Slutrapport / Loppuraportti

Botnia-Atlantica 2014-2020

Slutrapporten består av två delar/ Loppuraportti koostuu kahdesta osasta:

Del 1 avser den aktuella redovisningsperiodens aktiviteter./ Osa 1 sisältää kyseisen raportointikauden aktiviteetit.

Del 2 avser en sammanfattning av hela projektgenomförandet./ Osa 2 sisältää yhteenvedon koko hankkeen toteutuksesta.

Samordnande stödmottagare skickar via e-post in en projektgemensam slutrapport till programsekretariatet innan projektets slutdatum har infallit
Johtava tuensaaja lähettää hankkeen yhteisen loppuraportin sähköpostitse ohjelmasihteeristölle ennen hankkeen päätöspäivämäärää.

Allmänna uppgifter/ Yleisiä tietoja	
Projektets namn/ Hankkeen nimi	BioHub
Ärendereferens (ärende-ID)/ *Hankeviite (hanke-ID)*	20200866
Projektperiod (ÅÅÅÅMM t.o.m ÅÅÅÅMM)/ Hankekausi (VVVVKK – VVVVKK)	20160601 – 20190630
Insatsområde/ Toimintalinja	Innovation
Specifikt mål/ Erityistavoite	Ökad tillämpning av innovativa lösningar
Samordnande stödmottagare/ Johtava tuensaaja	Naturresursinstitutet LUKE Luonnonvarakeskus / 0244629-2
Övriga stödmottagare/ Muut tuensaajat	Biofuel Region Bfr AB (556664-1592), Keski-Pohjanmaan koulutusyhtymä (0208916-8), Seinäjoki University of Applied Sciences (2539767-3), Sveriges Lantbruksuniversitet (202100-2817), Terminalen i Bastuträsk AB (556591-5898), Vasa universitet (0209599-8)
Norska partners/ Norjalaiset kumppanit	N/A

Del 1. Senaste redovisningsperiod
Osa 1.Viimeinen raportointikausi

Redovisningsperiod (ÅÅÅÅMM - ÅÅÅÅMM)/Raportointikausi (VVVKK – VVVVMM)	201901 – 201906

Beskriv genomförda aktiviteter under senaste redovisningsperioden

- Beskriv vad som har gjorts och hur.
- Beskriv fördelningen av arbetet mellan olika aktörer i partnerskapet.
- Beskriv eventuella aktiviteter/resor utanför programområdet och hur de bidrar till projektets resultat.

Kertokaa viimeisen raportointikauden aikana toteutetuista aktiviteeteista

- Kertokaa, mitä on tehty ja miten.
- Kertokaa työnjaosta kumppanuuden eri toimijoiden välillä.
- Kertokaa mahdollisista ohjelma-alueen ulkopuolella järjestetyistä aktiviteeteista tai sinne suunnatuista matkoista sekä siitä, millainen vaikutus näillä on ollut hanketulosten saavuttamiseen

Aktivitetsbenämning/ Aktiviteetin nimi	Beskrivning/Kuvaus
WP1 Business models and rural development	Work has focused on the finalization and publication of WP1 results: a work report and two infosheets on the results of the interview survey. The input to the business support section of the BioHub model has been finalised. In addition, terminal entrepreneurs have been contacted and results have been presented to several terminals. WP1 has held three presentations at the BioHub final conference in Umeå. The work has been carried out by UVA, SeAMK, BFR, SLU and Luke. Bastuträsk terminal and Storuman terminal have contributed to the infosheet focusing on permits needed for terminal development.
WP2 Forest biomass feedstock and flows	Work has focused on the finalization of results: The results of the study on the opportunity cost of several methods for determining terminal locations in Northern Sweden has been accepted for publication in the International Journal of Forest Engineering. Some final work was undertaken on the maps that show biomass potentials in Sweden and adjustments were done to some infosheets. The results from biomass calculations on the Finnish side were adjusted to municipal level for the BioHub model and in order to bring the results closer to practice. WP2 participated in the BioHub final conference with three presentations. The work was carried out by SLU and Luke.
WP3 Terminal design, operations and logistics	Work has focused on the finalization of results: A doctoral thesis about supply chains for logging residues and small diameter have been published (Fernandez-Lacruz R. 2019), and will be defended 14th of June 2019. A master thesis about the storage design on the terminal in Bastuträsk have been finalized and is in the process of being published at https://stud.epsilon.slu.se/. Also master thesis in the area of fuel consumption on loaders at a terminal, and the logistics for

	transportation of chips at a terminal are finalized, but will not be published online before 2019-06-30. A draft manuscript about the terminal logistic for a specific terminal within the Swedish Botnia Atlantica area is ready for language editing, but will not be published before 2019-06-30. It will however be a part of the PhD dissertation of Kalvis Kons later this year, and then also published in Acta Universitatis Agriculturae Sueciae. An infosheet in this subject is planned in late June 2019. Input to BioHub model has been finalized.
WP4 Raw material quality	The focus of the work has been on the analysis of the data, i.e., results of the research work carried on during the project. Based on these results, and literature survey, content for the BioHub model part "Raw material quality" has been written. Additionally, focus has been on writing the last infosheets. All the partners (Luke, SLU, SeAMK) have participated to creation of BioHub model content. However, focus being strongly in chemistry, the main responsibility has been taken by Luke. Also, scientific publications have been written based on the results. These will be linked to BioHub model after they are published. WP4 gave 3 presentations in the BioHub final seminar.
WP5 Communication	Communication work has been highly emphasized during the last period. Work has focused on editing and publication of infosheets and newsletter, finalization of the BioHub model webpage (editing of contents and improving visual outlook and user-friendliness), and the organization of a workshop for terminal entrepreneurs in Vaasa on March 18 and the BioHub final conference in Umeå on May 7-8. The work s been carried out by BFR and COAE.
WP6 Management	Project management has arranged a meeting in the beginning of period 7 to ensure that project goals are met and the BioHub model can be finalized in time to be promoted to target groups. Management has also worked with the reporting from period 6 and payment claims from periods 4-5. Also, project partners have been instructed about final reporting. The work has been carried out by Luke with all partners participating in reporting. University of Vaasa has checked out after period 6.

Del 2. Sammanfattning av hela projektgenomförandet
Osa 2. Yhteenveto koko hankkeen toteutuksesta

Sammanfattning (på svenska)
Yhteenveto (ruotsiksi)

Beskriv vad som genomförts under projektet, hur dessa kopplats till det "programspecifika mål" som gäller för projektet, samt vilka resultat det har lett till. Stäm av gentemot "Projektets huvudsakliga mål" och "Förväntat resultat" i ert beslut. Redogör också för resultat som inte varit förväntade och eventuella goda exempel.
Kertokaa, mitä hankkeen aika on toteutettu, miten aktiviteetit on kytketty hanketta koskeviin "ohjelmakohtaisiin tavoitteisiin" sekä millaisia tuloksia aktiviteettien avulla on saatu aikaan. Verratkaa näitä päätöksessä mainittuihin "Hankkeen päätavoitteisiin" ja "Odotettuihin tuloksiin". Kertokaa myös odottamattomista tuloksista ja antakaa mahdollisesti hyviä esimerkkejä

Biohub projektet har arbetat med att skapa BioHub modellen som ett stöd för affärs och verksamhetsutveckling för de terminaler som främst hanterar skoglig biomassa. Modellen syftar till att stödja terminalers utveckling både för de traditionella råvarorna till dagens skogsindustri men även för hantering av nya sortiment för framtidens bioraffinaderier. Modellen innehåller (1) analyser av olika affärsmodeller, (2) beräkningar av biomassapotentialer och optimal placering i geografin för nya terminaler, (3) tillämpande studier av terminal design, intern logistik samt olika sätt att förädla biomassan på en terminal, samt (4) analyser av kvalitets förändringar i biomassan i en försörjningskedja.

BioHub tillhandahåller ny information om (1) sambanden mellan vald affärsmodell och lönsamhet, (2) råvarutillgångens påverkan på terminalens placering, (3) terminalens design, operativ effektivitet, samt metoder för att förädla råvaran på terminalen och (4) rekommendationer för hur råvaran ska hanteras beroende på olika slutanvändares kvalitetskrav. För att tillgängliggöra dessa resultat utvecklades BioHub modellen som ett web baserat lättillgängligt beslutsstöd för terminalägare. Resultaten kan också användas av skogsindustrier och bioraffinaderier.

Projektets aktiviteter och resultat har följt uppställd projektplan och därigenom har projektets mål mycket väl kunnat uppfyllas. Skapandet av BioHub modellen och dess implementering vid bl.a. Bastuträsk terminalen har bidragit till programmets specifika mål på " ökad användning av innovationer" i BA området. Genom det terminalnätverk som mobiliserades tidigt i projektet har projektets resultat och BioHub modellen aktivt kunnat marknadsföras till terminalägare och andra målgrupper. Detta leder till ökat användande av modellen främst inom men också utanför programområdet. Projektets partner kommer att fortsätta jobba vidare med och kommunicera resultaten också efter projektets slut.

Även andra resultat än de som beskrivs i projektplanen har framkommit. BioHub modellen visar på ett nytt sätt att på ett konkret och användarvänligt att kommunicera forskningsresultat. Att inkludera partners specialiserade på kommunikation tillsammans med forskare har visat sig vara framgångsrikt koncept. Det är mödosamt och tidskrävande att kommunicera forskningsresultat på ett sätt som når fram till målgrupperna men det har stor påverkan på resultatens tillämpning. Den kontinuerliga dialogen mellan forskare och kommunikatörer har byggt en förmåga hos projektets medarbetare att se och beskriva resultaten utifrån målgruppens eller kundens perspektiv.

BioHub projektet bygger på resultat från tidigare projekt finansierade av BA (speciellt Forest

Refine). Samarbete har nu pågått i mer än 15 år i ett konsortium byggt runt en axel mellan SLU och LUKE. Över tiden har detta byggt upp en världsledande grupp av experter med starka gränsöverskridande band inom området skogsenergi och bioraffinering. Detta har bidraget till fler projekt (TanWat, Bioraff Botnia, Green Bioraff Solutions) och nya europeiska nätverk och än mer EU finansiering till BA regionen. Resultaten har också haft en policy påverkan. Över tiden så har en del kompetens lämnat konsortiet och nya har tillkommit. Med det så sprids resultaten kontinuerligt på nya arenor. Nya former av samarbete och projektidéer utvecklas kontinuerligt för att bioekeonmi ska fortsätta att utvecklas i BA området.

Sammanfattning (på engelska)
Yhteenveto (englanniksi)

Beskriv vad som genomförts under projektet, hur dessa kopplats till det "programspecifika mål" som gäller för projektet, samt vilka resultat det har lett till. Stäm av gentemot "Projektets huvudsakliga mål" och "Förväntat resultat" i ert beslut. Redogör också för resultat som inte varit förväntade och eventuella goda exempel.
Kertokaa, mitä hankkeen aika on toteutettu, miten aktiviteetit on kytketty hanketta koskeviin "ohjelmakohtaisiin tavoitteisiin" sekä millaisia tuloksia aktiviteettien avulla on saatu aikaan. Verratkaa näitä päätöksessä mainittuihin "Hankkeen päätavoitteisiin" ja "Odotettuihin tuloksiin". Kertokaa myös odottamattomista tuloksista ja antakaa mahdollisesti hyviä esimerkkejä

BioHub has worked towards the creation of the **BioHub model** – a new business and operational model for forest biomass terminals – in order to improve the terminals' ability to cater both traditional forest industries as well as emerging biorefining industries. The work has included: (1) business model analyses, (2) calculations of potentials for different forest biomass assortments and development of a new model based on which it is possible to select the most favourable location for a new terminal on certain criteria, (3) hands-on studies on terminal layout, internal logistics and means of raw material treatment suitable for terminal environment, and (4) analyses of the changes that take place in raw material chemical composition along the supply chain.

Based on the work, BioHub has been able to provide new information on (1) the connection between business model choices and profitability, (2) raw material availability and choice over terminal location, (3) terminal design, operational efficiency and methods for upgrading raw material at the terminal, and (4) guidelines for raw material treatment taking into account the different quality demands of different end-users. Based on the results, the BioHub model was developed into the form of a web-based support tool in decision-making for terminal entrepreneurs and developers. The results are also of use for the forest industry and biorefining industry.

The activities and results of the project have followed the project plan, and project goals have been met to the highest degree. The creation of the BioHub model and its adoption into use by Bastuträsk terminal has contributed to the programme specific goal of "increased utilization of innovations" in the BA area. The project has been highly active in marketing the model to terminal entrepreneurs and developers also outside the consortium. This has led to wider use of the model among terminal entrepreneurs and developers within and outside the BA region. Project partners will continue to work on the raw material supply chain for biorefining based on the results gained during BioHub.

There have also been additional results to those anticipated in the project plan. The development of the BioHub model has taught new ways of communicating science to target groups in a very concrete, long-lasting and user-friendly manner. The choice to have organisations specialized in communication (BFR and COAE) in the consortium alongside the research organisations has proven

to be a good concept. It takes time and effort to "translate" the scientific results into language more familiar to the target group. This, however, has had a great impact on the results' usability. The continuous dialogue between project researchers and communication officers has built up skills and a more service-oriented mindset among project partners that helps to see ones work from the perspective of the end-user or customer.

Furthermore, the idea of BioHub was based on previous BA-funded projects (especially Forest Refine) and there has now been over 15 years of cross-border project cooperation between consortia that have been established around an axis formed by SLU and Luke. Over the years, cross-border cooperation has increased the competence among partners on the fields of forest energy and forest-based biorefining which has led to an international group of experts with strong ties. This has contributed to new BA projects (e.g. TanWat) and new European networks and attracted more European funding to the region. The results have also affected policies. Over the years, and at the end of BioHub, there have been personnel changes as some project personnel moves to new employment opportunities. As a consequence, the results have spread to new venues. Also, through the existing connections between (former) project personnel, ties are formed with new institutions which can lead to new ideas and new consortia.

Sammanfattning (på finska om projektet haft finska partners)
Yhteenveto (suomeksi, jos hankkeessa on ollut suomalaisia kumppaneita)

Beskriv vad som genomförts under projektet, hur dessa kopplats till det "programspecifika mål" som gäller för projektet, samt vilka resultat det har lett till. Stäm av gentemot "Projektets huvudsakliga mål" och "Förväntat resultat" i ert beslut. Redogör också för resultat som inte varit förväntade och eventuella goda exempel.
Kertokaa, mitä hankkeen aika on toteutettu, miten aktiviteetit on kytketty hanketta koskeviin "ohjelmakohtaisiin tavoitteisiin" sekä millaisia tuloksia aktiviteettien avulla on saatu aikaan. Verratkaa näitä päätöksessä mainittuihin "Hankkeen päätavoitteisiin" ja "Odotettuihin tuloksiin". Kertokaa myös odottamattomista tuloksista ja antakaa mahdollisesti hyviä esimerkkejä

BioHub on työskennellyt BioHub mallin – uudenlaisen (liike)toimintamallin – kehittämiseksi metsäbiomassaterminaaleille, jotta terminaalit pystyisivät palvelemaan paremmin sekä perinteistä metsäteollisuutta että uutta jalostavaa teollisuutta. Kehitystyöhön on sisältynyt (1) liiketoimintamallianalyyseja, (2) biomassapotentiaalilaskelmia ja uuden mallin kehitys hyvän sijainnin valitsemiseksi terminaalille, (3) käytännönkokeita terminaalien pohjaratkaisuista, sisäisestä logistiikasta ja terminaaliin soveltuvasta raaka-aineen käsittelystä sekä (4) analyyseja raaka-aineen kemiallisessa koostumuksessa tapahtuvista muutoksista toimitusketjun eri vaiheissa.

Työn pohjalta BioHub on kyennyt tuottamaan uutta tietoa (1) liiketoimintamallia koskevien valintojen vaikutuksesta terminaalin tuloksellisuuteen, (2) raaka-aineen saatavuudesta ja terminaalin sijaintia koskevista valinnoista, (3) terminaaliratkaisuista, toiminnan tehokkuudesta ja menetelmistä raaka-aineen jalostamiseksi terminaaliympäristössä sekä (4) ohjenuoria raaka-aineen käsittelemisestä ottaen huomioon eri loppukäyttäjien asettamat erilaiset laatuvaatimukset raaka-aineelle. Tulosten pohjalta BioHub-malli kehitettiin internet-pohjaiseksi päätöksenteon tukityökaluksi terminaaliyrittäjille ja -kehittäjille (esim. kunnille). Tulokset hyödyttävät myös metsä- ja biojalostusteollisuutta.

Projektin toiminta ja tulokset ovat olleet suunnitelman mukaisia ja projektin tavoitteet on saavutettu. BioHub-mallin kehittäminen ja sen käyttöönotto Bastuträskin terminaalilla ovat myötävaikuttaneet ohjelmakohtaiseen tavoitteeseen "innovaatioiden lisääntynyt hyödyntäminen" Botnia-Atlantica-alueella. Projekti on markkinoinut BioHub-mallia terminaaliyrittäjille ja -

kehittäjille erittäin aktiivisesti sekä BA-alueella että sen ulkopuolella. Projektipartnerit jatkavat työskentelyä biojalostusta palvelevien raaka-aineen toimitusketjujen parissa BioHubin tulosten pohjalta.

Biohubin seurauksena on myös odottamattomia tuloksia. BioHub-mallin kehitys on opettanut uusia tapoja välittää tieteellisiä tuloksia kohderyhmille hyvin konkreettisessa, aikaa kestävässä, käyttäjäystävällisessä muodossa. Valinta sisällyttää hankekonsortioon tiedotukseen erikoistuneita organisaatioita (BFR ja KPEDU) tutkimusorganisaatioiden rinnalle on osoittautunut toimivaksi konseptiksi. Tieteellisten tulosten ”kääntäminen” kohderyhmille tutumpaan kieleen on aikaa vievää ja vaatii erityistä osaamista. Tällä on kuitenkin ollut merkittävä vaikutus tulosten käytettävyydelle. Jatkuva dialogi projektin tutkijoiden ja tiedotusvastaavien välillä on kehittänyt taitoja ja palvelualttiimman ajattelumallin hankepartnereiden parissa, jonka seurauksena on helpompaa nähdä oma työ loppukäyttäjän tai asiakkaan näkökulmasta.

BioHub perustuu aiempien BA-rahoitteisten projektien (erityisesti Forest Refinen) tuloksille. Rajat ylittävää yhteistyötä on ollut yli 15 vuoden ajan konsortioilla, jotka ovat rakentuneet SLU:n ja Luken välille. Vuosien aikana rajat ylittävä yhteistyö on kasvattanut partnereiden kompetenssia metsäenergian ja metsä-pohjaisen biojalostuksen saralla. Tämä on johtanut kansainvälisen asiantuntijaryhmän muodostumiseen, jonka toimijoilla on vahvat siteet toisiinsa. Tämä on myötävaikuttanut uusien BA-projektien (esim. TanWat) ja eurooppalaisten verkostojen kehittymiseen sekä lisännyt alueelle houkuteltua eurooppalaista rahoitusta. Tulokset ovat myös vaikuttaneet politiikanmuotoiluun. Vuosien aikana, ja BioHubin päättyessä, osa hankehenkilöstöstä on siirtynyt uusiin tehtäviin. Tämän seurauksena projektien tulokset leviävät uusille areenoille. Lisäksi olemassa olevat yhteydet (entisen) hankehenkilöstön välillä auttavat muodostamaan siteitä uusien organisaatioiden välille. Nämä siteet saattavat johtaa uusiin projekti-ideoihin ja konsortioihin.

Hur väl motsvarade projektet utvecklingsbehovet och hur väl uppnåddes målen för projektet?
Miten hyvin hanke vastaa kehitystarvetta ja miten hyvin hankkeen tavoitteet saavutettiin?

During the past decades, there has been a lot of political will to support the markets for new forest biomass based products as part of the transition from a fossil-based economy to a bioeconomy. The emerging biorefining industries are likely to have different quality demands from those of the traditional forest industries (saw mills, paper and pulp mills, and power plants). BioHub was planned to create new supply chains that will better serve both traditional forest industries and emerging biorefining industries. To this end, the focus was put on forest biomass terminals as they are in a key position able to serve both set of industries. There was a need to create new knowledge based on which terminals could serve as “hubs” where raw material is treated and delivered forward so that the highest possible value can be gained from forest biomass.

The main goal of the project has been the development of the BioHub model, a support tool for terminal entrepreneurs and developers in decision-making, and its adoption into use at least by one forest biomass terminal. Through the realization of the goal, BioHub has contributed to the programme specific goal of increased utilization of innovations in the BA area.

The BioHub model has been created and released and it is based on the main results from the project (see next section). The BioHub model has been taken into use by Bastuträsk terminal who has also participated in its development. Strong contacts and trust have been built with the terminal entrepreneurs in the region through continuous personal contacts which is anticipated to ease the wider adoption of the BioHub model.

With the development of the BioHub model, the project has met the needs of the target groups and has made it possible for terminals to act as "BioHubs".

Vilka direkta resultat (förändringar) åstadkom projektet? Vilka effekter har resultatet?
Mitä suoria tuloksia (muutoksia) hankkeessa saatiin aikaan? Millaisia seurauksia tuloksilla on?

The BioHub model is based on a multitude of cross-disciplinary research results that have been published in 47 infosheets and 2 work reports and will be published in several theses and scientific articles. The model is comprised of the following direct results:

<u>New knowledge on business models (WP1)</u>
The project (WP1) has produced new information about the business models of terminals based on which terminals can be developed further. Focus was put on the business model analysis as our assumption was that the potential added value from biorefining to the entire value chain can only be realised if terminals constitute a profitable business in the long run. The business model concept provided tools to look at the connection between the terminal entrepreneurs' strategic choices and terminal profitability. Based on the business model analysis, terminals with a realistic view of their competences and competitive factors as well as a clear, well-structured business model where the different business model components support each other and form a meaningful whole, have the highest profitability. Based on the results it is possible to provide support in business management for terminal entrepreneurs for the future. The main effect of this has been the increased awareness of the importance of business management skills among terminal entrepreneurs in the BA area. The BioHub model's business support section can be used to refine one's business idea and clarify one's business model in order to aim to improve terminal profitability in the long run. The long-term effects of this result should show in terminal profitability.

<u>Model for selecting a location for new terminals (WP2)</u>
A good location is identified as the most common factor bringing competitive advantage to a terminal. However, there are several variables to consider when defining a good location, e.g. vicinity to industry, railroad or well-bearing roads, as well as availability of forest biomass assortments in the area. Based on the different variables, WP2 has produced new models based on which it is possible to choose the best possible location for a new terminal. The models also make it possible to weight whether the terminals should be open (i.e. available to all interested forest biomass producers) or closed (i.e. in the use of a single entrepreneur/ company). According to the results it would be very beneficial for the region if terminals were open to all forest biomass producers as this would bring cost-efficiency to the value chain.

New knowledge on the amount of available forest biomass assortments (WP2)
WP2 has calculated the amount of biomass potentials for different assortments based on the national forest inventory data of each country in order to identify the best areas for each assortment. Maps were produced showing the regional differences in the availability of the assortments. The results have also been adjusted to municipal level in order to bring them closer to practice. The produced information is of vital importance not only for terminals but also for the refining industry. For example, if the end-user industry is interested in spruce branch mass, it is now possible to find its potential availability in the BA region. Without the results, planning for future operations would be markedly more difficult.

Layout and design (WP3)
The new activities that can take place at terminals when serving a biorefinery, may also have an impact on terminal design and layout. A strict classification of existing and possible future forest biomaterial terminals in different types have made it easier to focus the terminal business in the intended segment, and to plan for future business developments. A terminal owner can then get an overview of possibilities and market segments, and easier find the best way forward for his or her specific terminal.

New results and best practice have been presented that support a decision-maker when a new terminal should be built or an old one modernized for higher efficiency and better economy. Examples about the best layout and the most suitable equipment to have at a terminal have been presented for a number of typical terminal situations. Even of higher importance is that tools and methods for analyses of any specific terminal type, size and situation have been presented. Such simulation tools are difficult for individual terminal owners to use, but with the knowledge about them presented it will be possible for a terminal owner to formulate the questions needed for an expert to use a simulation tool as a method to make tailor-made analysis.

Methods for processing of raw material into feedstock for biorefineries (WP3)
It is important to know the value of a terminal's buffering function, the change of product parameters due to storing, and the questions of comminution of assortments as well as screening and/or mixing of comminuted assortments to meet market demands. To this end, WP3 carried out many studies and practical experiments on methods for upgrading raw material. The produced new knowledge is of direct importance for cost-benefit analyses. Also a necessity for a high precision in above mentioned simulation analysis.

New methods for remotely capturing precise data on feedstock quantities (WP3)
New measurement techniques, such as a tool for direct measurement of moisture content, were evaluated. For example, for determining the moisture content (MC) of chipped fuels at Umeå Energi Dåva 2 plant, the common procedure is to take seven small samples (approx. 3 dl each) and merge them into a general sample, put the sample immediately in a freezer until scaled and oven dried for MC determination. This routine gives, however, no information about the variation in the samples (i.e. calculation of accuracy is not possible) and the amount of samples are, in practice, kept to as few as possible (as the cost of MC determination with the oven drying method correlates with the number of samples taken). However, with the tool for direct MC measurement there is no significant extra cost between

taking seven or fourteen samples, and the accuracy can be calculated. The tool is suitable for production management where the requirements of accuracy and precision are lower than for trade measurements (e.g. inventory, stock management). The use of this kind of tools for direct MC measurement can increase precision in fuel logistics management in future.

<u>Identification of and advice on key development needs (WP1-3)</u>
The more in-depth survey on terminals' development needs (WP1) showed that terminal entrepreneurs and managers most often make small improvements here and there in order to increase the cost-effectiveness of operations. Bigger issues that were considered of high importance among the entrepreneurs were, for example, a good location (along a railroad connection in Sweden and close or next to site of end-use in Finland). Based on the experiences of current terminal entrepreneurs it was possible to design studies in other WPs to match the entrepreneurs' needs and to provide advice to terminal developers on these key issues.

Advice based on the hands-on practical results from WP3 studies can be found from the BioHub model. For example, the importance of planning a short railroad within a terminal intended for loading of trains has been described in the model. The terminal area itself should, if possible, be elevated in comparison to the railroad in order to reduce the needed lifting height on loaders. Also, the work needed to clean the railroad from snow and residue biomass falling off during handling should be taken into consideration. Based on the advice terminal entrepreneurs are able to improve terminal profitability in the long run and terminal developers can learn from past experiences in order to set up a well-functioning terminal from the start.

<u>New knowledge on raw material quality management (WP4)</u>
Data on the rate and magnitude of the changes in chemical and physical properties of forestry side-streams during supply chain was provided. Especially information was provided about the degradation of valuable phenolic extractives compounds as based on the literature survey and results of our earlier project (Forest Refine), there was a gap in knowledge.

This information is essential in planning the delivery regimes for the refining industries. It is the basis of the guidelines how quality is preserved in biorefinery supply chain. Results have practical importance. It is not possible to produce high quality biochemicals with high yields from the feedstock that has been handled incorrectly and, thus ruined along the supply chain.

The results produced within WP4 provided novel information about raw material quality issues for the stakeholders (terminal owners). It gives them "tools" to be prepared for the changes in forest biomass utilization as the demand for the nature-derived ingredients to replace synthetic chemicals increases all the time. With this information we are able to minimize losses of valuable compounds in the supply chain.

The project goals were met as based on the results it was possible to formulate the guidelines for preserving quality in biorefinery supply chain.

Kommentera utfall av indikatorer

Kommentera det slutliga utfallet av indikatorerna. Jämför ackumulerat utfall mot målvärde och kommentera eventuella avvikelser samt vilka lärdomar ni har dragit av detta.

Kommentoikaa indikaattorien toteutumaa

Kommentoikaa indikaattorien lopullista toteutumaa. Verratkaa kertynyttä toteutumaa tavoitearvoon ja kommentoikaa mahdollisia poikkeamia sekä sitä, mitä hankkeessa on niiden perusteella opittu.

The intended indicator values have been met.

Näringslivets medverkan

Vad har näringslivets medverkan betytt för projektets genomförande och resultat? Beskriv på vilket sätt näringslivsorganisationer eller företag har deltagit i eller berörts av projektet. Namnge gärna företag som deltagit.

Elinkeinoelämän osallisuus

Mitä elinkeinoelämän osallisuus on merkinnyt hankkeen toteutukselle ja tuloksille? Kertokaa, millä tavalla elinkeinoelämän organisaatiot tai yritykset ovat osallistuneet hankkeeseen tai miten hanke on koskenut niitä. Mainitkaa mielellään hankkeeseen osallistuneet yritykset nimeltä

The participation of the private sector has been of utmost importance to the project. Without active involvement of terminals and end-users of biomass, the studies could not have been focused as well and the BioHub model could not have been tailored to meet the needs and knowledge gaps of existing terminals and industry. It has been key to the success of the project to have Bastuträskterminalen as a partner in the project participating actively in the development of the BioHub model.

The private sector companies have made their expertise and, in some cases, infrastructure available to the project.

In WP1, data for the business model analyses were gathered from 23 terminal entrepreneurs. The results explain terminal choices at present based on which it has been possible to provide support in business management and terminal development for the future. Via the studies the entrepreneurs have provided input to other project studies as well as the BioHub model. This input has ensured that the project studies have been tailored to meet the needs of the entrepreneurs. This has also improved the possibilities for result adoption among the target group. The contacted terminal entrepreneurs were met face-to-face at least once during the project timeframe, but several times in many cases. Respondents (participants) in WP1 surveys have been promised anonymity. However, there are several terminals that have cooperated with WP1 in other ways (e.g. networking, giving input to project studies outside the surveys, participating in project events), for example: Storuman terminal, Umeå Energi, Mellanskog, Pohjanmaan Biolämpö, BioWest (Retex), PK Bioenergi, Soffis Gränd, EPV Energia, Vaskiluodon Voima, and Metsä Group.

In WP2, many terminal owners were contacted in order to get information on the amount of terminals that exist in the Botnia-Atlantica region. Forest companies were contacted and advised when maps were produced on forest biomass potentials. For example, Sveaskog, SCA, Norra Skogsägarna, Nordmalings kommun, Storuman terminalen and Mellanskog have participated in the work of WP2. The feedback from the companies has helped to verify the results produced by WP2.

The company Domsjö Fiber has actively participated in the work of WP3. Simulations of their terminal logistics have been done, and for this, they have provided the project with many datasets needed for such analysis. They will on the other hand have huge benefits of this in the further

development of their terminal activities. Bastuträskterminalen is one of the project partners, and several of the practical studies of the project were performed there. Applicability of the results from these project studies have benefitted greatly from being carried out in actual terminal environment conditions. Storumanterminalen has been in contact with the BioHub project throughout the project duration as they have decided to develop the terminal to one of the most advanced types when it comes to terminal function.

Fresh Norway spruce bark (P. abies) was provided by UPM-Kymmene Oyj Pietarsaari sawmill for the storage studies of WP4. UPM also kindly provided the area for sawmill bark storage study. Results of the study have been discussed with them. Thus, their role on carrying out the industrial case study was significant. Lohtaja Energy cooperative provided spruce logs for a study where bark was held intact on stem wood both in summer and winter periods. This made it possible to make a comparison between industrial bark storage and roundwood storage.

A network of terminal actors has been built by WP5 via communication efforts. Several terminals and other relevant stakeholders (biomass producers, end-users, and municipalities) have been contacted as part of this work. The work has helped the project to gain visibility, trust and acceptance among key target groups but it has also helped terminal entrepreneurs and developers from Sweden and Finland to come into contact with each other. As a result some cross-border ties have been formed between terminal entrepreneurs. For example, the following companies have participated in project events or have been contacted by other means during the project timeframe:
Bruks, Penningbäcken, Holmen, Umeå Energi AB, SCA, Mellanskog, Alholmens Kraft, EPV Energia Vaskiluodon voima, Domsjö Fiber, Cintoc AB, NLC Storuman Terminalen, Umeå Energi AB, Metsäkeskus, UPM, Metsä Group, Metsänhoitoyhdistys Keskipohja, Pihlaja Forest Oy, Pohjanmaan biolämpö Oy, MTK Keskipohjanmaa, Kokkolan Energia Oy, Junnikkala Oy, K-P Metsämarkkinointi Oy, Bioendev AB, Daiwa Energy Investment Dir, Total S.A., SCA Energy, SEKAB, and Norra skogsägarna.

Gränsöverskridande mervärde

Vad har arbetet över gränsen betytt för projektets genomförande och resultat? Hur kommer samarbetet fungera efter projektets slut?

Rajat ylittävä lisäarvo

Mitä työskentely rajan yli on merkinnyt hankkeen toteutukselle ja tuloksille? Miten yhteistyö tulee toimimaan hankkeen päätyttyä?

The project has gained the competence required for the development of the BioHub model in its use only through cross-border cooperation (CBC). The development of the model would not have been possible otherwise as crucial skills and infrastructure would not have been available to the project if it had been carried only on national level. Through CBC the project has been able to build a joint solution based on which terminal development can take place during the coming years.

For WP1, CBC has been crucial in the designing the research questions. As the terminal businesses have distinctive features between the countries as well as commonalities, knowledge from both sides of the border has been a necessity in order to carry out a comprehensive analysis of the current state of the terminal business in the BA area. Without a deep enough understanding of the current state of terminal operations, it would not have been possible to provide support for terminal entrepreneurs and managers for the future. CBC has also made it possible to get a sufficient amount of respondents from the BA area to the surveys. Without CBC the amount of participants would most likely remained too low to gain reliable results.

CBC has been very important for the successful completion of WP2 work. Researches within WP2

met at least once per month (more often when needed) through Skype to coordinate the activities. The model for estimating the potentials of forest biomass in the extended Botnia-Atlantica area as well as the list on terminals in the area were direct results of discussions within WP2 that could not have been reached without CBC.

The cross-border cooperation was important in WP3. Swedish and Finnish researchers cooperated to a high extent, and participated in several field studies in both countries. The practical knowledge of the Swedish project partner "Bastuträskterminalen" was also of high value from a cross boarder perspective. Many small practical issues of high importance were discussed between the participants. Knowledge of these issues would not have been gained at a national level project.

The cross-border cooperation had remarkable role in WP4 work. By combining the expertise of Finnish and Swedish project partners we were able to produce results requiring multidisciplinary expertise, and thus reach the WP goals. After the end of the project cooperation continues by writing scientific publications based on the results.

For communication work knowledge of local circumstances has been of importance in order to effectively communicate results and identify possible barriers for result adoption.

Cross-border cooperation is well established and is going to continue by sharing experiences and applying for funding for the ideas that have come up during BioHub.

Horisontella kriterier

Beskriv hur ni arbetat med horisontella kriterier och hur det har bidragit till projektets resultat.

Horisontaaliset kriteerit

Kertokaa, miten hankkeessa on työskennelty horisontaalisten kriteerien parissa ja miten työ on vaikuttanut hankkeen tuloksiin?

SUSTAINABLE DEVELOPMENT

Bioeconomy strategies in the EU highlight the importance of replacing fossil-based raw materials with bio-based ones, using side-products efficiently, and creating new smarter products that provide higher added value. The BioHub project supports this sustainable development by providing information for the planning of supply chain from forest to biorefineries. In order to maximize the potential of biomass it´s properties should be on a certain level when it enters the biorefinery. By providing guidelines for preserving the quality, the results help the transition from synthetic chemicals towards natural ingredients.

Sustainability was also an important factor when biomass potentials and new terminal locations were calculated. Here three levels of environmental, technical and economic restrictions were taken into consideration in order to gain forest biomass supply volume.

GENDER

Considerable attention was put on gender equality based on the BA gender mainstreaming education. Both men and women were represented in various roles in the project's organizational and management structure (research, management and administration, field and lab work, etc.) and work was assigned based on competence with equal opportunities for all to participate in project work. For example, for successful implementation of project work, the work was divided into Work Packages (WP) and a leader was appointed to each WP. 50% of the WP leaders were men

and 50% women. The composition of the steering group was also based on a diversity perspective. Project partners have a long experience in participatory methods in designing meetings and other events. This ensured an equal possibility for both men and women to contribute to a creative and innovative project process.

WP1 focused on people (terminal entrepreneurs) due to which gender was taken up as a factor in the WP studies and gender related questions were included in the two surveys carried out by WP1. The results on gender equality with regards to terminal operations have been published in infosheets. Gender was not a factor explaining entrepreneurs' choices over business models or profitability. The main impact has been the raised awareness on gender equality and the benefits of gender balance among terminal entrepreneurs and managers. This can lead to more open and inclusive terminal operations in the future. However, terminal entrepreneurs seemed to be already rather aware of the problem with bad gender balance. Based on the experiences and knowledge from current terminal entrepreneurs the project has been able to give advice on some measures that can be used to attract a wider variety of people to terminal operations.

ANTI-DISCRIMINATION
Work was arranged so, that all participants could feel welcome to the project and accepted in the project group. There were several researchers involved with another ethnic background than Swedish or Finnish (Spain, Greece, Iran and Latvia).

Uppföljning, utvärdering, lärande och spridning av resultat
Beskriv hur projektet har arbetat med uppföljning och utvärdering och hur det har bidragit till att skapa kunskap och lärande, både internt i projektet och externt. Redogör för de viktigaste lärdomarna från projektet. Beskriv hur eventuell projektutvärdering har bidragit till att utveckla arbetet med projektets resultat och spridning av resultaten. Bifoga gärna slutrapport från projektutvärderingen. Hur fungerade styrgruppen? Hur upplevde målgruppen projektet (vilken respons har de gett)?

Seuranta, arviointi, oppiminen ja tuloksista tiedottaminen
Kertokaa, miten seuranta ja arviointi on toteutettu hankkeessa ja miten sen avulla on lisätty tietoa ja oppimista sekä hankkeen sisällä että sen ulkopuolella. Luetelkaa hankkeesta opitut tärkeimmät asiat. Kertokaa, miten mahdollinen hankearviointi on kehittänyt hanketulosten työstämistä ja niistä tiedottamista. Liittäkää mielellään mukaan hankearvioinnin loppuraportti. Miten ohjausryhmä toimi? Millaisena kohderyhmä koki hankkeen (millaista palautetta he ovat antaneet?)

LESSIONS LEARNED
The project's internal follow-up routines took place during steering group meetings. WP leaders have been invited to the meetings to give updates on WP progress.

BioHub has been able to curb knowledge gaps that existed on terminal businesses, biomass potentials, raw material processing and quality, all needed to design better suited supply chains for biorefineries. The most important result is the BioHub model, which was launched as a webpage in our final conference in Umeå 7.-8.5.2019 (https://biofuelregion.se/biohubmodel/). The webpage is the first and biggest source of knowledge about Nordic biomass terminals. The project partners can continue to work with issues linked to forest-based biorefining based on the BioHub model and results gained during the project.

Involving stakeholders early on to the project and keeping them actively involved throughout the project timeframe has been important for result adoption among target groups. It seems that those terminal entrepreneurs who have been contacted face-to-face in connection to project studies, have

been more likely to participate in project events and seem to have a lower threshold in taking the results into use.

The draft version of the BioHub model has been presented to stakeholders in Nov 2018 for the first time and since then to target groups during events and meetings. The idea has been to gather feedback from the target groups so that it could be taken into consideration before finalizing the model. This has helped to see its strengths and flaws from user perspective. However, feedback has mainly focused on the model contents and has been positive. Terminal entrepreneurs have noted that they wished the knowledge that can be found from the model would have been available already when they were establishing their own terminals. Also, entrepreneurs have stated that the information on the changes that take place in raw material chemical composition is of importance now, so that they can get acquainted with it already now in order to be in the forefront when biorefinery development really takes off.

When communicating research results to general public, it has been very important to use their own language. Also "cultural translations" are often needed, so it has been a great benefit to have project communication officers in both countries.

COMMUNICATING RESULTS

The BioHub model webpage is unique in that we have converted the scientific results to a language and format easier to access by the end-users. This has been done by using a visual, short, easy-to-understand language and it is also translated to both Finnish and Swedish.

The webpage is divided in three levels. The first, very general level is the video animation at the landing page explaining what a biomass terminal is (in Swedish and Finnish with English subtitles). The second level is divided in four useful themes for anyone who needs to establish and develop a terminal. In addition to this information directed to people working with terminals, we added a third level where all the scientific results from the project can be found.

By building this webpage we have compiled experience and new knowledge into one place, and it will remain available long after this project. The skills and knowledge on novel possibilities in terminal operations will continue to increase among the target groups.

Also, a cross-border terminal network was mobilised early in the project during the "terminal road trip" during which BioHub researchers visited terminals and interviewed operators and owners. These face-to-face meetings were held to build a relationship with the key target group. In addition we arranged a terminal workshop in Umeå and cross-border study tours to Finland and Sweden. These personal contacts have been a great advantage when promoting the BioHub Model and the project results. Important input has been collected from the terminal owners.

We have successfully transferred the results to all our target groups via various project events and meetings. The participants have represented all our target groups:

1. Network and end-users (terminals operators, owners and managers).
2. Business developers, refining industry, forest industry, power and energy industry
3. Forest companies and forest owners, machine manufacturers (both forest and terminal machinery)

4. Regional governments and other decision-makers, universities and the media.

THE FEEDBACK from target groups, especially terminal entrepreneurs, has been positive.

During a workshop, terminal entrepreneurs have highlighted that the new information in the model on the chemical changes that take place in the raw material during the supply chain is of crucial importance already today so that they can be prepared and in the forefront when new biorefinery and other development takes off. The entrepreneurs also mentioned the guidelines on business model development and advice on practical issues of terminal operations (stock management etc.) as something that they could take into use from the model.

Two terminal development projects, those of Pyhäjärvi and Nordmaling, have actively sought out information from the BioHub project and model. The development projects have also used the more detailed results which the BioHub model is based on. According to feedback from the projects, BioHub has produced a lot of the information that they were looking for.

Bastuträsk terminal, among others, has noted that they wish the information produced by BioHub would have been available already at the point when they were establishing their terminal. This would have saved them from many costly mistakes and helped to set up a well-functioning terminal from the start.

Several investments have secured ERDF (ERUF / EAKR) financing for terminal infrastructure during the project, especially on the Swedish side:

- Dåva Företagspark owned by Umeå Energi has secured 38 M SEK for a new railway terminal
- NLC Storuman terminal owned by the municipality Storuman has secured 36 M SEK to develop railway infrastructure
- Rundviks terminal supported by the municipality of Nordmaling has secured 23 M to develop a new terminal
- Pyhäjärven bioenergiaterminaalin selvityshanke 1.8.2018-31.12.2019: 62 370 EUR

BioHub project has cooperated with all of these new initiatives and promoted the projects with new ideas and research results.

Interactions and exchange of knowledge between terminal owners in the region, both nationally and cross-border has been strengthened and will continue for long time.

Statligt stöd till företag

Om någon del av stödet faller under de minimis- eller gruppundantagsvillkor, bifoga en lista med företagsnamn och organisationsnummer för de företag som erhållit statligt stöd.

Valtiontuki yrityksille

Jos tuen jokin osuus on vähämerkityksisen tuen (de minimis) tai ryhmäpoikkeusasetuksen piirissä, liittäkää oheen luettelo, jossa on valtiontukea saaneiden yritysten nimet ja y-tunnukset.

Terminalen i Bastuträsk AB, Business ID: 556591-5898

Övriga kommentarer
Beskriv hur ni arbetar vidare med projektets resultat efter projektet har avslutats.
Ange eventuell ytterligare information om projektet och dess resultat som bör uppmärksammas.
Muita kommentteja
Kertokaa, miten työskentelyä hanketulosten parissa jatketaan hankkeen päätyttyä.
Kertokaa muu mahdollinen hanketta ja sen tuloksia koskeva oleellinen tieto.

Bastuträsk terminal will continue to use the BioHub model and the results on which it is based according to their needs. The project partners will build new work on the results of BioHub which can lead to new project ideas. For example:

The results have comprised a part of two PhD theses at SLU and at least two Master's theses. These theses will be available at SLU's database. The project has thus contributed to competence building in the region which can lead to new project ideas and project funding. The students will continue to work with issues linked to the forest biomass supply chain and can build upon the Biohub results in their future work. SLU will also use the project results in education of forestry students and as a foundation for new R&D work.

The effect of supply chain on raw material quality has to be taken into account also when aiming at the development of the new forest biomass-based products. Thus, lessons learned in BioHub project are already utilized by Botnia-Atlantica funded TanWat project (Tannins for waste water treatment) in the development of new tannin-based flocculants for waste water treatment. They will be utilized also in future when we continue our research work within the development of new biochemicals.

Another concrete example of the utilization of the results of WP4 is that based on them a chapter is written to the digital material of book series "Papermaking Science and Technology" published by Paper Engineers' Association (in English). The book series has been used as study material in Finnish universities.

The cooperation and support to terminal development will continue after the end of BioHub e.g. within new EU Horizon 2020 project "MUSIC" where BioFuel Region is involved.

Förvaring av material och webbplats
Var förvaras eller arkiveras projektets material? Kontaktuppgifter till kontaktperson.
Vilken är projektets webbplats?
Materiaalien ja verkkosivuston säilyttäminen
Missä hankkeen materiaaleja säilytetään tai arkistoidaan? Yhteyshenkilön yhteystiedot.
Mikä on hankkeen verkkosivusto?

Project webpage: www.biofuelregion.se/biohub
OR: https://biofuelregion.se/en/projekt/biohub/

The BioHub model webpage: www.biohubmodel.se

Each partner will archive their own project material (e.g. data, cost reports etc.) and Luke as lead partner will archive joint material (e.g. joint reports, steering group minutes, etc.) in addition to its own partner material. The addresses and contact details are as follows:

Luke: electronic archives (VIRTA) and original paper documents at Teknologiakatu 7, 67100 Kokkola, contact person: Kirjaamo@luke.fi , Riitta Laitinen riitta.laitinen@luke.fi, Tel. +358 (0)29 532 2128; Marja Korpi marja.korpi@luke.fi , Tel. +358 (0)29 532 6270

University of Vaasa: Wolffintie 34, 65200 Vaasa, contact person: Elina Blomqvist, elina.blomqvist@univaasa.fi, tel. +358 (0)29 449 8508 and Hanne Seppälä, hanne.seppala@uva.fi tel. +358 (0)29 449 8087

SEAMK: Frami F, Kampusranta 11, 60320 Seinäjoki, contact person: Mari Viitasaari, e-mail: mari.viitasaari@seamk.fi and Otto Läspä, tel: +358 (0)40 6807109, E-mail: otto.laspa@seamk.fi

Central Ostrobothnia Federation of Education: electronic archives (Unit4) and original paper documents at Ollikkalankatu 3, 69100 Kannus and Närvilänkatu 8, Kokkola. Contact person: Teija Ihalainen, tel. +358 (0)44 725 0804, e-mail: teija.ihalainen@kpedu.fi

SLU: original paper documents at Skogsmarksgränd 17, 901 83 Umeå. Contact person: Jenny Högström tel. +46 (0)90 786 8730, e-mail: jenny.hogstrom@slu.se

BioFuel Region: electronic archives (all documents on external server)/ BioFuel Region AB, Storgatan 35, 90325 Umeå. contact person: Arne Smedberg, tel. +46 (0)70 817 4230, e-mail: arne.smedberg@biofuelregion.se

Bastuträsk terminal: electronic archiving, Terminalen i Bastuträsk AB, Vindelvägen 30, 93061 Bastuträsk. Contact person: Per Rud-Petersen, tel. +46 (0)70 654 2485, e-mail: per.rud@bastutraskterminalen.se

BILAGA 1: Aktivitetsindikatorer/ LIITE 1: Aktiviteettien indikaattorit

Specifikt mål: Ökad tillämpning av innovativa lösningar/ Erityistavoite: Innovatiivisten ratkaisujen lisääntynyt käyttö		
Aktivitetsindikator och definition/ Aktiviteetin indikaattori ja määritelmä	**Förväntat resultat (ansökan)/ Odotettu tulos (hakemus)**	**Utfall/ Toteutuma**
Antal deltagande organisationer som introducerar nya produkter eller tjänster *Deltagande organisationer (ej företag) som lanserar en ny produkt eller tjänst utifrån projektresultatet under projektperioden eller i anslutning till projektavslutet* *Observera att organisationerna och produkterna/tjänsterna ska kunna namnges!* **Hankkeeseen osallistuvien organisaatioiden määrä, jotka tuovat markkinoille uusia tuotteita tai palveluja** *Osallistuvat organisaatiot (ei yritykset), jotka lanseeraavat hankkeen tulosten pohjalta uuden tuotteen tai palvelun hankeaikana tai hankkeen päättymisen yhteydessä.* *Huomatkaa, että organisaatiot ja tuotteet/palvelut tulee voida nimetä!*	**0**	**0**
Antal produkter, tjänster eller metoder som utvecklas i projektet *Produkter, tjänster eller metoder som utvecklats under projektet och är vid projektslut klara för introduktion/implementering.* **Hankkeessa kehitettävien tuotteiden, palvelujen tai menetelmien lukumäärä** *Hankkeessa kehitetyt tuotteet, palvelut tai menetelmät, jotka ovat hankkeen päättyessä valmiita esiteltäviksi/toteutettaviksi.*	**1**	**1**
Antal deltagande företag som introducerar nya produkter eller tjänster *Deltagande företag som lanserar en ny produkt eller tjänst utifrån projektresultatet under projektperioden eller i anslutning till projektavslutet.* *Observera att företagen och produkterna/tjänsterna ska kunna namnges!* **Hankkeeseen osallistuvien yritysten määrä, jotka tuovat uusia tuotteita tai palveluja markkinoille** *Hankkeeseen osallistuvat yritykset, jotka lanseeraavat hankkeen tulosten pohjalta uuden tuotteen tai palvelun hankeaikana tai hankkeen päättymisen yhteydessä.* *Huomatkaa, että yritykset ja tuotteet/palvelut tulee voida nimetä!*	**1**	**1**

Antal företag som får stöd för att introducera för marknaden nya produkter *Företag som är stödmottagare eller får icke finansiellt stöd/processtöd för att lansera en för markanden ny produkt. En produkt är ny för markanden om det inte finns någon annan produkt på marknaden som erbjuder samma funktionalitet, eller att teknologin i den nya produkten är fundamentalt olika från teknologin i de existerande produkterna. En produkt kan även vara immateriell inklusive tjänster. Om produkten är ny både för marknaden och för företaget ska båda indikatorerna fyllas i.* **Niiden yritysten lukumäärä, jotka saavat tukea uusien tuotteiden tuomiseksi markkinoille** *Ne yritykset, jotka ovat tuensaajia tai saavat muuta kuin taloudellista tukea (esim. prosessitukea) uuden tuotteen lanseeraamiseen markkinoille. Tuote on markkinoille uusi, jos markkinoilla ei ole vastaavaa tuotetta joka tarjoaa saman toiminnon tai, jos uuden tuotteen teknologia eroaa selkeästi olemassa olevien tuotteiden teknologiasta. Tuote tai palvelu voi olla myös immateriaalinen (palvelut mukaan lukien). Jos tuote on uusi sekä markkinoille että yritykselle, molemmat indikaattorit on täytettävä*	**1**	**1**
Antal företag som får stöd för att introducera för företaget nya produkter *Företag som är stödmottagare eller fått icke finansiellt stöd/processtöd för att lansera en för företaget ny produkt. En produkt är ny för företaget om företaget inte redan producerar en produkt med samma funktionalitet eller att produktionsteknologin är fundamentalt olik från den tidigare producerade produkten. En produkt kan även vara immateriell inklusive tjänster.* **Niiden yritysten lukumäärä, jotka saavat tukea yritykselle uusien tuotteiden tuomiseksi markkinoille** *Ne yritykset, jotka ovat tuensaajia tai saavat muuta kuin taloudellista tukea (esim. prosessitukea) uuden tuotteen lanseeraamiseen markkinoille. Tuote on yritykselle uusi, jos yritys ei tuota vastaavaa tuotetta joka tarjoaa saman toiminnon tai, jos uuden tuotteen teknologia eroaa selkeästi olemassa olevien tuotteiden teknologiasta. Tuote tai palvelu voi olla myös immateriaalinen (palvelut mukaan lukien).*	**1**	**1**

BILAGA: INDIKATORER
LIITE: INDIKAATTORIT

Redovisning av medräknade organisationer och företag. Om projektet rapporterat företag/organisationer under tidigare redovisningsperioder är dessa färdigifyllda (och visas med ljusblå bakgrund). Se exempel nedan.
Mukaan laskettujen organisaatioiden ja yritysten raportointi. Jos hanke on raportoinut yrityksen/organisaation aiemassa raportointikaudessa ovat nämä esitäytetty (ja näkyvät vaalean sinisellä pohjalla). Kts alla olevat esimerkit.

Specifikt mål: Ökad tillämpning av innovativa lösningar
Erityistavoite: Innovatiivisten ratkaisujen lisääntynyt käyttö

Antal produkter, tjänster eller metoder som utvecklas i projektet Produkter, tjänster eller metoder som utvecklats under projektet och är vid projektslut klara för introduktion/implementering. ***Hankkeessa kehitettävien tuotteiden, palvelujen tai menetelmien lukumäärä*** *Hankkeessa kehitetyt tuotteet, palvelut tai menetelmät, jotka ovat hankkeen päättyessä valmiita esiteltäväksi/toteutettavaksi.*	
Produkt, tjänst, metod *Tuote, palvelu, menetelmä*	Kort beskrivning *Lyhyt kuvaus*
BioHub model	A web-based support tool for decision-making for terminal entrepreneurs, developers, municipalities, and the forest and biorefining industries (interested in developing their supply chain): www.biofuelregion.se/biohubmodel

Antal deltagande organisationer som introducerar nya produkter eller tjänster Deltagande organisationer (ej företag) som lanserar en ny produkt eller tjänst utifrån projektresultatet under projektperioden eller i anslutning till projektavslutet Observera att organisationerna och produkterna/tjänsterna ska kunna namnges! ***Hankkeeseen osallistuvien organisaatioiden määrä, jotka tuovat uusia tuotteita tai palveluja markkinoille*** *Osallistuvat organisaatiot (ei yritykset), jotka lanseeraavat hankkeen tulosten pohjalta uuden tuotteen tai palvelun hankeaikana tai hankkeen päättymisen yhteydessä. Huomioi, että organisaatiot ja tuotteet/palvelut tulee voida nimetä!*			
Land / *Maa*	Namn /*Nimi*	Organisationsnummer, FO-nummer / *Y-tunnus*	Produkt, tjänst *Tuote, palvelu*

Antal deltagande företag som introducerar nya produkter eller tjänster

Deltagande företag som lanserar en ny produkt eller tjänst utifrån projektresultatet under projektperioden eller i anslutning till projektavslutet.

Observera att företagen och produkterna/tjänsterna ska kunna namnges!

Hankkeeseen osallistuvien yritysten määrä, jotka tuovat uusia tuotteita tai palveluja markkinoille

Hankkeeseen osallistuvat yritykset, jotka lanseeraavat hankkeen tulosten pohjalta uuden tuotteen tai palvelun hankeaikana tai hankkeen päättymisen yhteydessä.

Huomioitahan, että yritykset/tuotteet tulee voida nimetä!

Land / *Maa*	Namn /*Nimi*	Företaget ägs av: kvinna/man/blandat	Organisationsnummer, FO-nummer /*Y-tunnus*	Produkt, tjänst *Tuote, palvelu*
Sweden	Bastuträskterminalen	Man	**556591-5898**	BioHub model

Antal företag som får stöd för att introducera för marknaden nya produkter

Företag som är stödmottagare eller får icke finansiellt stöd/processtöd för att lansera en för marknaden ny produkt. En produkt är ny för marknaden om det inte finns någon annan produkt på marknaden som erbjuder samma funktionalitet, eller att teknologin i den nya produkten är fundamentalt olika från teknologin i de existerande produkterna. En produkt kan även vara immateriell inklusive tjänster. Om produkten är ny både för marknaden och för företaget ska båda indikatorerna fyllas i.

Niiden yritysten lukumäärä, jotka saavat tukea uusien tuotteiden tuomiseksi markkinoille

Ne yritykset, jotka ovat tuen saajia tai saavat muuta kuin taloudellista tukea (esim. prosessitukea) uuden tuotteen lanseeraamiseen markkinoille. Tuote on markkinoille uusi, jos markkinoilla ei ole vastaavaa tuotetta joka tarjoaa saman toiminnon tai, jos uuden tuotteen teknologia eroaa selkeästi olemassa olevien tuotteiden teknologiasta. Tuote voi myös olla immateriaalinen (palvelut mukaan lukien). Jos tuote on uusi sekä markkinoille että yritykselle, tulee molemmat indikaattorit täyttää.

Land / *Maa*	Namn /*Nimi*	Företaget ägs av: kvinna/man/blandat	Organisationsnummer, FO-nummer /*Y-tunnus*	Produkt, tjänst *Tuote, palvelu*
Sweden	Bastuträskterminalen	Man	**556591-5898**	BioHub model

Antal företag som får stöd för att introducera för företaget nya produkter

Företag som är stödmottagare eller fått icke finansiellt stöd/processtöd för att lansera en för företaget ny produkt. En produkt är ny för företaget om företaget inte redan producerar en produkt med samma funktionalitet eller att produktionsteknologin är fundamentalt olik från den tidigare producerade produkten. En produkt kan även vara immateriell inklusive tjänster.

Niiden yritysten lukumäärä, jotka saavat tukea yritykselle uusien tuotteiden tuomiseksi markkinoille

Ne yritykset, jotka ovat tuen saajia tai saavat muuta kuin taloudellista tukea (esim. prosessitukea) yritykselle uuden tuotteen lanseeraamiseen markkinoille. Tuote on yritykselle uusi, jos yritys ei tuota vastaavaa tuotetta joka tarjoaa saman toiminnon tai, jos uuden tuotteen teknologia eroaa selkeästi jo tuotannossa olevien tuotteiden teknologiasta. Tuote voi myös olla immateriaalinen (palvelut mukaan lukien).

Land / *Maa*	Namn /*Nimi*	Företaget ägs av: kvinna/man/blandat	Organisationsnummer, FO-nummer /*Y-tunnus*	Produkt, tjänst *Tuote, palvelu*
Sweden	Bastuträskterminalen	Man	**556591-5898**	BioHub model