ANNEX TO THE ANNUAL REPORT 2020:

2. OVERVIEW OF THE IMPLEMENTATION OF THE COOPERATION PROGRAMME

Key information on the implementation of the operational programme for the year concerned, including on financial instruments, with relation to the financial and indicator data.

Indicator	Achieved	Target	Percentage achieved	Analysis
Number of enterprises cooperating with new / improved knowledge partnerships	2165	1789	121,0%	Specific objective 1.1 is well on its way to being achieved. According to programme-level targets, there was an achievement of 454% of this objective by end of 2020.
Number of improved or new innovation support measures launched for businesses	117	182	64,3%	Specific objective 1.2 is well on its way to being achieved. According to programme-level targets, there was an achievement of 585% of this objective by end of 2020.
Number of improved or new innovation support measures launched for public service delivery	90	95	94,7%	Specific objective 1.3 is well on its way to being achieved. According to programme-level targets, there was an achievement of 450% of this objective by end of 2020.
Number of green products, services and processes piloted and/or adopted by the project	291	453	64,2%	The output indicator for specific objectives 2.1 and 2.2 is well on its way to being achieved. According to programme-level targets, there was an achievement of 571% of this objective by end of 2020.
Number of new and/or improved climate change adaptation methods demonstrated	63	81	77,8%	Specific objective 3.1 is well on its way to being achieved. According to programme-level targets, there was an achievement of 252% of this objective by end of 2020.
Number of sites managed using new solutions supporting long-term sustainability	193	172	112,2%	Specific objective 3.2 is well on its way to being achieved. According to programme-level targets, there was an achievement of 460% of this objective by end of 2020.
Number of new and/or improved green transport solutions adopted	166	170	97,6%	The output indicator for specific objectives 4.1 and 4.2 is well on its way to being achieved. According to programme-level targets, there was an achievement of 332% of this objective by end of 2020.
Number of enterprises participating in cross-border, transnational or interregional research projects	4795	5011	95,7%	Compulsory output indicator

Number of research institutions participating in cross-border, transnational or interregional research projects	6740	746	903,5%	Compulsory output indicator
Number of organizations/ enterprises adopting new solutions by project end	3930	6230	63,1%	Compulsory output indicator
Number of organizations/ enterprises informed about new solutions by project end	593.308	170.140	348,7%	Compulsory output indicator

In terms of approved full applications, all four thematic priorities saw an overachievement of the 2020 milestones.

There is one output indicator for each specific objective, and these are automatically selected for the projects. In addition, all projects must provide information on the compulsory indicators as most of this data is aggregated by the European Commission to measure progress throughout the European Union. Projects report on all five indicators – even if the target is zero. Thus, each of the programme's nine specific objectives contains output indicators that capture the extent to which the pooled resources of the transnational partnership have resulted in improvements to existing practices in participating organisations/regions. These outputs serve as a proof of concept, which validates the project's approach and justifies the duplication of the approach by other organisations.

As the projects progress, the Joint Secretariat has processed an increasing number of reports. Achievement of output indicator targets can be seen above.

This table also includes an analysis of achievement against programme-level targets. From these numbers, it is already quite clear that all output targets had been overachieved by the end of 2020.

* This is the only way to make an explanation to the reference on page 26, 3.3. Table 3: An explanation for the indicator types I and O. I = Information. O = Output. These tables are pre-formatted by the SFC. Hence, no possibility to provide an explanation in the current set-up.

3. IMPLEMENTATION OF THE PRIORITY AXES

3.1. Overview of implementation

1. Thinking Growth: Supporting growth in North Sea Region economies

(This is a continuation of the text provided in the SFC under this heading):

Result targets and achievements:

Call #	Project name	Result description	Quantified target	Achievement through 2020
1	CC	New transnational SME collaborations pursuing novel creative digital opportunities/solutions	30 collaborations	0
		SMEs providing new or more efficient creative digital services or engaging with new markets for these to support sustainability of business and turnover.	50 projects	0
1	REFRAME	Political and Consumer commitment to new products of food related SMEs	€ 2.750.000	€ 3.730.000
		Increase in average turnover for SMEs participating in an RCA	5%	37,01 &
		New and/or better equipped food related SMEs	160 new business activities	534 new business activities
1	SHINE	Spin-offs from healthcare organisations	3 Spin-offs from healthcare organisations using the transnational SHINE approach based on shared value creation	11
		Strengthen regional innovation capacity	3 implementations of the jointly development integrated Business model for complex partnerships in the healthcare economy	13
1	Lean Landing for Micro SME's	Increased turnover and/or export and/or employment	20%	10 %
		Created long-term viable knowledge network	1 Soft landing network consisting of 6 NSR member countries	1
		Delivered concrete marketable new products, services or processes	160 partnerships that result in concrete new products, services or processes	157
2	In For Care	Increase economic growth by enhancing regional innovation demand	€0.5 million growth in turnover of SMEs supported by project	€ 0.56

		Improve the effectiveness of delivery of (healthcare) services by enhanced cooperation between formal and informal networks	10% increase in user experience and satisfaction	24 %
		Improve service delivery through increased efficiency of networks between formal and informal service delivery	3% reduction of costs of operating budget per year	7,7 %
2	Inn2POWER	Number of participants successfully completing the MBA module (being organized using the methodology developed in the project) within the project lifetime.	70% of participants successful * 46 participants have successfully completed MBA modules in total.	100%
		Number of SMEs that enter new transnational markets (this means delivering services or goods in a country where the SME was not active before)	50 SMEs	7
		Number of long-term (=LT) transnational SME collaborations. The LT intention involves minimum 5 years.	15 Long-term transnational innovative SME collaborations.	5
2	Like!	Deliver the next generation of smart services (with the use of data, digitization, co-design) to support increased customer value across the NSR	10% increased customer satisfaction of end users per new, redesigned or digitized service within the Like! project	21
		Deliver more cost-efficient services (for those services where process-changes occur within the Like! Project)	5% reduction in costs of those services which have been redesigned	29
2	Northern Connections	Enterprises in partner regions collaborating with innovation partners outside their own country	10	12
		Enterprises moving at least one step up on the technology readiness level	50	48
3	CORA	Enhanced level of local authorities' awareness around new telecommunication technologies and effective solutions for creating advanced digital environment in rural areas	50 local authorities being informed and trained	63
		Improved level of digital inclusion and public digital skills (local communities and enterprises) in rural areas	25% increase in share of citizens and enterprises using digital technologies and services in selected pilots	0 %
		Mainstreaming CORA approach and developing a transnational rural community around digital inclusion	200 CORA rural community members (online community platform around rural digital inclusion)	295

3	GrowIn4.0	Collection of new and improved methods and tools, ready for publication to business support organisations and other relevant target groups.	3 tool collections	0
		Test and evaluation of I4.0 tools and methods, which will help SMEs to implement new business models, techniques or competences	80 SMEs	0
3	Inno-Quarter	More cost-effective start-up programmes	25% reduction of average costs per start-up programme	0
		Increased regional market uptake of innovations	Market uptake of 30 products, services that have been realised via the integral public service of the Inno-Quarter approach	0
3	PERISCOPE	New emerging Blue Growth markets	€50 million p.a. estimated market value potential	150000
		New transnational SME collaborations pursuing novel Blue Growth market opportunities	10 collaborations	0
		Transregional Blue Growth innovation projects	2 projects	0
3	SCORE	Reduction in service provision costs using data-driven and open source solutions	10%	0%
		Improvement in service provision of authorities in the sectors of sustainability, environment and urbanism from data-driven and open source solutions	20%	0%
		Reduction in solution development time	30%	0%
5	CUPIDO	Stronger cross-sector knowledge based cooperation	8 long lasting partnerships, embodied in culture centres of excellences	0
		Increased culture business capacity	40 SMEs established	24
		Increased regional attractiveness	8 (qualitative perception indicator)	7
5	PROWAD LINK	Increased income from nature visitors / sustainable offers with focus on off-season periods.	€5 million	€70.000
		Increased investment in sustainability	€2 million	€0
		Long-term engagement and collaboration of SMEs in local and transnational networks	1000 partners	21
5	RIGHT	Increased innovation capacity	75% of participating SMEs	0

		New and Improved Collaborations That Enhance Innovation Ecosystems	90 % Share of interviewed managers/ policymakers evaluating project activities	0
		Enhanced regional innovation support capacity	75 % Share of interviewed intermediaries/ policymakers evaluating project activities	0
7	BLING	Bling will significantly improve the body of knowledge about how to develop and deploy blockchain-enabled services in local/regional government	30 government organisations	0
		Deliver a more cost effective government by reducing the cost of developing and accelerating the deployment of blockchain-enabled services	20% increase in cost effectiveness (of services changed)	0
7	FBD	Increased SME Innovation	120 SMEs	0
		Increased SME Productivity	120 SMEs	0
		Increased SME Growth	120 SMEs	0
9	COM³	Positive economic growth (employment opportunities) in the pilot regions	5%	0%
		Increased share of new companies and growth of existing businesses	10%	0%
		Increased share of rural enterprises using digital-tech locally and transnationally	15%	0%
9	NorthTick	Optimise diagnostic strategies for Borrelia infections resulting in cost efficiency	10% improvement in health economic evaluation	0%
		Reduce the number of patients with long-term complaints associated with TBDs	20% decrease in the number of patients with long-term complaints associated with tick-borne diseases	0%
		Increase the vaccination coverage in relevant areas against tick-borne encephalitis	10% increase in number of vaccines doses sold in relevant geographic areas	0%
11	EXSKALLERATE	Increased average turnover of manufacturing and construction SMEs in the North Sea Region through the application of industrial exoskeletons	10%	0
		Musculoskeletal disorders (MSDs) in manufacturing and construction SMEs reduced by exoskeleton use	75%	0
		Increase SME exoskeleton adoption rate	25%	0
11	I2I	Improved efficiency of delivery of public social services in order to improve social inclusion and	10%	0

		counteract loneliness in NSR communities/neighbourhoods		
		Improved innovation capacity of the public sector to generate innovation demand and innovative solutions to combat social exclusion	10%	0

The following provides an overview of the projects, their stages of implementation and expected results:

Create Converge: 9 beneficiaries from 5 NSR countries (UK, DE, NL, SE, DK) are focusing on getting visualisation and gaming technology sector to work together with a wide range of other sectors from architecture to science to deliver converging creative technologies (CCTs). They want to connect creative digital to these sectors to show, tell and sell. The project targets all kinds of creative technologies like animation, screen, visual effects, virtual reality, augmented reality and games; and users beyond entertainment like fashion, energy, architecture, healthcare and screen tourism. In this way, the project aims to ensure that technology is no longer seen as a niche activity, or a sort of science fiction process, but as an integral part of business as usual, driving improvements in productivity, design and delivery.

In 2020, the project published a new book called "Storytelling beyond the Screen" produced in collaboration with industry. So far the project has hosted more than 60 industry events and exchanges, and participated in more than 40 industry events which were attended by at least 1000 delegates each to promote the project. In addition, the project has established a transnational lab with more than 100 companies engaging. A total of 30,000 companies have been mapped, and the project has created a network platform as part of their new website. Lastly, three demonstrators of VR/AR are running, which work with space research, a live-streamed fashion show and the event VR Connect.

REFRAME: 15 beneficiaries (public and private) from five NSR countries (NL, BE, DE, DK, SE) looking to establish a Regional Food Frame (RFF) as an effective set of measures to scale up and accommodate urban food demands and regional supplies. The project stimulates large scale urban consumers (public & corporate) to utilize regional sourcing, to cooperate with regional suppliers and thus foster a regional innovative food frame. Reframe helps food related SMEs to find and develop smart specialization options, and to fulfill a role in a regional supply proposition.

In 2020 the project partners continued project implementation, and by the end of the year had developed 89 smart specializations and support measures. This year, the partners put strong emphasis on the consequences of the COVID-19 pandemic, which posed (and poses) a threat to many SMEs in local food supply chains. The project implemented several new local initiatives and showed how food-related SMEs, policy makers and other organizations can take actions to support the EU Farm to Fork strategy. Highlights include the following: in Sweden, REFRAME helped local food

producers sell products directly to local consumers through an online ordering system. To ease this process, REFRAME offered guidance on food regulations, pricing, etc. In the Netherlands, two organizations supported farmers in providing a local food box to consumers through an online network established by REFRAME. The boxes sold 700 in the first week; a local financial institute even donated 100 boxes to the Food Bank, a social initiative. Overall, the project has continued to have a positive impact on the turnover of local products supplied by the involved SMEs and to increase the number of local producers selling products in stores.

SHINE: 8 beneficiaries from 3 NSR countries (BE, UK, NL) worked together to find a solution within the healthcare economy to cope with the changing demography. As the demand for healthcare is continuously growing, caused by an ageing population and complex co-morbidities, the availability of resources is not catching up at the same rate. Faced with this increasingly aging population, it will be a challenge to keep tomorrow's care affordable, accessible and high-quality, tailored to the end user. The general objective of the SHINE project was to develop sustainable integrated business models for the healthcare economy to increase the innovation capacity in this sector. Starting point were the regional smart specialisation strategies since this will avoid duplication of effort and resource to solve universal challenges. These integrated business models will be built on public/private cross- sector partnerships and economic valorisation based on transnational exchange of best practises and will lead to new, innovative market opportunities, thus dealing with the future needs of healthcare.

The project successfully closed down on 31 January 2020. To help new partnerships, the project developed an e-tool guiding organisations to set up integrated business models with shared value. The tool takes users through the process step by step, from defining shared value to scaling up the business. SHINE consulted the tool in 89 countries in Europe and beyond. Over 5,000 people from 136 countries have so far explored the system. Until now, 36 new partnerships have adopted the SHINE approach. These include 11 in West Flanders, 9 in South Holland, and 16 in Scotland. From these, 11 joint ventures have matured into spin-offs aiming to bring the developed solutions to the market. Backed by the experience of the dynamic partnership and the positive feedback from companies and healthcare organizations, it was the project's ambition to further embed the new methodology for setting up integrated business models with shared added value in the healthcare economy.

Lean Landings: 16 beneficiaries (SMEs, incubators, business development and knowledge organizations) from six NSR countries (DK, SE, NO, DE, UK, NL) worked on developing and implementing a soft-landing network and concept between incubators, accelerators and partners in the North Sea Region to support the internationalisation efforts of micro SMEs and start-ups. The project was completed in June 2019. and was the first VB NSRP project to close. Overall, Lean Landing succeeded in achieving its objectives. By focusing on co-creation and relationship building, the project built a strong network with a sound physical and digital infrastructure. At project end, 276 SMEs had participated in the project, with 169 SMEs having been abroad and having been presented with new business opportunities in new markets with profit enhancing partners, potential customers or

business partners. Out of these, 157 SMEs delivered concrete marketable new products, services or processes.

In For Care: 16 beneficiaries (public and private) from 6 NSR countries (NL, NO, SE, BE, DK, UK) addressed the rising costs and need for health and elderly care in the North Sea Region by focusing on informal and voluntary care. The partnership used a quadruple helix model and co-creation sessions to improve the cooperation between informal and formal care, develop smart technological solutions to help voluntary and informal caregivers, and to foster informal care networks cooperation. The project closed in December 2019.

The project successfully produced a wealth of insights and solutions for sustainable informal care in the North Sea Region. By the end of the project lifetime, the project had delivered a 24 % improvement of the effectiveness of delivery of (healthcare) services (measured as increase in user experience and satisfaction), reduced the costs of service delivery by 7.7 % and increased SME turnover in the health care sector by 560.00 Euro by involving them in the development and delivery of innovate solutions. The project's activities resulted in mind-set changes among SMEs, carers and the political level regarding the importance and potential of informal care and the project managed to have the issue of informal care and voluntary assistance incorporated into several policy documents, thus contributing to policy changes on the local level. Several of the partners in In For Care continue to work together in the Interreg North Sea Region project Isolation2Inclusion (I2I).

Inn2POWER: 11 beneficiaries from 5 NSR countries (BE, NL, DE, UK, DK) have worked together to create incentives for SME's operating within offshore wind market opportunities. In 2020, the project launched the Company Director, an online address book containing over 2,300 registered offshore wind companies, making it easier to find domestic and foreign partners. In addition, a Network Brokerage Tool has also been implemented – allowing cluster managers to optimise their "match-making" service provision to businesses within offshore wind sector. Finally, the transnational offshore wind energy MBA which comprises 9 modules and a thesis, has had 46 graduates.

Like!: 10 beneficiaries from 5 NSR countries (NL, DE, BE, UK, DK) collaborated to develop a Local Digital Innovation Culture across the NSR, giving authorities & practitioners new skills and knowledge to deliver innovative services, to develop new ways to engage with communities, and to build more inclusive services. The Like! project addressed the themes local government are coping with in order to improve customer service delivery.

The project successfully closed on 1 March 2020. Services which were restructured by the project have reached more than 250,000 users to date. New and improved skills have been used by both local and transnational innovation teams to deliver more than 50 innovative Smart Services in the NSR that use information more efficiently, that communicate with citizens using more appropriate channels

and content, and which have helped governments move from delivering generic services to delivering truly local services that meet real community needs. These new services have now been used more than 750,000 times by citizens, organisations and SMEs across the North Sea Region.

Over the last 3,5 years the Like! project has significantly enhanced the capacity of the public sector in the North Sea Region to facilitate and deliver innovation, resulting in the development of a wide range of new and innovative services for improved public service delivery and delivering a substantive reach and impact across significant numbers of citizens and service users, organisations, and regions. Like! has delivered results at scale and shown significant engagement and impact across partners and regions.

Northern Connections: 21 partners (clusters, cities, regions and knowledge institutions) from all seven NSR countries (NL, DE, BE, UK, DK, SE, NO) have been working together to create innovation connections between their enterprises and clusters in the energy sector, to involve more enterprises in transnational innovation cooperation and to support SME internationalization. One of the key means to achieving this has been the project's Living Labs where SMEs from across (and beyond) the North Sea region were able to pitch solutions to "challenge owners" - typically public sector organisations or larger companies.

In 2020, the project continued with the implementation of project activities. The project held several living lab events, organized a third iteration of the cluster training seminar and organized its final conference. The project was able to deal with the consequences of the COVID-19 pandemic in a constructive manner, for example by moving several events to an online setting. The project also continued to work towards ensuring the transferability and durability of the project's results beyond the timeline and outside of the partnership of Northern Connections by evaluating, drawing lessons learned and preparing them in reports, which in 2020 accompanied the project's on-the-ground implementation. The project was completed in December 2020. It is currently preparing its final report.

CORA: 18 beneficiaries from all seven NSR countries (NL, DE, BE, UK, DK, SE, NO) are targeting the rural digital divide in the NSR, focusing on digital infrastructure, services and skills, aiming to enhance the adoption of internet, digital technologies and e-services in rural areas and create an environment stimulating digital innovation. To create an advanced digital environment in the North Sea Region, the CORA project works on enabling local authorities to identify their common challenges and empowers them to exchange experiences and test innovative solutions and tools.

In 2020, the project has created and fine-tuned existing courses and training materials to improve digital knowledge and skills of local authorities, enterprises and communities and made them available on the CORA training platform. The project also continued with the roll-out of the pilot activities in the partner regions throughout 2020. Overall, the project partners have made significant

progress testing digital skills, services and infrastructure solutions in the pilot regions. Towards the end of 2020, the project also started to evaluate lessons learned and to prepare its final conference, planned for Summer 2021.

Growin 4.0: 15 beneficiaries from 5 NSR countries (DK, DE, BE, UK, NL) focus on common challenges faced by manufacturing SMEs throughout the NSR. If the manufacturing industry in the NSR is to remain competitive, it needs to capture the potential for productivity and growth that Industry 4.0 has to offer. There is a profound need for an experience based and smart gathering of efficient methods, tools and knowledge to guide SMEs in their transformation towards Industry 4.0. GrowIn 4.0 aims to build strong competences and tools in the participating regions for the benefit of manufacturing SMEs. The overall objective is to raise the level of innovation and to create more growth within manufacturing SMEs who are heading for Industry 4.0. The approach is to establish a strong partnership which pool knowledge on the manufacturing industry and Industry 4.0. Main challenges and solutions in regards of implementing Industry 4.0 will be investigated.

In 2020, the project had to convert most activities to online versions, and is doing everything they can to continue project activities in spite of the global crisis. This included testing, meetings and dissemination. The project continues to carry out online training sessions across national borders, resulting in a better understanding for the tools developed in other countries and a higher degree of professionalism in the tests. The partners met virtually more often to cooperate on how best to adapt to the new situation. However, a lifetime extension of at least six months will be needed in order to successfully implement all activities.

INNO-QUARTER: 12 beneficiaries from five NSR countries (NL, SE, DE, DK, BE) are involved in the project. Inno-Quarter (IQ) provides a new way to short track innovation processes and improve the cost-effectiveness of startup support mechanisms and redirect funds towards sustainable commercialisation of more innovations. The project uses European festivals as living labs where innovators within the North Sea Region can work on their product or service and go from idea to market launch very fast.

In early 2020, the partners started with implementing the project in the well-developed annual rhythm: preparation of Inno-Quarters, including lessons learned from previous festival seasons and the selection of start-ups in Spring; which would have been by the organisation of Inno-Quarters in Summer and ex-post evaluation and drawing of lessons learned in Autumn. However, this did not come to fruition as COVID-19 led to the almost entire cancellation of the 2020 festival season. Nonetheless, the project was able to organise some Inno-Quarters. In Sweden, the festival Hallifornia still took place, though with certain adjustments. The project carried out tests in small groups where people had to register. In the Netherlands, the project was able to test some start-up solutions online during the Oerol Festival (a culture, music and coastal festival on Terschilling), which was organised completely online in 2020. The latter is a new approach, developed in light of the ongoing pandemic.

Beyond that, the project worked on more research related aspects of its approach, conducted in-depth interviews and worked on the Layman report.

PERISCOPE: 13 beneficiaries from 6 countries (DK, DE, NL, SE, UK and NO) are involved in creating a permanent innovation ecosystem to foster transnational partnerships for sustainable business development in emerging blue markets. In 2020, 5 Market Opportunity Reports were provided to SMEs, knowledge institutions and other players in the innovation chain for further development and uptake of concrete innovation actions and business development; the areas were aerial drones; drones on ships; microgrids at large ports; offshore energy hubs and offshore logistics hubs. Through deep dives, the Periscope Network has identified the emerging 3D-printing and Additive Manufacturing sectors in the Offshore Energy market. Due to the early stage evolution of this new sector, a business case is required to develop better understanding of innovative materials and the processes required to additively manufacture offshore wind turbine blades, or those in the tidal sector for example. Additive manufacturing gives designers the flexibility to realise concepts which aren't currently achievable with standard materials and processes, but these initial technical approaches need to be better understood to enable a comparative case to be built for 3D printing and additive manufacturing alternatives. New processes may enable new technological advances for example the future construction of 20MW+ Offshore Wind Turbines with blades lengths in excess of 115m.

SCORE: 13 beneficiaries from all 7 NSR countries (BE, DK, DK, NL, SE, UK and NO) are involved in the project. SCORE aims to improve the delivery of public services, tackling everything from parking and sustainable mobility to water and waste management, by using innovative software solutions based on open data that are open sourced and replicable for other cities. To create these solutions, SCORE has engaged a community of cities, developers, open data experts, and specialists in the domains of water, mobility, and environment. Together they work in an open, agile and transnational way, where they put end-users, city operators and citizens at the heart of development.

In 2020, the SCORE project developed a replication guide for open source solutions in public service delivery. The objective of the guide is to facilitate the replication of open-source smart city solutions from one city to another. Furthermore, a number of open data solutions, at different levels of readiness, are shared and used by other cities in the areas of mobility, flooding and environment. Some of the solutions have been tested at living-labs. Pilots have also been set up to encourage sharing and the replicability of data and solutions.

CUPIDO: 16 partners from 7 NSR countries (BE, DK, DK, NL, SE, UK and NO) are working to develop new business opportunities in the cultural and cultural heritage sector around the North Sea, to reinforce the economic position, competitiveness and social cohesion of local rural communities in areas with a declining population. The project is mainly about commercialisation of the cultural sector that contributes towards creating vibrant, sustainable rural communities.

In 2020 the project continued to work towards creating knowledge partnerships in several cooperation initiatives. Partners and stakeholders worked with Storytelling, VR workshops, films, online platforms, multi streaming testbeds, seminars, educational programmes and much more, in order to promote cultural heritage and supporting businesses in various ways. The CUPIDO activities about the DNA of the regions have continued with development of joint templates for regional inspiration packages to help partners share resources, knowledge and expertise to explore new business models and to support commercialisation within the culture sector.

The CUPIDO partners had also planned for activities that unfortunately were cancelled due to the Corona pandemic. Most of the partners have been able to shift physical activities into digital activities. Positive is that the Corona pandemic also has led to a new way of thinking. It has been observed in the regions that culture, including cultural heritage, has played an important role for people during the pandemic.

PROWAD LINK: 14 beneficiaries from 6 NSR countries (DE, DK, NL, SE, UK and NO) aim to support sustainable economic growth in the North Sea Region (NSR) by engaging SMEs in nature conservation, unlocking the potential of nature heritage brands as a driver for jobs and sustainable regional development. The project will develop and test innovative tools and strategies for SMEs in the NSR in order to improve access to brands provided by natural heritage sites with economic value; enhance SME sustainability in the NSR; and develop innovative marketable offers and products in a co-creation process with knowledge partners. The project will be carried out and implemented in selected pilot areas (Wadden Sea World Heritage Site, Wash & North Norfolk Coast European Marine Site) to ensure transferability of all outputs and results to designated natural areas and World Heritage properties on a national, European and potentially global scale.

In 2020, the project was strongly affected by the Covid-19 crisis as many activities such as training workshop, co-creation activities, study visits and workshops needed to be cancelled. Touristic activities first underwent a complete stop and were then forced to “reboot” extremely fast in order to absorb the increase of inland tourism in summer. In order to stay connected, to create awareness and to demonstrate a credible interest in the target groups, the project facilitated an exchange of experiences, problems and comping mechanisms between SMEs during this special time.

With some delay, but with flexibility and engagement, the project team continued the development of key elements of the project, such as the brand activation toolkit, the sustainable business models and the implementation of co-creation workshops for new and improved products. The first transnational visitor survey covering the entire Wadden Sea World Heritage area started in July 2020 with the summer holidays.

RIGHT: 14 beneficiaries (public and private) from all seven NSP countries (NL, DE, BE, UK, DK, SE, NO) are working on strengthening the competitiveness and innovation support capacity of the regional economy, with a focus on the blue growth and energy sectors. In these sectors, subject to many disruptive innovations, the current level of education and competencies will not be able to meet the

demands in the future. The project is working on bridging this skills gap by developing, adapting and testing dynamic educational programmes to prepare a strong workforce with the necessary skills to support future growth and eventually to unlock NSR innovation capacity.

In 2020 the project partners finalized regional and the transnational skills report and continued their work on the pilots. The project has started all most of its 14 pilots, but experienced some delays related to COVID-19 restrictions. Updates on the pilots are regularly published on a dedicated website, which was launched in 2020. The pilots have formed an important conduit of information and engagement with SMEs, students, educational and training institutes, intermediary agencies, strategic and interest groups related to blue and energy sectors including policymakers at different government levels and their agencies. Based on initial pilot findings, the project was able to identify key areas for policy dialogues and further explorations to produce impact analyses reports and recommendations at the end of the project.

BLING: 13 beneficiaries from 6 NSR countries (BE, DE, NL, DK, SE and UK) target the use of blockchain technology for public service delivery. Blockchain-enabled systems will allow governments to deliver a range of new solutions and service designs that have the potential to redefine the relationship between governments, citizens and SMEs in terms of transparency, trust and data-sharing. The project builds upon the substantial investments by the EU, national governments, corporations, SMEs and wider networks to provide one of the first dedicated platforms to bring these tools and approaches into local and regional services. BLING provides a unique combination of public authorities, knowledge institutions and SMEs who will work to develop and deploy blockchain-enabled public services focusing on Identity, Direct Democracy, and Customer Services. A number of pilots will be tested to demonstrate the viability of the blockchain technology for government services and other public service delivery. The project results will improve capacity-building in this cutting-edge technology applied to the public sector and help reduce the costs of public service delivery.

In 2020 the project progressed reasonably well despite the pandemic. Multiple pilot cases are completed, and some others are under development, such as a digital wallet application and the Attandency app. The project is also developing a smart contract builder tool which aims to enable non-experts to build and contribute to smart contracts. The monthly sessions of the Blockchain Lab were held and attract a broader audience since they are now online available. Two reports on the promise of blockchain have been finalized, as well as a series of academic papers. The project has actively cooperated with the Horizon 2020 project TOKEN and started the preparations for their (online) Mid-term Conference.

FBD: 12 partners from five NSR countries (BE, DE, NL, SE, UK) are working to help 300 SMEs in the North Sea Region to grow, increase productivity and innovate better by helping them to use data to drive up performance. The targeted SMEs are placed at the end of the value chain, typically located in hinterlands of larger innovation hubs. While critical to regional economies, their capacity for success

is limited by insufficient access to and ability to analyses data - about finance, legal changes and markets. The project is doing this by designing and creating new 'Horizon Scanning Knowledge Transfer' (HSKT) hubs that will provide data-analytic tools and data-harvesting capacities to support SMEs in the health technology, light engineering and agri-technology sectors, and by evaluating and disseminating the experiences from HSKT and data analytics tools.

In 2020, the project finalized the HSKT concept, developed an initial set of tools and trialled these TOOLS in a successful pilot phase across each of the six HSKT hub regions. Building on the experience of this initial pilot, the project partners identified a larger range of tools to be developed for HSKT hubs. The project also designed and implemented a system for logging the progress of each SME along the FBD process and launched the HSKT Central hub. While the launch of the full set of tools was slightly delayed due to COVID-19 related restrictions, the project is now in the operation phase. 131 SMEs are registered with FBD and making progress on their FBD journey, with 20 of them having reached the Project Set Up point, i.e. are about to start their FBD project. The project has drawn important lessons from the pilot phase and the initial findings from the project operation phase and is adapting to them throughout project implementation.

COM³: 19 partners from all seven NSR countries (BE, DK, DE, NL, SE, UK and NO) come together to address the lack of digitization of business in rural areas in the NSR. The project aims to empower local and regional public authorities in their role as innovation facilitators and enablers. Public authorities can subsequently facilitate the improvement of tech-readiness of rural businesses and exploit local potential for rural innovation and smarter growth. The project aims to develop an innovation framework for SMEs that is established and run by local and regional authorities as facilitators. It will develop the COM³ model for enhancing the tech-adoption of rural businesses, provide guiding measures and training solutions. The project was approved in July 2019.

In 2020, the project started to develop the training and coaching concept. Information has been gathered about the local and regional circumstances at the level of tech-readiness and the knowledge about design thinking in all partner regions. The creation of a rural digital business platform has been launched to encourage the cooperation. Several of the nine planned pilots to test the developed solutions have started.

NorthTick: 11 beneficiaries from all seven NSR countries (BE, DK, DE, NL, SE, UK and NO) are involved in combatting tick-borne diseases. In 2020, the project started to gather and develop a competence network around the North Sea region to handle how to combat tick-borne infections. One concrete measure has been a cooperation between Sweden and the Netherlands, where the involved beneficiaries have managed to set up an antibody test to detect human infection with the new variant of Borrelia named Borrelia miyamotoi, which is not picked up by the commercially available Borrelia antibody tests. This will enable the competence network to determine how common it is to have been exposed to this new Borrelia variant.

EXSKALLERATE: 13 beneficiaries from 5 countries (NL, DE, BE, UK, DK) focus on manufacturing and construction workers that undertake physically strenuous activities which increase the risk of health problems, disability and sick leave, leading to lower job attractiveness and job candidate scarcity. The unfilled job openings slow growth and competitiveness especially as SMEs in the North Sea region are mostly unaware of available solutions via exoskeleton adoption. The project tackles these issues by focusing on accelerating the adoption of exoskeletons into construction and industrial manufacturing SMEs. Exoskeleton use could alleviate 10-40% of muscle peak loads for passive, and up to 80% for active exoskeletons. In this way the project contributes to SME competitiveness & occupational health by making NSR a leading exoskeleton ecosystem.

Despite the outbreak of the Corona pandemic right at the start of the project, the EXSKALLERATE consortium have adapted to keep doing as many planned activities as possible under the current global circumstances. The project prepared a set of methodologies/strategies for the work packages. This has allowed the consortium to set up 8 field labs for exoskeleton testing and design improvement, organise the first 3 Information and Networking workshops and to identify over 50 metrics for the development of a brand new set of benchmarking guidelines for industrial exoskeletons. In order to develop a brand new knowledge partnership in NSR, over 165 SMEs have been pre-identified, which will be the basis of the Exskallerate Community Platform, which will launch to the public in January 2021 (a beta version is already available). These efforts (design testing, awareness-raising, dissemination…) will be used in future months to set up 30 pilot sites in manufacturing and construction SMEs.

I2I: 12 beneficiaries from all seven NSR countries (NL, DE, BE, UK, DK, SE, NO) are working together to enhance innovation in social service delivery to improve social inclusion and counteract loneliness in NSR communities and neighborhoods. These challenges have a negative impact on social cohesion and high hidden socioeconomic cost, but public authorities in the region are not yet adequately able to deal with them. To mitigate this, the project will increase the capacity of public authorities to develop innovative services and provide them with new tools and solutions. It aims to do this by improving cross-sector collaboration using a quadruple helix user-centered approach working with service-/co-design methods. It will develop and test new services and technologies and make existing public services more integrated in a quadruple helix approach and co-creation sessions. These

solutions will eventually be brought together in integrated methodologies. Focus is thereby on cost-effective preventive care, in addition to care and cure.

In 2020, the project partners kicked off the project, though the kick-off phase was overshadowed by COVID-19. The project worked on communication and awareness-raising, building relations with the stakeholders in the regions as well as on setting the scope in the regions in order to start developing interventions. It also delivered first interventions, such as the initiative "Aalst Helpt' in Belgium and a DYI-club in Aarhus in Denmark. It should be noted that in light of the ongoing COVID-19 restrictions, social exclusion and loneliness has been featured heavily on the political agenda, and the project has been reacting to this.

2. Eco-innovation: Stimulating the green economy

(This is a continuation of the text provided in the SFC under this heading):

Result targets and achievements:

Call #	Project name	Result description	Quantified target	Achievement through 2020
1	Dual Ports	COST REDUCTION by concretely implementing tangible low carbon solutions in DUAL Ports Regional Entrepreneurial Ports	20% DUAL Ports DECARBONISATION PROGRAMME COST REDUCTION	23%
		CARBON REDUCTION by concretely piloting and/or adopting tangible low carbon products and green technologies that improve utilities in DUAL Ports Regional Entrepreneurial Ports	12% DUAL Ports DECARBONISATION PROGRAMME CARBON REDUCTION	89%
1	SCALE-UP	40 Green solutions piloted / demonstrated from the meet the buyers event	These products, services and processes will expect to result in a 30% reduction in carbon emissions	31
		Reduced costs for match-making ('Meet the buyer') events for NSR cleantech clusters	25% average cost reduction	19%
2	COBEN	Climate improvement	18 CO_2 reductions – Number of NSR communities exhibiting reduction in CO_2 emissions up against the 2016 values due to adoption of COBEN's climate-energy models by the year 2030.	58
		Civic energy uptake	7.5% of the North Sea Region area served by civic energy due to the adoption of one of the COBEN Civic Energy Business Models by 2030	10%
3	Smart-Green	Productivity and quality	5 days – reduction in production time (average)	4
		Energy saving with respect to heating and supplemental light	15% reduction in kWh and gas (m3)	5
		Energy efficiency increase	10% of first data of energy efficiency per produced unit	4

3	BIOCAS	CO2 reduction	608 CO2 reduction realized by processing biomass streams by the developed BCA's, new techniques, and products during the project period - * this is under revision	0
		Biomass transformed	26 000 Tonnes waste, biomass transformed to resources or used for new applications till project end.	701
3	2IMPRESZ	Increased awareness in schools on energy and energy saving	50% % increase of students, teachers and other personnel that are aware of the concepts of energy and energy saving	0%
		Increased level of energy saving in existing school buildings via 2IMPREZS energy saving programme.	30 % of fossil derived energy saved (against baseline value)	27%
		Decreased environmental footprint of existing school buildings by CO2-reduction via 2IMPREZS energy challenges concept	7320 tonnes of CO2 related to energy consumption for heating and electricity	1926 tonnes
3	SalFAR	Energy per year needed for pumping out saltwater back into the sea to keep the farmland saltwater free.	Reduction of energy consumption by 20% by allowing more seawater in for saline farming methods.	0
		Reduction of freshwater consumption in order to improve resource efficiency	Reduction of fresh water use by 10 % by end of the project.	1%
5	Carbon Farming	Enhanced uptake of carbon farming in the agri-food chain to reduce carbon emissions above ground	10,000 Tons of Co2 (equivalent) sequestered in farming ground	0
		Optimise the application of carbon sequestration techniques to increase the effects and impact.	20 % improved soil quality in structure, water holding, biology	0
		Increased awareness of carbon sequestration as a technique to reduce carbon emission in the food supply chain and as a –regional- option to compensate for carbon emissions.	10 economic actors in the food supply chain (farmers, producers/processors, retailers, consumers) and third parties (i.e. outside the food supply chain)	2
5	DeComTools	Carbon reduction in offshore decommissioning operations	25% By piloting innovative processes and services that improve logistical and technological concepts for offshore dismantling and recycling operations BASELINE: see C.2.1 Project overall objective	0

		Cost reduction in offshore decommissioning operations	20% By piloting innovative processes and services that improve logistical and technological concepts for offshore dismantling and recycling operations BASELINE: see C.2.1 Project overall objective	0
		Raise know-how/expertise capacity in offshore decommissioning operations	1250 Raise know-how/expertise capacity in offshore decommissioning operations	0
5	INDU-ZERO	Cost reduction	Cost reduction of 50% for the production of renovation packages. The automation production process will reduce 50% of the cost compared to current manual production of renovation packages	0%
		Reducing NSR environment footprint	The showcases will reduce CO2 in the NSR region by 21,6 kton CO2 during the project. Adoption of INDU-ZERO will result in NSR CO2 reduction of 79 Mega-tonnes (Mt).	0
7	ACCESS	Reduction of smart energy grid project costs	20% Lower costs for smart grid development using upscaling methodology.	0
		Reduction of CO2 emissions	25% Average CO2 emissions reduction per city related to the pilots. General baseline: European average carbon intensity electricity*electricity consumption.	0
		Reduction of smart energy grid project development time	30% Reduced time for the set-up and implementation of smart grid demonstrator projects.	0
7	ProCirc	CO2 % saved per pilot	20%	0
		% Virgin materials avoided per pilot	20%	0
		% of waste prevented per pilot	25%	0
7	EMPOWER2.0	Increased uptake of renewable energy by households	1% 14000 households. 50% of their electricity consumption generated either by generation on their own building or on a site into which the household has invested and 100%	0
		Reduction of carbon dioxide emissions in North Sea region as result of transition to renewable energy	14.700 tonnes – Average CO2 reduction per	0

			household is 2.1 tonnes with transition to 100% renewable energy. 2.1 tonnes times 0.5 times 14000 households make 14700 tonnes total at the end of the project.	
7	OESA	Increased ocean energy capacity deployed within the North Sea Region	30%	0%
		Reduced CO2 emissions in the North Sea Region	102.000 Tonnes of reduced CO2 emissions	0 tonnes
7	SoilCOM	Utilized amount of water, pesticides and inorganic fertilizers	-5% L/ha per farm or enterprise (water, pesticides); Kg/ha per farm or enterprise (fertilizers)	0
		Crop productivity	10% Kg/ha or pieces/ha	0
		Utilized amount of quality compost	20% Kg/ha at farm or enterprise	0
9	NON STOP	CO2 reduction	2% reduction in port CO2 reduction by smart digitalized management systems	0
		Energy reduction	8% reduction in port energy consumption and pollution by smart digitalized management systems	0
		Time reduction	10% reduction of the time spent for a pre-set defined port maintenance / operation by introducing smart management platforms	0
9	WASP	HFO Heavy Fuel Oil / Marine Diesel Oil saved with Wind Propulsion Technology (WPT)	Measuring starts with WPT in operation. WASP performance indicators will be used. Measuring methods will be aligned with EU Emission Control Area policies and the Energy Efficiency Design index.	0
		CO2 reduction realized during the project period with WPT in operation	Measuring starts with WPT in operation. WASP performance indicators will be used. Measuring methods will be aligned with EU Emission Control Area policies and the Energy Efficiency Design index	0
		KWH generated with WPT's in WASP during the project with WPT in operation	Measuring starts with WPT in operation. WASP performance indicators will be used. Measuring methods will be	0

			aligned with EU Emission Control Area policies and the Energy Efficiency Design index	
11	CIRC-NSR	Further adoption of CE initiatives and governance models	Through pilots as well as the further processes leading to the improvement of the governance set-up in the piloting regions	0
		CO2 reduction	Tons of CO2 annually saved	0
11	STRONGHOUSE	50 Kiloton CO2 emission reduction	A substantial reduction of CO2 emission of their home	0
		100 million-euro investment in the reduction of CO2 emission of homes in the North Sea Region	Through the instruments shared, developed and disseminated by Stronghouse 0homeowners and neighbourhoods invest substantially in the reduction of CO2 emission of their home	0
		15.000 homes with substantially reduced CO2 emission	Reduction of the environmental footprint of their homes through energy effiency and/or renewable energy sources, after energy renovation	0

The following provides an overview of the projects, their stages of implementation and expected results:

Dual Ports 16 beneficiaries from six NSR countries (BE, DE, NL, DK, SE, UK) are working together to decarbonise regional entrepreneurial ports across the NSR. Together they are exploring how to enhance ports' energy efficiency and performance, facilitating low carbonisation at reduced cost, with added value in terms of knowledge and investment. In 2020, 15 pilots were successfully deployed. Some early promising results are now available: The HEAT pilot, which focuses on expanding and developing the port of Vordingborg by using recycled products, such as contaminated soil, concrete, and excessive soil from building projects in the municipality, has displayed 40% in operating cost reduction; 28% total cost reduction and 92% carbon emission reduction for the green investment compared to the conventional ones which were deployed prior to the Dual Ports project. Another example is the SAILCARGO pilot, which focuses on testing the adaptation of a sail vessel to transport cargo by combining wind propulsion to hydrogen generation. 12% in operating cost reduction; 12% total cost reduction and 98% emission reduction compared to truck + ferry in the considered case; i.e. of a 50 tonne sailing cargo vessel between Osteende (BE) and Ramsgate (UK).

SCALE-UP 8 beneficiaries from six NSR countries (BE, SE, DE, NL, DK, UK) help clean-tech SMEs bring 40 green services and products onto the market. Through targeted 'Meet the Buyer' events, SMEs can pitch their innovative concepts to procurement officers of large buyers. This way the project offers

concrete transnational business support services. These 'Meet the Buyer' events are designed to match large enterprises (buyers) to cleantech suppliers (innovators). The project has contributed to moving towards decarbonisation by accelerating the uptake of new technology aimed at reducing CO2 levels. So far 31 success cases have been implemented, leading to an average of over 30% CO2 reduction. In total the project has triggered nearly €24 million in investments.

COBEN 11 beneficiaries from all 7 countries (DE, NL, SE, DK, NO, BE and UK) are exploring how to improve climate and civic energy uptake. This is mainly being done by facilitating transnational cooperation on local energy promotion within a collaborative civic energy network.

The mid-term conference in 2019 concluded with the unanimous adoption of the European Commission's invitation to set up a European Civic Energy Forum. Keynote speaker Brendan Devlin of the European Commission's DG Energy urged more initiatives like COBEN and he proposed that COBEN write a European handbook providing examples of civic energy implementation. A permanent European Civic Energy Forum would allow Europe to capitalise on COBEN's results and promote community energy on a large scale.

This journey and approach have continued in 2020. With the approved extension in 2019, new and additional focus areas now include the market uptake of civic energy, digitalization, policy innovation and measures to mainstream the civic energy process. One such example of concrete implementation and uptake of civic energy is the example in the pilot in Uppsala municipality, Sweden. In Uppsala a possible community energy case has been recruited to the matchmaking platform. This involves a building, which contains a mobility house with 60 charging points for electrical vehicles, apartments for students and a grocery store. The mobility house is equipped with solar panels and a battery storage. The idea is to connect the mobility house, the apartments and the grocery store to share and use the energy.

SmartGreen 12 beneficiaries from six NSR countries (DE, BL, NL, NO, DK, UK) are working together to reduce energy use, increase the energy efficiency and optimize the productivity of the North Sea greenhouse industry. The partners are using Big Data analysis of climate and production data to pinpoint unnecessary energy use and to improve the climate control and combine it with research and practical demonstrations in commercial greenhouses.

In 2020, the project partners continued with the implementation of the project. Highlights include: the continuation of different tests (e.g. effects of use of LED, different lightning regimes, sensors and multilayer growing system), the update of ICT solutions, and the continued development of a cloud based integrated workspaces. The project also continued work on the horticultural ontology, including a dedicated website and graphical user interface as well as on software development, data sharing and on the development of machine learning models and algorithms. Project partners have also written several research papers (some presented at conferences, submitted and accepted for

publication). The project is well-represented among the relevant stakeholders and has delivered interesting results in terms of data management and ontology development in 2020.

BIOCAS 18 beneficiaries from four countries (NL, BE, DE, DK) work together for a more sustainable conversion of biomass. The approach is built on 18 regional initiatives around technologies, processes and businesses for the conversion of biomass streams. In 2020, one of the most concrete results was the launch of reusable festival cups. Through the set-up of a transnational team (the Province of Fryslân, NHL Stenden University of Applied Science and Van Hall Larenstein University of Applied Sciences, Limm Recycling from the Netherlands, and World Perfect from Denmark); students of the Frisian Design Factory designed a handy cup holder, in which festivalgoers could easily carry the cup to stimulate reuse. Applied researchers from the Frisian Design Factory, HoD, sustainability consultants from the Danish World Perfect and LIMM tested the cup at Welcome to the Village festival, so that the first prototypes could be checked and then improved. 83 kilos of biomass were used and transformed in making a new batch of biocups. The final goal is to also implement the cup in public buildings, schools, universities, municipalities. develop a re-usable and biodegradable cup.

2IMPREZS 10 beneficiaries from five countries (NL, FL, DE, DK, UK) come together to empower school children at 141 schools in the North Sea Region to take a leading role in reaching 30% energy savings and reducing emissions by 7,320 tons of CO2. In 2020, the main output was a joint energy saving programme, tested in different NSR school environments and conditions and replicable in and beyond the North Sea Region, which will support the new 2030 framework for climate and energy, 2030 energy strategy. The project also entered the North Sea Region Video Contest 2020 and was awarded the gold medal in the ‘people in focus’ category.

SalFar 14 beneficiaries from all seven countries around the North Sea (NL, FL, DE, UK, SE, NO, DK) are working together on the degradation of farmland due to salinization. In summer 2020, the partnership expanded with three new Danish partners (Food & Bio Cluster; SAGRO and University of Aarhus). The same year the new baseline study report was released by the University of Lincoln. The baseline study report focused on three main areas: 1) an assessment of the economic impacts of salinity-induced land degradation and adaptation options; 2) a survey of relevant EU agri-environment policies; and 3) the development of an indicator framework and an inventory of the extent and severity of salinity-induced land degradation in the North Sea region (NSR), including the production of “salinization maps”, to inform the scope for implementing innovations in salt tolerant and saline agriculture. The main take away is the fact that a review of studies on the impacts of salinity show that salinity intrusion costs range from € 577 – 610 million per year in Europe and are projected to increase significantly with sea-level rise over time.

The project has expanded its test fields from the original 10 test fields to 16 with different soils like clay, sand or a mixture of both for testing a variety of crops, grains, halophytes and pasture grass.

Carbon Farming Seven beneficiaries from four NSR countries (BE, DE, NL, NO) are developing new and innovative farming methods to reduce the carbon footprint of agriculture in the North Sea region. More specifically, the project is using carbon sequestration methods, which have been scientifically validated, but for which the potential for up-scaling and demonstration in practical farming has not yet really been exploited. To mitigate this, the project is conducting a feasibility study on the economic viability of carbon sequestration methods for farmers in the NSR and tests and validates economically viable business cases for CS in the whole agri-food chain.

In 2020, the project published an inventory of carbon sequestration techniques, which shows a concise overview based on scientific literature. It also held a second and third call for participation in Carbon Farming showcases. The main highlight of 2020 was the organization of the project's first showcases, which are the project's pilots. The partners also continued their work on the development of business cases, where they held five co-creation sessions on potential incentives for carbon sequestration and have been working on an overview of business models for the economic and ecological viable adoption of CS. Beyond that, the project worked on a joint methodology and setting a baseline to measure impact of CS techniques, which is relevant for the measuring the achievement of the project's results.

DeComTools 13 beneficiaries (private and public) from six countries (BE, DE, DK, NL, NO and UK) are involved in the project. The partnership aims to develop a sustainable approach to the offshore wind farms' end of lifecycle. DecomTools is doing this by devising and developing eco-innovative processes of decommissioning and repowering offshore wind parks, and by combining innovative and already existing technologies in the areas of logistics, safety, ship design and up-/re-cycling. These are validated by demonstration pilots.

In 2020, the partners continued project implementation. Highlights include: the initial version of the Live Product Modelling Software, the first version of the “Decommissioning decision support system" including decommissioning cost formulations and the first draft of the Discrete Event Simulation Model. The partners have finalized several reports, including a Stakeholder Inventory on concerned stakeholder groups, ranging from investors, producers, suppliers, to customers, employees, training centres and infrastructure providers as well as a Market Analysis, which underlined the need to need to meet the DecomTools objective of reducing the environmental footprint and costs related to the dismantling of offshore wind parks becomes even more urgent. Two workshops were held on the issue of recycling and a Master Thesis on the "Assessment of recycling potential and system circularity of offshore windfarms" was realised. Lastly, the project raised awareness on the project´s objectives and interim findings in the offshore wind community.

INDU-ZERO 14 beneficiaries from six countries (BE, DE, NO, NL, SE, UK) are working together to design a blueprint for a factory that can produce these renovation packages at an industrial scale. The project is preparing a blueprint for smart factories delivering net zero energy renovation packages at industrial scale and at half the cost. The standardized INDU-ZERO approach can be applied to terraced houses and apartments built between 1950 and 1985.

The project has received a lot of attention. In 2020, the project was selected as one of the talks during the 19th European week of Regions and Cities in October 2020. The project was also featured in the 'This is Europe' podcast, which offers a series of stories of collaboration and cooperation from across the European Union, brought to you by the Interreg Community. Finally, the project was also mentioned in a letter from the Dutch commissioner of the king in Overijssel to Frans Timmermans of the European Commission. In the letter, the commissioner states that INDU-ZERO is one of two projects within the province of Overijssel which offers solutions within the built environment as stated in the Green Deal.

ACCESS 10 beneficiaries (public and private) from five NSR countries (NL, SE, FL, UK and DK) are working together to advance the coordination of future low-carbon energy grids development in cities. The focus is to increase the capacity of governments to scale up and plan future investments in low-carbon smart grids. A transnational and transferrable Upscaling Framework will be developed for supporting cities in systematically upscaling their smart grid projects with reduced costs and time. The project aims to reduce CO2 emissions in smart-grid pilots by at least 25% through the uptake of resource-efficient, sustainable technologies and processes enabling increased renewable energy generation, reduced consumption, and optimized management. In 2020 the preparation of the four smart grid pilots (West Suffolk, Mechelen, Amersfoort and Malmö) where they will test and adopt new low-carbon technologies, energy services and business models were initiated. Progress towards result indicators will be measured once pilots will start running and finally addressed by project end.

ProCirc: 11 beneficiaries from 6 countries (NL, FL, SE, UK, DK and NO) experiment to learn how circular economy and procurement can benefit the region. To fully benefit from circular opportunities and to contribute to the international development of circular economy, ProCirc will conduct 30 pilots to demonstrate procurement opportunities. Each pilot aims to reduce 20-25% raw materials, waste and CO2 emissions. Insights and tools regarding specific sectors like construction, furniture and ICT will be disseminated in the North Sea region by creating an active transnational network on the topic.

In 20202, many activities were shifted online or postponed due to the Covid19 pandemic. However, in spite of this, the partnership has kept the pace up and made progress in other activities. A first event for pilots was also arranged in March where the pilots and other invited stakeholders were introduced to the project and the first version of the toolbox. A space has been created on the Online Communication Platform to facilitate communication with and among the pilots. The project did confirm 2 new pilots during the period and have 23 pilots that are still expected to progress over the next periods. The challenges posed by Covid-19 also resulted in the development of new perspectives on circular procurement with the aim to practically demonstrate how a circular economy can support a green recovery transition. For instance, the Circular Office CoP is refocusing on practical examples from circular suppliers who can repurpose office equipment for home use and is surveying delegates to determine how the pandemic is likely to impact their workplace environment in the future.

EMPOWER2.0 15 beneficiaries from four NSR countries (BE, DK, NL and UK) are addressing entry barriers to citizen-led energy transition in the NSR. Citizens encounter significant challenges (governance, technical, legal, financial) in playing an active role in the energy market. Empower2.0 will create a framework to remove these barriers through empowerment of "prosumers" (citizens or social structures that produce as well as consume energy) and local energy communities.

In 2020, the project partners did important work on the (technical) preparation and planning of the pilots, such as delivering the transnational in-depth analysis, establishing management structures and starting the tender for the physical installations. Beyond that, the partners also made contact with the relevant stakeholders on the ground necessary for pilot implementation. The project also defined structures (Value Proposition Canvases and Business Model Canvases) and plans for further development and refinement of the prosumer propositions through interactive sessions. The first of these sessions took place in June. The project presented a prototype of the EMPOWER2.0 toolkit, which aims to organize large scale engagement in the local energy transition and will evolve into a freely accessible online digital platform, co-created with stakeholders and end users. It started work on the online training for local authorities, which will be held to test the first toolkit prototype. Lastly, the partners continued with the development of a whitebook, including a mapping of legal, technical, social/behavioural and financial/organisational challenges.

OESA 13 beneficiaries from six NSR countries (DE, NL, UK, SE, NO, DK) work together to create an accelerator programme for SMEs in the marine energy sector. They work together to develop new services to support accelerated deployment of ocean energy parks in NSR. The partnership will realise the deployment of 4 pilots during the project that will increase the installed ocean energy capacity with 30% and reduce 100.000 tonnes CO2 emission. In addition, OESA engages policy makers, offshore companies and investors to realise even more deployments.

In 2020, all parties had the opportunity to continue working collaboratively on the development of their technologies and the deployment of the new pilots. So far, 3 out of 4 pilots have been successfully launched: (1) Seabased pilot: Developer of wave energy systems including linear wave energy converters and corresponding marine sub-stations; (2) SeaTwirl pilot: A developer of vertical axis floating offshore wind technology; (3) Floating Power Plan pilot: A developer of hybrid floating offshore wind and wave energy converter systems. More information on the fourth and final pilot will be available in the next report.

SoilCOM brings together 12 beneficiaries from 5 NSR countries (DE, DK, NL, BE and UK) to develop and implement new quality compost products for specific uses, as economically and environmentally effective soil improvers. The project aims to increase the demand for compost and enhance the recycling of biological waste suitable for composts as part of the growing circular economy. The project also involves a governance element and wants to provide NSR authorities involved in biological waste, compost and water management with tools to regulate and administer the sector.

In 2020, the project sampled and analysed compost for physical, biological and chemical pollutant properties. Plans have been drafted for testing the effect of these compost on plant growth in pot trials. Information on compost production, quality and use is sought after and shared by farmers and producers through online channels of SoilCOM and through demos across the regions. Questionnaires have been used to address quality demands and use of farmers' compost.

NON STOP 8 beneficiaries from four NSR countries (DE, NL, BE and DK) are working together to implement a green smart digital transition in the management of NSR por. This will be achieved by introducing, testing, and monitoring intelligent technologies and processes in the storage, deployment, sharing and transmission of data related to marine conditions, sea/landside operations and energy production / consumption / distribution in ports. The goal is to reduce by 10% the time of pre-defined logistical / maintenance port operations and lower by 10% the port energy and pollution by building on collaborative expertise and joint practice.

The project was approved in June 2019 and they submitted their first report in 2020. One of their pilots consists of a digital real time system where the objective is to monitor and show the level of air, light, and noise pollution from the ports. For instance, sensors will be installed in the port of Helsingor in light poles to ensure real time data on the port and the users.

WASP 15 partners from all seven NSR countries (NL, DE, BE, UK, DK, SE, NO) are working together to accelerate the uptake of hybrid wind assisted ship propulsion (WPT) on sea in the North Sea Region. WPTs are becoming increasingly economically viable, are future proof and offer great potential for fuel and emission reduction. However, at present, WPT operational expertise is weak and fragmented among different players in the NSR. To mitigate this, the project will deliver third party validation of capital and operational performance to encourage market uptake, set up and connect WPT sea trials and improve WPT concepts. With this, the project will enable WPT market penetration and contribute to greener NSR sea transport. The expected results will be considerable CO2, SOx, NOx emissions reduction as well as a reduction of heavy fuel oil/marine diesel oil consumption.

In 2020 the partners continued with project implementation. A main highlight from 2020 is the delivery of the project's first two pilots, namely the installation of WPT on two vessels of project partners. Further pilots were under preparation and will be delivered in early 2021. This was accompanied by first testing with these two pilots and the development of related performance indicators. Additionally, the project started work on the business cases and organized a first business case workshop. The partners published reports, such as the report 'New Wind Propulsion Technology - A Literature Review of Recent Adoptions'. Master theses within the scope of the project were also realized. Lastly, the project partners continued engaging with stakeholders and project promotion, with good success so far.

Circ-NSR 9 beneficiaries from 6 NSR countries (DE, BE, NL, NO, DK and SE) aim to bring the North Sea Region on a path to a stronger Circular Economy by supporting better Circular Economy governance structures. They are addressing the fact that at this stage, there are many fragmented initiatives without an overview of the mechanisms and conditions for securing uptake of successful pilots into mainstream policy and wider governance framework. To mitigate this, the project will develop an overview of existing initiatives to uncover enabling conditions and causal mechanisms for success. These will be validated through eight pilots. From both streams of activities, findings are captured in a governance transfer centre including an online toolbox targeted at municipal, regional & sectorial actors to inspire them for adapting practices and improve Circular Economy governance structures. The project was approved in December 2019.

In 2020 the partners kicked off project implementation. The project has started to share knowledge and experiences on the governance mechanism behind circular economy initiatives, initiated its planned eight pilot projects, and made first steps towards collecting governance experiences from a wide range of projects and organisations across Northern Europe. A highlight in 2020 was the project's participation at the 2020 European Week of Regions and Cities, where they co-hosted a policy workshop on the circular economy.

Stronghouse 14 beneficiaries and 5 sub-partners from 6 countries (DE, BE, NL, UK, DK and SE) are working together to change the attitude and behavior of individual homeowners and neigbourhoods. The aim is to adjust and redesign these measures based on a better understanding of the drivers that motivate homeowners – individually and on a neighbourhood level - to invest and reduce the environmental footprint of their homes. Together these redesigned measures support homeowners in their journey from initial interest, to planning, financing and contracting energy renovation. Therefore, the partnership has been set up to address and develop support measures that lead to lower costs and thus make energy renovation more affordable.

The project was approved in December 2019 and submitted their first report in 2020. As for all projects, Covid-19 related restrictions made physical meetings impossible. Thus, the partnership has moved cooperation and learning online, while also increasing the use of digital and other distanced tools to engage with homeowners, neighbourhoods and enterprises. The areas of focus are: (1) Instruments and tools that enable individual home-owners to invest in energy efficiency and renewable energies; (2) A neighbourhood-approach to organizing the necessary scale and drivers to invest; (3) Market access for regional SME’s specialized in energy renovation for individual home-owners and (4) Adoption strategies for implementing these instruments, approaches and market access. More tangible results will be available in their second report which will be submitted in May 2021.

3. Sustainable North Sea Region: Protecting against climate change and preserving the environment

(This is a continuation of the text provided in the SFC under this heading):

Result targets and achievements:

Call #	Project name	Result description	Quantified target	Achievement through 2020
1	BwN	Climate change resilience increase at target sites.	10 %	17 %
		New catchment areas managed using shared BwN techniques as a result of the effectiveness of project demonstrations, based on Building with Nature principles.	550 km	10938 km
		New coastline plans using shared insights, designs and demonstrations of the effectiveness of the methods of Sand Nourishments, based on Building with Nature principles.	700 km	700 km
1	FAIR	Increase in the number of functions of the targeted infrastructure in comparison to current mono functions	2 # of functions	2 # of functions
		Reduction of life cycle costs of flood protection infrastructure	5 % decrease	5 % decrease
		Increase in the lifespan of targeted infrastructure	5 % decrease	5 % decrease
1	NorthSEE	Reductions of time spent on application procedures for interconnectors and transboundary EIA procedures	36 Months	-
		Avoidance of stranded investments for application of wind farms in designated shipping routes, and of sunk costs for development of unsuitable environmental areas	60 Mio. €	-
		Cost savings by exchange of data	300.000 €	-
1	TOPSOIL	Water quality. Improvement of quality by 20%.	25%	27%
		Water quantity. Improvement of buffer capacity by 20%.	25%	33%
		Water quantity or quality (extension pilots)	10%	-

1	WaterCoGovernance	Long term cross sector commitment (sustainability) to co-governance in pilot areas	3 years	-
		Increased return on public investment by adopting participatory/ co-governance approaches to management of NSR ecosystems	20 % increase	20 % increase
		Improvements to the environmental status of pilot areas	15 % increase	10 % increase
2	BEGIN	Reduced probability of floods from extreme rainfall	30 %	50,73 %
		Reduced expected impact from flood events in NSR by 2020	9 Mio. €	17,9 Mio. €
		Increased long-term financial performance of investments, including social, environmental and financial benefits	430 Mio. €	347,2 Mio. €
2	FRAMES	Resilient authorities: Increase the awareness, capacity and policy drivers for public authorities and practitioners to taking action to reduce the impact of flooding	2 scale increase from baseline; aggregated improved resilience level for 13 flood prone areas measured by increase of average capacity on a scale from 1 to 10	0,5
		Resilient areas: Achieve an improved level of resilience against the impact of flooding in areas	2 scale increase from baseline; aggregated improved resilience level for 13 flood prone areas measured by increase on 1 to 10 scale	0,7
		Resilient communities: Achieve an improved level of resilience against the impact of flooding in at-risk communities	432 stakeholders and 2800 inhabitants have an increased level of self-efficacy and resilience in case of flooding through	432

			empowerment of inhabitants and sustainable coalitions	
2	NuReDrain	Direct reuse of P-containing filter material as fertilizer	20 %	-
		N removal in demonstration sites	50 %	80 %
		P removal at demonstration sites	70 %	-
2	PARTRIDGE	Increased capacity to improve farmland ecosystems across NSR	100 %	55 %
		Farmland ecosystems improved	30 %	10 %
2	Sullied Sediments	Reduced economic cost of disposal of dredged material	10 %	1
		Reduced level of selected watch list chemicals in outflow from waste-water sites piloting spore technology	25 %	10
		Reduced level of selected watch list chemicals in inflow to waste-water sites in catchments piloting behaviour change activity	20 %	1
3	CANAPE	Carbon captured	1640 tons of CO2-eq/year	79 tons of CO2-eq/year
		Profit per Hectare	2089 €	-
		Reduction in flood risk	228600 cubic meters of water per year	3000 cubic meters of water per year
		Conservation Saving Achieved per hectare	500 €/ha	-
3	CATCH	Reduced costs from flood events due to extreme rainfall	20 %	-
		Reduced probability of floods due to extreme rainfall	30 %	-
		Increased awareness of the need to accelerate the formulation and execution of water sensitive climate adaptation strategies in midsize cities	1000 people	1020 people
3	JOMOPANS	Promoting ecosystems services: Proportion of the North Sea for which underwater noise can be managed	90 %	-
		Promoting ecosystems services: Potential for management to reduce the area adversely affected by underwater noise. The capacity to identify and	10 %	-

		validate measures to reduce the area adversely affected by ambient noise will be built		
		Cost reduction	50 %	-
5	IMMERSE	Increased potential delivery of measure benefits, resulting from advances in measure development during the project	25 %	-
		Increased stakeholder acceptance of measure designs and subsequent implementation	25 %	-
5	North Sea Wrecks (NSW)	Increased capacity of key stakeholders for sustainable & efficient management of the North Sea, reducing the risks associated to wrecks, munitions, related pollution and hazardous substances for human-being, life species and blue growth options	14 uptake of management measures by key stakeholders as a part of a holistic assessment of mitigation options for shipwrecks and dumped munitions during user testing (2-4 scenarios x 3 locations)	-
		Improved coordination between the relevant NSR actors and stakeholders, especially for cross-border and transnational agreements, such as OSPAR or providing relevant portals (EMODnet) with decision-relevant data	5 number of national policies (regulations, initiatives, strategies) influenced by the project thanks to the input provided (1 by participant country (NO,DK, DE, NL, BE))	-
		New knowledge used by stakeholder organisations about risks of hazardous substances – better access to knowledge & information: 1. improved access to existing data, 2. providing missing eco-toxicological data 3. applying data for decision support	20 number of square miles with sensitivity indicators, where the inventory and comparable data about risks of hazardous substances in selected/ representative	-

			North Sea sub-regions are used (4 pilot studies x 5 square miles = 20)	
7	C5A	Increased number of multi-benefits (functions / services / outcomes) delivered	3 No. of additional functions of the targeted infrastructure / system	-
		Improving long-term risk reduction for less whole life investment	5 Benefit-Cost Ratio (BCR) of the investment in flood protection, in percentages of increase	-
		Increased adaptability of flood management approaches	3 No. of additional adaptation pathways available to the decision maker to choose from	-
7	GEANS	Improved transnational environmental health assessment	7 competent authorities	-
		Increased time-efficiency	60 %	-
		Cost reduction	40 %	-
9	BEESPOKE	Increase in crop yield or quality on the demonstration sites	10%	-
		Increase in pollinator diversity compared to the baseline on each demonstration site	10%	-

The following provides an overview of the projects, their stages of implementation and expected results:

BwN - Building with Nature has 13 beneficiaries and two co-beneficiaries from seven countries (The Netherlands, Norway, Germany, Sweden, Flanders, Denmark, and the UK). The overall objective of the project is to make coasts, river estuaries and catchments of the region more adaptable and resilient to the effects of climate change. To achieve this, aim the project wants to demonstrate "Building with Nature" solutions that utilize natural processes to deliver flood risk and coastal erosion management whilst enhancing ecosystem related services.

In 2020 a Policy Brief on nature-based solutions was produced in favor of making the NSR more climate resilient. This Policy Brief was picked up by several high level institutions and it has been disseminated

through EU DG Regio to other DGs (DG Environment, DG Climate, DG Mare) as well as the CPMR (Conference of Peripheral Maritime Regions). This year there was also an opportunity to present the findings to the DG Environment Working Group Floods.

For the CPMR North Sea Commission Energy and Climate Change group the project produced the "Climate change adaptation and the North Sea Commission" paper in cooperation with the Interreg North Sea Region projects Topsoil, Frames, Fair, Catch, Begin, Canape and C5a. Another hallmark in the project development was the launch of the online platform which functions as an up-to-date end report (https://building-with-nature.eu). That platform will be kept online for the upcoming years and links to relevant developments throughout the world in the rapidly evolving field of Building with Nature solutions. Finally, the online event "Be adaptive to become resilient" was held on June 4 2020. It had over 200 participants from 14 countries. Altogether 20 workshops were facilitated there. Find the fully captures sessions and speeches here: https://northsearegion.eu/building-with-nature/events/conference-bwnfairc5a-be-adaptive-to-become-resilient/.

FAIR - Flood defense infrastructure Asset management & Investment in Renovation, adaptation, optimisation and maintenance has 12 beneficiaries and one co-beneficiary from seven countries (The Netherlands, Norway, Germany, Sweden, Flanders, Denmark, and the UK). The overall objective of the project is to reduce flood risk across the North Sea region by demonstrating climate change adaptation solutions to improve the performance of flood protection infrastructure. 2020 was the closing year for the projects and therefore a very intense period for all partners. Project partners met several times to coordinate project activities and to elaborate on the main outputs of the project. The project's final report was submitted at the end of the year and processed and approved in early 2021. All the planned result targets were achieved. By its closure the project gave a state of the art approach of risk based asset management of flood defense in relation to the future challenges like climate change, end of life time of vital assets and limited resources to adapt these assets.

The main outcomes and benefits from FAIR included a review of existing asset management practices and asset management processes for flood protection and flood risk management; bringing together of practices and knowledge as to how this can be improved in response to current and future challenges based on a number of pilot projects, outlined in individual reports; formulation of a framework around which asset management can best be planned and delivered, the FAIR Framework; recommendations for policies that can help to deliver this in a Policy Brief; requirements for knowledge in a Knowledge Agenda report.

Reviewing the application of the framework in FAIR in the pilot projects detailed in separate reports, has shown that the use of the framework can help to ensure that flood protection assets are designed and used to be as multifunctional as possible, that there can readily be reduced life cycle costs of at least 5%, and a typical prolongation of the lifespan of targeted infrastructure by at least 5%. There are many challenges for asset managers, including how best to deal with single assets in the context of a network of defense. The FAIR project outcomes demonstrate that a risk based quantified approach needs to be used for adaptive asset management.

NorthSEE - A North Sea Perspective on Shipping, Energy and Environmental Aspects in Maritime Spatial Planning, with 12 beneficiaries from 7 countries (*Germany, the Netherlands, Norway, Sweden, Belgium, Denmark and the UK),* is the frontrunner in achieving greater coherence in Maritime Spatial Planning (MSP) and in Maritime Spatial Plans across the North Sea region (NSR). NorthSEE focuses on the fields of shipping, energy, and environmental protection. The project is promoting sustainable development for the marine space, while also balancing environmental, economic, and social objectives.

The project published the official "NorthSEE Interim Findings" brochure in 2020 and continues to support important transnational initiatives on MSP, such as the Meeting of Representatives of the North Sea Maritime Spatial Planning Authorities, as well as a number of individual sector activities. The "NorthSEE Interim Findings" report provides an overview of the main interim project results with more details to be found in the referenced main reports. It is designed for planners, sector and regional stakeholders and experts. Findings will hopefully inform the discussion on how to continue transnational cooperation in the future.

The project was able to continue to support important transnational initiatives for shipping, as well as overarching MSP planning, by bringing together relevant experts from across the NSR to (1) translate NorthSEE project results into planning practice for shipping and (2) to strongly support the newly set-up Meeting of Representatives of North Sea Maritime Spatial Planning Authorities. The latter is an informal cooperation of national planning authorities within the NSR which has been started in 2019 and lead to the additional meetings in 2020. Both initiatives are strongly supported by NorthSEE and its project partners.

NorthSEE is going to continue to work on transnational cooperation in MSP until September 2021 to continue the facilitation of greater coherence in MSP and to support the implementation of the MSP Directive (2014/89/EU) for a strong and healthy North Sea. In 2020 a new lead partner, University of Oldenburg, took over the tasks of the lead beneficiary and proved to be an engaged and competent to move forward and facilitate project activities.

TOPSOIL - Top soil and water - The climate challenge in the near subsurface, implemented by the partnership of 20 beneficiaries and 4 co-beneficiaries from 5 countries (Denmark, Germany, the Netherlands, the UK and Flanders), aims at the joint development of methods to describe and manage the uppermost 30 meters of the subsurface, in order to improve the climate resilience and protect the environment of the North Sea Region.

In 2020 many pilot activities were successfully finalized and several of the project objectives were formally achieved. The original project ended in April 2020 and a preliminary Final Report has been published on the webpage. Given the need for more work on climate change adaptation in groundwater management, the project applied for and was granted an extension until December 2021. As continuation, numerous local, regional, and national meetings and events have been organised in all regions aimed at ensuring the right stakeholders are involved in the development of the pilot aims and

activities. Even though the efforts in many pilots have been concentrated on analysing and summing up results of TOPSOIL, investigation methods and models have been further tested and developed in few pilots.

Partners started new activities in 2020, addressing the two objectives of the extension. The new focus is on balancing between seasonal extremes and its impact on groundwater issues which are expected to increase due to climate change. Further, the partnership is also putting extra efforts into capitalisation of the project results. A major success in terms of innovation and capitalization is the tTEM system, developed in TOPSOIL by Aarhus University. In 2020, the tTEM system was redesigned into a smaller and more mobile system, able to acquire data in more difficult terrains. There is now a high demand for tTEM surveys all over the world.

Also in 2020 new farmers were involved to improve soil management and groundwater protection. Activities combined demonstrations on appropriate land management with governance issues. The project also continued to establish and strengthen connections to other projects and transnational stakeholders. For dissemination of the results, and benefiting from transnational exchange, TOPSOIL was engaged in organising a meeting in February where the projects WaterCoG, goCAM, TOPSOIL and STEER were brought together to discuss and learn about sustainable practices to water co-governance and improving the effectiveness of measures.

WaterCoGovernance – Water Co-Governance for sustainable ecosystems has nine partners from five different North Sea Region countries (UK, DK, SE, GER and NL) that are working together to develop and demonstrate new solutions and technologies for delivering sustainable ecosystem management of the North Sea Region. The project will demonstrate through the adoption of new participatory, ecosystem service based approaches that implementation and integration of different water management frameworks can be achieved at the same time as providing additional social, economic and environmental benefits.

In 2020 the first activities that got approved as part of an approved extension were realised. New activities include new programmes of citizen science and the establishment of knowledge/data sharing platforms. In addition, WaterCoG partner OOWV hosted a WaterCoG Conference “Water Co-Governance Conference 2020 - Transnational learning from governance projects" in Oldenburg (Germany) in February 2020. About 40 participants from authorities, research, business and non-governmental stakeholder groups discussed different governance approaches to sustainable water management, as developed and tested in the projects WaterCoG, Topsoil, STEER and go-CAM projects. Moreover, a toolbox for stakeholder participation was published in Sweden. The toolbox is containing of 58 tools for increasing local cooperation in water management. Last but not least home schooling as a result of the COVID-19 outbreak inspired the project to develop home schooling packages. The resources are intended to help educate younger pupils about the critical importance of rivers using data and examples more relevant to their local rivers than the examples often provided in the classroom.

BEGIN – Blue Green Infrastructure through Social Innovation includes 16 cities and research institutions from six countries in the programme area (BE, NL, NO, SE, GER and UK). They use pilots in order to demonstrate how cities can improve climate resilience with Blue Green Infrastructure (BGI), involving stakeholders in a value-based decision-making process. The BEGIN project helps cities to overcome implementation barriers for BGI´s through Social Innovation (SI) that empowers multiple stakeholders to contribute to the design, construction and maintenance of BGIs.

In 2020 BEGIN partners continued their project activities according to the work plan. Even after increasing targets in 2019 as part of an extension, partners achieved some of the main project results. While pilots were measured, partners were also working on the pilots themselves. In 2020 the work in 3 pilots was concluded, progressing according to plan towards the target of 34 (previously 28). Despite the effects of the COVID-19 outbreak, stakeholder engagement via Social Innovation (SI) continued to be at the core of the implementation in this project - with citizens, NGO's, students, companies and policy-makers being involved in the design phases altogether. Even though COVID-19 restrictions made it impossible to continue with the C2C Learning in a face-to- face format, a new concept was developed. C2CL will be re-activated in an online format with at least 6-7 events throughout 2021.

FRAMES – Flood Resilient Areas by Multi-layEred Safety is comprised of 16 partners from five countries in the programme area (NL, BE, GER, DK and UK). More frequent and severe flooding due to climate change is one of the most significant risks for the North Sea region. The project closed in 2020 as one of the first priority 3 projects to do so. FRAMES aimed to reduce the effects and impacts of flooding and reduce recovery time through enhanced resilience of flood prone areas and communities in several selected target sites.

The project succeeded in reducing the impacts of floods and increased response capacity in all 15 pilots. The FRAMES partners combined their knowledge and experience to test, demonstrate and validate the MLS concept by developing helpful tools and creating a large involvement of stakeholders. It was proven that an integrated approach (affecting all four layers of MLS) is sustainable and effective on the short and long term. Based on input of the pilots the knowledge institutes produced a series of academic articles, creating impact on a scientific level as well. The results of the project led to invitations for presentations on a European level, a presentation at the Floods Directive Working Group (DG Environment) in October 2019 and a workshop during the joint event of the Interreg NSR projects Fair, Building with Nature and C5a in May 2020. The results of the Frames project have already been incorporated in other EU projects. Finally, partners will continue disseminating FRAMES results, even after project closure.

NuReDrain – Nutrients Removal and Recovery from Drainage Water consists of eleven partners from three different North Sea Region countries (BE, GER, DK. The North Sea region is recognized as an intensive farming area and nutrient inputs from land have resulted in eutrophication in rivers, lakes, estuaries and coastal zones. The NuReDrain project aims at developing a technology for trapping phosphorus and nitrogen in agricultural waste streams such as drainage discharges and greenhouse effluents. The project wants to stimulate joint development of cost-effective filter technologies,

targeting nutrients removal for different situations and regions, reuse the recovered phosphorus for agricultural purposes and eventually offer guidance to policy makers about implementation strategies.

In 2020 the project continued to work on the pilots with regard to N removal technologies. 3 filters have been developed: 1/ a MBBR (= moving bed bio reactor); 2/ a ZVI (= zero valent iron) filter and 3/ a mobile constructed wetland. In addition, the project also considers 4 P removal technologies: 1/ a P filterbox; 2/ a sediment filter combined with a reactive filter; 3/ an inline drain P filter and 4/ a filter column. The project developed a do-it-yourself guidance to build a MBBR filter. The manual has been translated from Flemish to English and Dutch so far.

Around 40% of P could be desorbed from saturated filter material. The resulting P quantity was too low to be economically viable for P recovery. Desorption was nevertheless interesting to recover the filter material as such. ICS filter material saturated with P could also be used as a substrate (30%) for some plants (e.g. Chysanthemum and Chlorophytum). Techno-economic evaluation of 3 nutrient filter systems revealed that these technologies are more cost effective as compared to current measures. This result has strengthened the discussion with national authorities.

PARTRIDGE (Protecting the Areas Resources through Researched Innovative Demonstration of Good Examples), which has 11 partners in four North Sea Region countries (UK, NL, BE, ER), is demonstrating how new best practice management solutions can improve biodiversity and ecosystem services by up to 30% in four years, and how these can be transferred across all regions of the NSR and the EU. The project measures are tailored to their flagship species, the Grey Partridge, because existing evidence shows that partridge-friendly measures benefit farmland biodiversity in general.

In 2020 PARTRIDGE published three national in-depth stakeholder interview reports; the transnational report was almost complete. A large-scale online survey aimed at farmers across the NSR has been finalised and will be launched in March 2021. The project was heavily affected by COVID, mainly limiting the number of our farm walks, direct engagements among our partnership and our stakeholders. Despite this, PARTRIDGE continued to make good progress on all deliverables.

Since November 2016, around 70 farmers were managing c. 7% high-quality habitats at all demo sites (mainly perennial PARTRIDGE flower mixes). Other measures included beetle banks, supplementary winter feeding (managed by hunters and volunteers) and indirect predation management via habitat blocks. Legal lethal predator management was carried out at six sites and electric fences were used to protect nests at one site.

Sullied Sediments - Sediment Assessment and Clean Up Pilots in Inland Waterways in the North Sea Region *consists* of 13 partners from United Kingdom, Germany, Belgium and The Netherlands. They are developing and testing new tools, procedures, and protocols to better assess, treat and prevent

contamination from emerging pollutants in the sediments in our waterways. 2020 was the last full year of implementation and the project will close in early 2021.

This project focused on the sediments from inland waterways: their characterisation in terms of chemicals present as well as any associated toxicities or wider impacts (including the new chemical watch list); a spore-based technology intervention to attempt to remove selected chemicals at waste water treatment plants; and a citizen engagement initiative and intervention to prevent further chemicals from entering these waterways by influencing citizen's behaviour.

The outputs of the project include an extensive database comprising data on ecotoxicity, chemical contaminants, sediment properties and biological community status that were gathered during 18 sampling surveys in three river catchments over the course of 30 months. The database and information about how to use it can be found here: https://northsearegion.eu/sullied-sediments/sampling-database/.

The project also launched a volunteer sampling programme called RiverDip, including a portable dipstick-sampler that measures phosphate levels in samples and an app that enables volunteers to share their results. The deployment of the RiverDip website greatly enhanced efforts to reach volunteers across the North Sea Region and was complemented by a virtual workshop in Belgium in October to engage with volunteers there who completed over 100 tests in the last 3 months of the project. By the end of the project over 300 measurements had been made, with the majority of new (100+) measurements appearing in the Elbe and Scheldt catchments. These were the result of engagement with waterway users within these regions via VMM (Flemish regulator), in particular through the Flanders Anglers Group, and through engagement with the RiverDip website.

The analytical chemistry methods developed earlier were applied to activities, which includes the "Bioavailability" (of estrogens attached to SpECs) experiments. These results give preliminary indications of the potential of SpECs to 'tie up' estrogenic compounds in waste water treatment plant effluent and render it less toxic.

In 6 sampling campaigns over the course of the project, 3 watersheds of presumably different chemical pressures were sampled at 3 sites each, within a time window of a few weeks. Sediments were shared among partners. More than 130 chemical substances were analysed, among these 3 watch list chemicals, 10 bioassay performed, and two biotic indices for community diversity derived. All data were compiled in a relational, now published database, which has provided the scientific basis for identifying the pressures on the different sites and for deriving a new biological effect based assessment scheme that will reduce uncertainties for risk managers.

CANAPE - Creating A New Approach to Peatland Ecosystems, with 6 beneficiaries and 7 co-beneficiaries from 5 countries (The UK, Germany, the Netherlands, Flanders and Denmark), aims at reducing CO2 emissions, increasing flood resilience, developing new wetland products and restoring unique ecosystems in the North Sea Region, also through several pilots in the region.

2020 saw good progress made on a number of project deliverables, and a number of notable successes. 4 sites (Store Vildmose, Lille Vildmose, Hickling Broad, Barver Moor) saw construction work, with Barver Moor and Store Vildmose being converted from agricultural fields to pluviculture sites.

Alongside this, despite the disruption of the pandemic, the project reached out to 180 people in person, and put out 9 news stories. The project was recognised with 2 awards, a Green Apple International Environmental Reward, and the photo contest award from the North Sea Region programme. Alongside this, the project has continued to build relations with 3 other peat projects - CARE-PEAT, C-CONNECTS and LIFE Peat Restore. This has included joint workshops across the projects, and the preparation towards a joint conference with C-Connects in October 2021 is in progress.

2020 marked also the mid-point of the project, therefore a Mid-Term review was conducted, including initial carbon calculations for the project. Following the review the partnership prepared and submitted a project modification, which allows CANAPE to expand its work to additional sites, and make up for time lost due to the pandemic.

CATCH – water sensitive Cities: The Answer to Challenges of extreme weather events has 12 beneficiaries from six North Sea region countries (NL, GER, SE, BE, DK, and UK) that are focusing on the redesign of urban water management of midsize cities to become climate resilient cities.

The project runs seven pilots that will test out the joint developed decision support tool and roadmap that will help to formulate long term climate adaptation strategies. In 2020 the partnership was affected by the implications of the COVID-19 pandemic, which had a negative impact on some of the pilots, strategy development and overall communication activities. This resulted in an application and subsequent a granting of the extension of the project lifetime.

Nonetheless, progress was made in several ways. In 2020 two pilots were completed, as for example in Enschede. The Pinkeltjesplein pilot is now an attractive playing area for children that also functions as a water storage area during heavy rainfall. The brook of the city runs through the square, making water part of city living once more. The project was designed in cooperation with the citizens living in the surrounding neighbourhoods. CATCH helped to integrate biodiversity and heat reduction into the project. Another successful achievement in 2020 was the translation of the self-assessment, which is used by another twelve municipalities in the province of Overijssel as part of the Dutch CATCH spin off, CATCH+.

JOMOPANS - Joint Monitoring Programme for Ambient Noise North Sea, with 11 beneficiaries from 7 countries (The Netherlands, the UK, Germany, Belgium, Norway, Sweden, and Denmark), is recognised as a leading project on underwater noise monitoring in the North Sea.

Team members of Jomopans attended a number of meetings and presented the project at the International Whaling Commission workshop in May and at the Ocean Sciences Meeting in San Diego

in February as well as at various national meetings. The results of Jomopans are being discussed in the OSPAR committees EIHA and ICG Noise and in the EU Technical Group on Noise. The project works closely together with the JONAS project that focusses on the Atlantic region and with INTAROS on the Arctic seas.

Despite the pandemic restrictions the project made considerable progress in 2020. One of the major tasks in the last year of the project is to ensure that the methods are implemented in the North Sea countries. In June the first draft of an implementation plan was discussed with the Policy Advisory Board (marine managers of the North Sea countries). All members of the PAB acknowledged the outcome of Jomopans as the template for future monitoring of underwater noise. It is also important that the results are shared in the underwater sound community. This is achieved through presentation and the publication of all project reports. By the end of the project sound scape maps will be presented in a GIS management tool. Marine managers can use this tool to evaluate the ambient noise levels in the North Sea and their spatial distribution. Based on this information measures can be defined to reduce the pollution by underwater noise. In the last year of the project all elements will come together. The results will help implement noise monitoring in the North Sea, but they will also help to define monitoring in other sea regions.

IMMERSE - Implementing Measures for Sustainable Estuaries's 11 beneficiaries from 6 countries (Flanders, the Netherlands, the UK, Germany, Sweden, and Denmark) collaborate on sharing knowledge and experiences on stakeholder engagement and estuary governance, which resulted in the publication of the first project outputs in 2020:

- the results of a stakeholder mapping exercise, designed to inform partners about key types of stakeholders to engage
- a report on improving stakeholder integration, based on an analysis of past experiences

Both outputs set the stage for further engagement with estuary stakeholders, which is a key project objective.

Media coverage in this period focused on work done by Chalmers University to develop a new integrated assessment tool for improved management of contaminated sediments. A scientific journal article and subsequent press release was covered by several Swedish media channels.

Notable progress on estuary-specific measures was also made in 2020:

- Flanders Department of Mobility and Public Works advanced designs of the cross-border solution for maintenance dredging in the Scheldt, and permitting requests are now being considered by relevant authorities.
- Tees River Trust also revised designs for their intertidal habitat creation pilot, and submitted licensing requests to begin testing designs.

In order to share project progress and engage with the broader NSR estuary management community, IMMERSE established a new LinkedIn group "North Sea Region Estuary Managers". Governmental and decision making structures and processes at the Elbe, Humber and Scheldt were also compared last year. The aim was to elaborate lessons and best practices from estuaries with comparable physical, economical and societal characteristics. Despite the discovered differences in mutual dependencies between actors as well as cultural differences, that affect governance modes, recommendations to further improve stakeholder involvement at the Elbe are provided. Further outreach and engagement was carried out in the frame of the 2nd Transnational Estuary Exchange Lab (TEEL), over 50 participants (online) from across the North Sea Region.

North Sea Wrecks (NSW), consisting of nine partner organisations from five NSR countries (GER, BE, DK, NL and NO), is developing and implementing a common approach for facing economic, environmental and safety challenges caused by existing ship and aircraft wrecks, lost cargo and munitions in order to improve the sustainable management of the North Sea ecosystem. The consortium will generate and share information about the location of the polluting and potentially dangerous items and assess and prioritize their risk. This will strengthen the capacity of key stakeholders as well as promote the North Sea as a more safe space for new business opportunities for a better use of natural and maritime resources (as for example blue growth activities). One objective is also to define transnational policy recommendations to address hazards. In addition, the project wants to preserve cultural and historic heritage by developing the travelling exhibition "Hazardous Waters". The exhibition is part of a sensibilisation campaign in order to raise awareness and social acceptance for the problems arising from wrecks and dumped munitions.

In 2020 the samples collected in autumn/winter 2019 were tested and results made available to the project partnership. Work on the decision support / risk assessment tool (WRECKNS) continued without problems and is developed as planned. This involved the setup of the mathematical and AI models (risk assessments), the creation of backend functionalities, database structures and data traffic. In addition, the frontend/user interface is conceptualized and is being checked for the user-needs. Progress was also made in relation to the specific legal aspects of war wrecks. One law student started her thesis project on this topic. Another law student finalized her thesis on a suitable forum to create policy on the NSW topics. The Travelling Exhibition was also evaluated, and a new organisational concept was designed that will be more resilient in times of uncertain epidemiological conditions.

C5A - Cluster for Cloud to Coast Climate Change Adaptation has ten partners from all seven North Sea Region programme countries who are cooperating to respond to the challenge of climate change. C5A will deliver a from 'Cloud-to-Coast' (C2C) approach to the management of flood risk. The whole-of-system approach will integrate four constituent systems (catchment, coasts, cities, infrastructure networks) and enable the development of multifunctional and adaptable solutions that deliver more sustainable, integrated and multifunctional solutions across the NSR. To do so, the project will build upon the outcomes of seven ongoing Interreg NSR projects to ensure our approach is both evidence-based and practical. The project will organise 7 case studies, 2 sessions with EU DGs and a high level policy learning group. Project partners will reach out to local, national, transnational and global

networks to raise awareness and acceptance in- and outside the NSR. C5A builds capacity and support for the take-up of Cloud to Coast by relevant authorities and practitioners across the NSR, and beyond.

In 2020 the project activities were significantly affected by the COVID-19 pandemic. Although work was continuing, all plans were rescheduled and delayed. Although C5a is rated behind schedule, the consortium was able to achieve some highlights in the last year. A working version pf the C2C approach was completed. Also, two workshops were carried out in the City of Dordrecht (NL) and the outcomes were partially analysed. Final results are expected in 2021. The biggest event in 2020 was the organisation and conduction of a digital midterm event. During the event a digital excursion to one of the pilot sites took place and it was discussed how the C2C approach was applied.

GEANS comprises nine partner organisations from all North Sea Region member states (NO, SE, DK, GER, NL, BE, UK) that are cooperating in the field of ecosystem health assessment of the North Sea Region and will promote the shift from morphological species identification to harmonized genetic tools. The first step is to develop a reliable DNA sequence reference library, which will be complementary to traditional monitoring and allow continuity over time. A set of pilot studies will be carried out by the project in order to implement genetic approaches into existing environmental assessment and management. Last but not least, the project will develop a decision support framework, which will facilitate the implementation of a transnational uniform DNA-based approach by all competent authorities. A harmonized genetic approach will reduce conflicts and create synergies and improve the environmental health assessment, as demanded by different EU directives. In addition, it is supposed to result in an increased time-efficiency by 60% as well as cost reduction by 40%.

In 2020 a key species list from over 800 species of policy relevance, known to be non-indigenous (NIS) and important for the pilots within the project were compiled. Until to the end of 2020, high quality DNA sequences (COI barcode) of around 40% of the key North Sea species were produced. Each of these sequences was linked to a vouchered specimen in a physical collection, was connected to high quality digital images and contains metadata on collection and identification. A further 32% of the species was collected and still needs to be sequenced or is in the process of quality control to further populate the North Sea reference library. Three pilots to investigate implementation and applicability of DNA meta barcoding for environmental monitoring were operational, and all run in close collaboration with national authorities responsible for sustainable North Sea management.

BEESPOKE (Benefitting Ecosystems through Evaluation of food Supplies for Pollination to Open up Knowledge for End users) comprises 16 partners from six North Sea Region member states (SE, DK, GER, NL, BE and UK) cooperating transnationally to increase levels of pollinators and crop pollination at local and landscape scales by providing land managers and policy makers with the new expertise, tools and financial knowledge to instigate bottom-up change creating more sustainable and resilient North Sea Region ecosystems. This is supposed to be achieved by enhancing and improving non-crop habitats for pollinators, by creating more resilient ecosystems for pollinators and crops and by demonstration of improved habitats for pollinators and techniques for measuring pollination. In addition the project will focus on stakeholder engagement, delivery and uptake of outputs and results to bring change in land management and policy.

In 2020 27 new seed mixes were developed - targeted at the types of pollinators required by the crops or to support pollinators in forage crops. These were established at 65 sites comprised of orchards (apple, plum, cherry), soft fruit (strawberry, raspberry, blackberry, blackcurrant), grassland or arable crops. Some of these sites will be used for knowledge exchange events later in the project. To identify where more flower-rich and bee nesting habitats are needed in the landscape, two landscape models were developed. One is predicting the level of pollination service and the code for this has been written. The other is using an existing app and assesses the capability of the landscape to support bumblebees. The project also started compiling information on the range of agri-environment measures available in each partners country to encourage pollinators to help identify where improvements can be made.

4. Promoting green transport and mobility

(This is a continuation of the text provided in the SFC under this heading):

Result targets and achievements:

Call #	Project name	Result description	Quantified target	Achievement through 2020
1	SEEV4-City	Increase of real zero emission kilometers in the SEEV4-City Operational Pilots	150 tons CO2 emissions avoided annually	2786 (final result)
		Increase in energy autonomy in SEEV4-City sites	25%	2% (final result)
1	SHARE-North	New or improved shared mobility services	60	20
		Cars removed from public streets through car-sharing	10,000	772
		Reduction of local and global transport-related emissions	66,000 tonnes of CO2 saved during project lifecycle	505,45
2	HyTrEc2	Reduction in the cost of hydrogen vans, large trucks and other tested vehicles	25%	10%

		Number of public sector organisations and transport operators investing in hydrogen vans and other tested vehicles	18	4
		CO2 reductions from tested vehicles	18 kilograms per vehicle per month	0
3	#IWTS2.0	Number of companies and institutions realizing modal shifts by the end of the project period	4	3
		Long distance modal shifts from road to IWT in tkm	20,000,000 tkm per year	9,768,975 tkm per year
3	G-Patra	Additional passenger transport km using green transport solutions	100,000 passenger kilometers	105,802
		Demonstrate reductions in CO2 emissions from remote, rural and island transport using lighthouse projects and business cases	10%	0
3	SURFLOGH	Increased use of zero emission urban vehicles in last mile distribution	15 zero emission vehicles used in pilots	23
		Reduced conventional freight traffic in last mile by using bundling solutions or zero emissions vehicles	1.800 conventional trips saved by using consolidation options or covering by zero emission vehicles	2.138
		Increased volume handled, carried out and/or distributed by emission reducing logistics solutions	60.000 parcels handled by emission reducing solutions (e.g. consolidation, lockers, hubs) and vehicles (e.g. cargo bike)	106.773
5	MOVE	Reducing the use of private cars in local mobility streams	10% reduction of the number of single local private cars trips of target groups individuals	2%
		Increase in the usage of sustainable mobility solutions	20% increase in number of passengers	1%
		Increase social integration through mobility	20% increase of yearly travel in km using sustainable mobility solutions	1%
7	ART-Forum	Removing bottlenecks: Improved efficiency and safety in passenger and freight transport	50%	0
		Increased capacity of authorities in the NSR to future proof their	100 organisations	67

		transport strategies – 100 organisations		
		Revised Transport Strategies	75%	1%
7	BITS	Reduction of CO2 emission thanks to cycling (instead of using other modes)	9%	0
		Increase in cycling use (kms) of commuters, students, school children and recreational cyclists within the project period	10%	0
		Realisation of a CyclingDataHub as an open platform to share cycling data in the North Sea Region	100 datasets	67
7	Stronger Combined (SC)	Relative increase in number of passengers in rural public transport (implying increase cost coverage and profitability of public transport services)	30%	0
		Relative decrease in CO2 emissions per person-kilometer travelled using combined mobility services	20%	0
9	North Sea CONNECT	Cargo handling with sustainable modes	5% increase in cargo handling / shifting to sustainable modes	NO DATA
		Efficiency raise	5% cost reduction in sustainable modes	NO DATA
		Increased awareness of smart intermodality and comprehensive network	20 smart intermodality users/stakeholders	NO DATA
9	PAV (previously SUV)	Number of urban developers trained by materials developed within SUV such as the handbook on urban planning strategies integrating AV and related public workshops.	200	NO DATA
		Value of public/private investments shaped by materials developed within SUV such as the open innovation community platform and the publications about socio-economic impact.	100 million €	NO DATA
		Number of people transported with autonomous, shared and electric vehicles through pilots organised by local- and transport authorities.	10.000	NO DATA
9	ZEM Ports NS	Total reduction in emissions of CO2, NOx, SO2 and particulates	7000 tonnes of annual CO2 reduction	NO DATA
		Expected reduction in the cost of port side energy and services during the project period	15% reduction in the costs of energy and port side services during the project	NO DATA

		Reduction in the cost of zero emission vessels	15%	NO DATA
11	AVATAR	Volume of goods transported in and out the city centers, during operation test-runs in the project (last year)	15.000 kg transported goods shifted from road haulage to IWT in one city centre per year (with just one vessel)	NO DATA
		CO2 reduction realized during the project period with zero-emission vessel, assuming one 20T operational vessel in the last year of the project	750 kg (CO2 saved)	NO DATA
		Level of automation for vessels smaller than 100 tonnes	2 Increased levels of automation (as defined in CCNR Resolution 2018-II - 16)	NO DATA

The following provides an overview of the projects, their stages of implementation and expected results:

SEEV4-City (Smart, clean Energy and Electric Vehicles 4 the City): 11 beneficiaries from 4 countries (BE, NL, NO, UK) demonstrated smart electric mobility solutions, integrated renewable-energy sources, and encourage take-up of both in cities. When SEEV4-City started, Vehicle-to-Grid (V2G) was still a largely theoretical concept and smart charging not yet pervasive. The goals were CO2 emissions mitigation, increasing ultra-low emission kilometres, increasing energy autonomy, avoiding grid investments, and making power grids compatible with an increase in electro-mobility and local renewable energy production. The project closed on 25 October 2020.

The consortium ran seven operational pilots. They tested the possibilities for sustainable urban mobility and energy plans (SUMEP), Electric Vehicle-for-Energy-Services (eV4ES), and business models for home, business, neighbourhood, and city-scale solutions. These ranged from a single household, office buildings with multiple electric vehicles, a car parking garage, stationary batteries and power parking at a football stadium, to large-scale public smart charging solutions. The SEEV4-City project consulted public and private stakeholders to create an extensive support base. The team then used the results of their pilots and research to recommend appropriate policies at local, regional, national, and EU levels. They also highlighted challenges, such as the regulatory and fiscal framework, the need for standardisation and communication protocols, subsidy schemes and other incentives, as well as the need for awareness raising and further research. The team ensured knowledge transfer and exchange across stakeholder groups and projects, including educational materials.

SHARE-North (Shared Mobility Solutions for a Liveable and Low-Carbon North Sea Region) with 10 beneficiaries from 6 countries (DE, SE, UK, NO, BE, NL) are contributing mobility hubs and discussions on lessons learned from the project partners active in this area have increased the knowledge of all project partners in the project and have led an expansion that goes beyond Bremen, Bergen, Flanders and the Netherlands.

The pandemic has had a major impact on project activities, the resilience of shared mobility providers with which the SHARE-North project works. After a period of adjustment organisations began to suit, so that by the end of May, most planned conferences were taking place as webinars. The SHARE-North partners adapted quickly to the new situation and continued to deliver results despite certain setbacks. In 2020 the opening of the first 8 mobihubs has happened in the Netherlands in the Kop (North Holland) Various forms of transport are offered on a mobihub. Public transport is often nearby and there are shared bicycles and shared cars. This is the direct result of collaboration in the SHARE-North project.

The realisation of a regional fleet of shared bicycles (which contains 120 bicycles) in the Leiedal area in Flanders will ensure accessibility to shared bicycles throughout the region, including rural locations.

The Mobility Hub Strategic Study has been completed to which several SHARE-North partners contributed. This helped secure funding from Transport Scotland for the planning of mobility hubs in Southeast Scotland in the future. In Bergen, Norway the usage of mobility hubs has increased steadily, and the increase in electric car sharing means even more emissions reductions.

Three SHARE-North cities were nominated as the Top Five International Carsharing Cities for the category of cities under 750.000 inhabitants: Bergen, Bremen and Ghent. On May 28, Ghent was awarded the top prize by the Carsharing Association. All three cities were praised for their work on carsharing and sustainable transport policies. Thanks to some advanced networking attempts by Autodelen.net, Advier was able to tender for a project by the European Commission (DG Reform) for supporting the Netherlands in the area of promotion and development of car sharing. The overall objective is to provide technical support to the Netherlands in the area of the promotion and development of car sharing, via capacity building of Dutch municipalities to support faster implementation of car sharing. A strong emphasis is laid on the uptake of international experiences by SHARE-North partners and the use of the knowledge from the SHARE-North manual.

HyTrEc2 (Hydrogen Transport Economy in the North Sea Region 2) has eight partners from four North Sea countries (UK, SE, GER and NL) who are exploring together how the conditions for hydrogen-fueled transport can be improved across the North Sea Region.

In 2020 vehicle trials and testing continued with a retrofitted hydrogen-diesel roadsweeper joining the Aberdeen City Council fleet. Provincie Drenthe's new Hyundai Nexos also arrived and were tested by Cenex as part of the Living Lab. Geemente Groningen's two hydrogen-electric waste trucks continued apace after COVID-19 delays. Both Refuelling Stations in Groningen and Aberdeen continued to generate interest and opportunities for learning exchange, and prior to COVID-19 visits included the North Sea Region Commission Working Group for Transport and Marine Research in

February 2020. Provincie Drenthe continued to progress work on the business case for solar produced green hydrogen production and refuelling at Pelle. Aberdeen City Council completed and presented work to Partners and the Scottish Government for the business case of a commercial supply of renewable hydrogen. UIT took delivery of its refuelling station in Narvik and, despite COVID-19 delays, the start of infrastructure work for its installation.

#IWTS 2.0 (#Inland Waterway Transport Solutions), with 10 beneficiaries from 5 NSR countries (NL, DE, BE, UK, SE), aims at carbon emission reduction by promoting a modal shift from road to water. The project strives to develop solutions for minimum intrusion adaptations of existing, smaller waterways in order to make them accessible for Classification of European Inland Waterways (CEMT) standard vessels. The project is for example aiming for an improved Aire and Calder Navigation, which allows CEMT class 2 vessels on this waterway. The main bottleneck, the Bullholme Lock, has been drained and thoroughly inspected. The project also develops and promotes the use of innovative barges and transshipment concepts. In that context the project is for example working on the development of the smaller barge for the city of Gent.

In 2020 a new partner was introduced: TESCO, who took over part of the activities of beneficiary De Groote – Houtboerke NV, who were not able to invest sufficient amounts of money due to the corona crisis. De Groote – Houtboerke and TESCO together developed the smaller barge for the city of Gent, which was launched in October. Before the launch, the project developed a simulator model of this fully electric barge and a simulator model of the waterways in Ghent in order to test the model. In order to improve the Aire and Calder Navigation, which allows CEMT class 2 vessels on this waterway, a design study is made on the Bullholme Lock. The study has to make clear how the lock can be made suitable for use.

G-PaTRA (Green Passenger Transport in Rural Areas) has 12 beneficiaries and one co-beneficiary from Denmark, Flanders, Germany, the Netherlands, Norway and the UK. The project aims to promote green transport and mobility by enhancing the capacity of authorities to reduce CO2 from personal transport in remote, rural and island areas by embedding more zero emission vehicles in rural transport systems and by improving, optimizing, and better integrating available passenger transport resources.

The start of 2020 coincided with the first wave of the pandemic and it had an overriding influence on the project. Although operational at the beginning of the year, many of the Lighthouse projects offering public transport ceased or reduced operation, and restarts have been sporadic at best. Travel and gathering restrictions have meant that meetings and visits to partner countries were cancelled or postponed, and there has been a significant move to using virtual platforms to meet.

On the positive side, work on business cases has been able to continue, including the HITRANS report on electric trains in the far north of Scotland and progress in Norway and Germany. Some partners were able to offer different transport services: Aberdeenshire Council made their vehicles available for journeys to health care, and HITRANS switched their electric bus to a new route and offered their e-bikes to key workers for long term use. As a precursor to calculating CO2 emission results RGU has

developed a flowchart covering a range of circumstances which partners will use during the remainder of the project. It is hoped that the on-demand ride sharing system trialled by Amt fur regionale Landesentwicklung Leine-Weser in Hameln-Pyrmont will be implemented more widely in the rural area, with a political decision pending. In Norway, More and Romsdal council produced a report with Troms and Finnmark council on the development of profitable value chains for emission-free hydrogen in the region. Aalborg Univesitet have not yet been able to start the second phase of the village buses scheme due to Covid lockdowns, but it is hoped this will be possible in 2021.

SURFLOGH (Smart Urban Freight Logistics Hubs) has six beneficiaries from four North Sea region countries (NL, BE, SE and UK) that are focusing on the improvement of the role of logistic hubs in the structure of urban logistics. By investigating, evaluating and implementing different actions, techniques, organizational forms and logistic tools, the goal is to increase the efficiency of last mile logistics between hubs and to stimulate green transport solutions.

In 2020 SURFLOGH made substantial progress towards meeting the overall project results. Due to COVID-19 the partners could not meet in person. They had an online meeting on May 19th and four shorter update meetings with all partners instead. Inspired by the SURFLOGH pilot in Mechelen, Drenthe started a new pilot: 'Parcel lockers on hubs for public transport'. Three public transport hubs were selected to accommodate a parcel locker. One out of three locations already got the official permit of the local government. A (research) framework to measure effects on transport, livability and business has been established.

During the spring of 2020, the second part of the Good Goods service was launched, where a custom built electric vehicle (electric car with a trailer for transport of bins) is serving customers in Borås city. Further services were also added to the goods distribution service, as for example the pick-up of smaller volumes of packaging materials from various businesses in the city.

The final case study draft for the Edinburgh pilot summarized the establishment and subsequent development of a bicycle logistics provider in and around Central Edinburgh. Napier was researching the impacts of COVID-19 on the operation of the Edinburgh hub and included finds in subsequent research.

MOVE (Mobility Opportunities Valuable to Everybody) Eleven beneficiaries (including one local partnership) from five North Sea Region countries (NL, BE, GER, DK and the UK) are developing and disseminating innovative, environmentally sustainable and economically viable mobility initiatives through multidisciplinary co-creation, bringing together different stakeholder. The project will use local specificities to create practical solutions in four pilots based on unlikely combinations. MOVE supports the greening of the transport sector by offering solutions aiming at a reduction in the use of individual vehicles and by using alternative greener options. The overall objective is to enhance accessibility of small and middle-sized cities/ towns and their surroundings within the North Sea region.

In 2020 the knowledge partners (University of Ghent, Goettingen and HZ) had frequent meetings. They supported the pilot partners with their proceeding, gave advice and tried to find the best

solution to proceed the pilots under the COVID-19 circumstances. The Flexbus pilot of Igemo pilot entered the evaluation phase. The Regional Transport Council was pleased with the passengers' numbers and extended the Flexbus pilot into 2021 and 2022 – which is really good news. Another highlight was the use of the pilot Scithos of HZ. This simulation tool gives insights on what impact some circumstances have, like COVID-19. The tool gave MOVE the opportunity to think in another way. The users of the tool started thinking of possibilities.

ART-Forum (Automated Road Transport Forum for the North Sea Region) has 14 beneficiaries and one co-beneficiary from 6 countries (Germany, Flanders, Denmark, the Netherlands, and the UK). The project's aim is to create a debating ground for local/regional authorities, address risks and opportunities and help guide policy development with regard to the impact that automated transport could have on the road transport system and life in cities and regions of the North Sea Region. The project started in 2019 and organized its kick-off meeting in Bremen.

In 2020, apart from the circumstances beyond the control of the partnership (pandemic restrictions), one of the main achievements was the launch of the first self-driving busses in Denmark. The grand opening on the 5th of March in Aalborg was a big event with over 1000 guests but had to close one week later. The pilot re-opened on August 13th. Over 3000 passengers were able to use the busses by ending of this period. The pilot in Mechelen is still in the tender process. In Bergen the main focus to evaluate self-driving vehicles is on the analyses on micro-mobilty.

Some partners were already able to show adaptability at short notice and changed their planned workshops into virtual events or consultations. Others changed their research approaches and methods. On the communication level a professional website (www.art.forum.eu) were launched.

The planned project meeting on the Orkney Islands had to be cancelled and was substituted by an online-meeting. To increase the exchange a monthly project meeting was initiated by beginning of June. The exchange between the partners is unchanged intensive. ART-Forum is also collaborating with the PAV-Project to create more capacity and awareness. In the 4th reporting period, the pandemic will continue to make it presumably impossible to travel and organize physical events. Therefore further creativity and adaptability can be expected from the partners to achieve the deliverables, objectives and outputs of ART-Forum - as they have already done.

BITS (Bicycles and ITS), with ten beneficiaries from 5 countries (The Netherlands, Germany, Belgium, Denmark and the UK), aims at implementing ITS solutions that directly increase the take-up of cycling and reduce CO2 emission, while collecting and processing reliable and useful cycling data for policy making.

The project has already accomplished much in the first 9 months of 2019. At the start of the project many communication activities were carried out. The project has - as many European projects - been hampered by the COVID-19 crisis. It has influenced the ITS implementations, and the overall cycling patterns in our NSR countries. However, overall, the project has done quite well despite these challenges. In 2020, BITS succeeded quite well in continuing the project as well as in contributing to opportunities that arose from the situation. Cycling, as a sustainable and active travel mode, is being

recognized more and more as a solution for sustainability related challenges and the pandemic even speeded up the demand for good cycling conditions. The transnational sharing of knowledge and experience on this are central to BITS and it therefore contributes to the desired shift.

ITS and data are inherently connected and require a certain approach. To capitalize on the opportunities of ITS and data to improve cycling conditions, international collaboration is an absolute condition. The project does not only contribute to the capacity of public authorities to effectively implement cycling ITS, but it is the first and only initiative in the development of transnational common approaches to cycling data.

Stronger Combined (SC, Combined Mobility in the rural public transport system to build sustainable rural public services in symbiosis with private mobility providers and citizens) comprises 15 beneficiaries (including two local partnerships) from all seven member states in the North Sea region (NO, SE, DK, GER, BE, NL and UK) that are investigating the future role of public transport authorities in regard to combined mobility in sparsely populated areas. By presenting open data infrastructure, validated service models and public-private mobility cooperation, the project wants to stimulate the take-up and application of green transport solutions for personal transport. As a result of a shift from single-person private car trips to multiple-person shared vehicle trips, CO2 emissions are expected to be decreased.

In 2020 Stronger Combined managed to launch its first pilots despite the difficult circumstances. Stronger Combined discovered that the pilot "Village points" (realized by Dienstverlenende Vereniging Westhoek) became more important than initially anticipated. In times of COVID-19 the need for sale of food in the neighbourhood as well as the reach in an area have increased and the role of the "shop assistant" has become ever so important. The "shop assistants" in the "Village points" filled an almost therapeutic role as they became one of the few social interaction for many citizens, in a time when other contacts were limited. COVID-19 is hence also an eye-opener. The pandemic also led to a break through with decision makers in the City of Genk. They are gaining a better understanding of the role and importance of bikes in the sustainable transport ecosystems of the future.

North Sea CONNECT (CONNECTing North Sea Region's TEN-T nodes - Support intermodality growth in the North Sea Region through smart efficiency enhancements) is comprised of 10 partners from 5 countries (DE, BE, NL, UK and SE) that focus on intermodal nodes in the North Sea region. To increase attractiveness of a location along with its market potential, i.e. the achievable market, efficient, smart, and ecological transportation networks are needed. Intermodality should enable a concentration of transnational traffic and long distance flows, and as a result of their integration, provide for a highly resource efficient infrastructure use. The overall project objective is to support smart intermodality growth in the NSR through efficiency enhancements. To raise the efficiency of transport flows in a holistic approach, the project will include both major and remoter transportation nodes to establish learning opportunities. After some initial delays due to a lead partner shift at the beginning of the project, the project has organized a hybrid kick-off meeting in the summer of 2020, after which the first activities followed quickly.

PAV (Planning for Autonomous Vehicles) (previously SUV), with 13 partners from 6 countries (the UK, SE, BE, NO, DK and NL), will promote Autonomous Vehicles (AV), or self-driving vehicles, to become widely available, low-cost, clean, door-to-door transport for people and goods. Widespread use on Europe's roads is anticipated by the 2030s and is expected to have numerous societal implications for equity, health, economy, and governance resulting in potential impacts on city development and design (from street to district- and regional development). Many cities (plan to) start experimenting with AV in Europe. However, integration of AV in spatial planning has yet to start. This is urgent as cities plan district (re)developments, transport infrastructure and related investments decades ahead. SUV aims to stimulate the up-take of electric, shared AV by developing green transport and spatial planning strategies that incorporate AV.

In 2020 the PAV partnership made sound progress in preparing 4 demonstrators with Autonomous Vehicles (AV) that aim to test new mobility services as added value for public transportation. Despite the COVID19 pandemic, which escalated during this reporting period, the PAV partnership has quickly adapted its activities accordingly to successfully support each other in the preparation of the AV demonstrators by peer reviewing strategies and implementation plans, including European AV solution providers and participating in online events. Because of this joint effort, the first demonstrators are planned to be launched in the spring of 2021. This will also allow the PAV partnership to proceed to the next step in their collaboration: to develop and improve the Sustainable Urban Mobility Plans of the public authorities involved.

ZEM Ports NS (Zero Emission Ports North Sea) has 8 partners from 5 countries (DK, NL, the UK, SE and BE) and will facilitate the use of zero emission fuels (electric and hydrogen) in the NSR ports and maritime sector. The project looks at the role of ports in the interface between zero emission vessels and port infrastructure. It especially addresses the integration of zero emission fuels into the port refuelling infrastructure and local energy systems as well as port and on-ship energy storage. It will develop refuelling infrastructure for vessels and training for the crews of zero emission vessels and staff using associated infrastructure.

The main progress until now has been the data collection and subsequent analysis conducted on the Danish island of Ærø. The electricity consumption demands of the E-Ferry in Soeby has been assessed, modelled and analysed in terms of flexibility provider for Ærø as a whole. In the UK the project is making preparations for the construction of the mobile charging unit. In the Netherlands the project is working to secure the HAZID certificate for their vessel and start the safety studies. Most activities have been affected by the COVID-19 outbreak, but some more than others. In Strömstad the project planned to facilitate a charging facility for the new Color Line ferry. However, the work in Strömstad has been delayed due to financing issues directly resulting from COVID-19 implications as the ferry stopped operating in March 2020.

AVATAR (Sustainable urban freight transport with autonomous zero-emission vessels > modal shift from road to water) comprises 7 partners from 3 countries (BE, DE and NL) that aim to develop, test and assess adequate technologies and business models for urban autonomous zero-emission IWT. Through this, the project unlocks the economic potential of urban vessels and corresponding

waterways, increases available solutions for full-cycle automation and sets up a sustainable supply chain model for urban goods distribution and waste return.

To enhance automation and interoperability on inland waterways, it is critically important that different vessels, and by extent all systems operating in the inland waterway transport context, are able to communicate with and understand one another. One ship that will be piloted currently only allows for manual, on-board control. To increase the intelligence and automation capabilities of this vessel, the project started with investigating, selecting, and purchasing hardware components that suit the needs of these objectives. Another ship that will be piloted in Ghent will be built from scratch, and the project has started investigating the appropriate dimensions and the implementation of electric inboard and outboard motors. In addition, the project started investigating functional specifications in order to define the needs of the Control Center for remote control and situation monitoring. The project also started the economic assessment to define the necessary conditions that lead to a long-term (sustainable) uptake of the developed concept.

3. IMPLEMENTATION OF THE PRIORITY AXIS

5. Technical Assistance

(This is a continuation of the text provided in the SFC under this heading):
The National Contact Points have been operational in a North Sea Context since 2000 and have always played a very important role as national representatives of the programme in the member states/Norway. With one exception (Denmark) the contact points are operational in all participating countries and represent a crucial asset both in terms of assisting project development and as trouble shooter when something goes wrong.

In addition to Corona but on a more positive note the secretariat has been involved in the preparation of the new Interreg VIB programme. In total 4 meetings were held in the Programme Preparation Group which is in charge of the programme preparation. It has been a very intense experience but also a really good option for transferring the lessons learned in the Interreg VB programme to the new Interreg VIB programme.

Brexit represented another big issue in 2020. After a long and, at times, challenging, process, the UK finally left the EU and the North Sea Region Programme by the end of 2020. The Brexit process was difficult for all involved, not least as a result of the significant uncertainty that characterised the process. However, there was a very close and positive cooperation between the secretariat and the UK national authorities in this process, and the key factor for all involved was to make the transition as painless for the projects involved as possible. The lack of information was particularly challenging as it could have provided the perfect breeding ground for all sorts of rumours. Thus, a Q&A section on the programme website feeding information both from the UK national authorities and the secretariat was crucial to keeping the projects with UK participation going without premature loss of the UK participants.

Table 4: Financial information at priority axis and programme level

Present information on reported information submitted to the Commission via the SFC system by the end of 2020. The table contains information on total funding allocated to operations and to technical assistance, how many operations they programme by the end of 2020 is supporting and the amount of eligible expenditure these operations has reported to the programme and entered into the accounts of the Certifying Authority.

Table 5: Breakdown of the cumulative financial data by category of intervention

Represent a detailed breakdown on the eligible expenditure reported to the programme. The detailed perspectives include a breakdown in the format of the template provided in the SFC system, including breakdown on the dimensions of territory, delivery, thematic objectives, economical and location. The interventions are detailed and outlined in the cooperation programme, however, the location dimension is not outlined in the cooperation programme as this information has been requested in the SFC template after the delivery of the programme has been initiated. The location dimension is a bit unclear and challenging for a transnational programme to report on, due to the transnational nature of the operations and not located in individual territories. The point of departure of the programme when reporting on this dimension is to demonstrate in which country the lead beneficiary of the largest economic activity of an operation is located at the time of reporting.