnadsslag	2023	2024	2025								Totalt
Personal	1 158 143	1 236 267	1 273 060								3 667 470
Schablonkostnader	463 257	494 507	509 223								1 466 987
Summa kostnader	1 621 400	1 730 774	1 782 283								5 134 457
Projektintäkter											
Summa faktiska kostnader	1 621 400	1 730 774	1 782 283								5 134 457
Bidrag annat än pengar											
Summa bidrag i annat än pengar											0
Summa totala kostnader	1 621 400	1 730 774	1 782 283								5 134 457

Finansiering

Finansiär	2023	2024	2025								Totalt
Offentligt bidrag annat än pengar											
Totalt offentligt bidrag annat än pengar											0
Offentlig kontantfinansiering											
Länsstyrelsen i Norrbottens län	1 053 910	1 125 003	1 158 484								3 337 397
Region Norrbotten	135 116	144 231	148 524								427 871
Region Västernorrland	135 117	144 231	148 524								427 872
Sveriges lantbruksuniversitet	82 189	94 337	96 824								273 350
Totalt offentlig kontantfinansiering	1 541 448	1 652 033	1 700 880								4 466 490

Finansiär	2023	2024	2025							Totalt
Total offentlig finansiering	1 541 448	1 652 033	1 700 880							4 466 490
Privata bidrag annat än pengar										
Total privat bidrag annat än pengar										0
Privat kontantfinansiering										
BioFuel Region BFR AB	79 952	78 741	81 403							240 096
Total privat kontantfinansiering	79 952	78 741	81 403							240 096
Total privat finansiering	79 952	78 741	81 403							240 096

Stöd

Finansiering	2023	2024	2025							Totalt
19.1.1 Regionala tillväxtåtgärder Regionalt projekt	135 116	144 231	148 524							427 871

Sammanställning (Stödprocent)

Stödandel av faktiska kostnader:	8,33 %
Stödandel av stödgrundande finansiering:	8,33 %
Stödandel av total finansiering:	8,33 %
Andel annan offentlig finansiering:	86,99 %
Andel privat finansiering:	4,68 %

Rapportering och begäran om utbetalning

Stödet utbetalas i efterhand efter redovisning av faktiska utgifter

Sista datum för slutrapport

2026-03-01

Allmänna villkor för stöd

Se bilaga 1.

Beslut i detta ärende har fattats av Katarina Molin efter föredragning av Mikael Johansson Åberg.

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