

**Roles of Expertise, Knowledge, and Communication Dynamics in CE Innovation Ecosystem: Evidence
from Aquaculture Plastic Equipment Industry Collaboration**

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What is Circular Economy?	What change are you working towards concerning CE in your role (directly or indirectly)?	How do you measure the circular economy implementation in your company?	What knowledge have you gained for circular economy in the project?
Reuse of material	Increased recycling, sharing information, use of recycled materials, less end of life waste	I dont know that.	Økt forståelse av verdikjeden
Closing the loop	Investing in plastic recycling, and processes related to gathering plastic material for recycling and getting as good quality as possible on the recyclate for use in new products.	Measuring amount of recycled material used in the products	Circular buisness models
Zero waste	Chritical thinking about own chritical thinking	The share of turn-over linked to CE-projects	Much higher insight in the details and dynamics of the whole value chain of the aqua farming industry
Using the same resources several times.	Establish a lasting business model that will be (at least) as attractive as any other business, meaning that this will be a prioritised field for our side.	CO2 and climate accounting	Complex, but do-able if everyone comitts and are willing to think different
Economical model based on reuse of resources rather than use and throw	Sirkulær økonomi er et overordna prinsipp som vi tar med oss inn i alle prosjekt og kunder vi jobber med, både forskningsprosjekt og kommersielle prosjekter.	The percentage of reworked or recycled material used in new products vs the percentage of virgin material used	Have gained knowledge around a more global approach of the circular economy. Was more focused on mainly recycle earlier but have now a better understanding of the system approach and its impact
Reducing environmental impact	Change in mentality - rethinking the life cycles of products and materials	Kan se på andelen solgte produkter i kategoren levetidsforlengelse, gjenbruk og resirkulert og sammenligne med solgte jomfruelige produkter	Hele prosjektbeskrivelsen er bunnet ut i sirkulær økonomi
La ressurser gå i lukke loop	Working towards enabling use of existing resources for recycling, reuse , lifetime enhancement, by ensuring quality	Klimaregnskap og bærekraftsrapport	Faglig kunnskap om kvaliteten på materialene som benyttes i havbruksnæringa, og overraskende god kvalitet på produkt/råvarer selv etter mange års bruk eller materialgjenvinning.
Economi based on reusing resources without any new incitaments in the major product.	Changing valuechains	Production kg/h	Understanding the importance of processability, feedstock avaliability and market for recycled materials.
sustainable solutions for e.g plastics, embracing the total value chain in order to reuse or recirculate materials or components.	Pushing timelines and results in all WP's. it is a value chain and one partner must make its best efforts to hand over their job to the next one	We are not producers, but contributing with knowledge and expertise.	A project of 8 companies, its a challenge of embracing mutual timelines in order to change a value chain from linear to circular.
An economy where valuable resources are collected and used again and again. And where products are designed for this purpose.	improve knowledge and experience on recycling design to support for recycling process	Measure how many tons of plastic from pens being recycled in our facility and how many tons of pen components with this recyclate is being put back on the sea to a fish farmer.	It is challenging the companies perception of how to cooperate and share. The work requires lateral thinking and more holistic approaches than today's structures in the companies offer.
There is no end of life for a product, but it goes into a new circle after use.	During design phases of a product or a design change: contribute with a focus on material selection making the product last as long as possible and being possible to recycle.	When results are ready provedures of changes (2468, ECO and EPO) will be initiated. Its prepared. Involving a complete value chain inside the company is critical	knowledge of sustainability
Cooperation among different stakeholders to organize their sustainable existance. It is thus based on trust and will to change	Demonstrate value retaining and value creation	By number of partners willing to implement recycled materials in their daily use and, even more so, in research and development of their enterprise.	Ikke lært noe nytt direkte. Men erfaringen fra prosjektet i helhet har vist hvor viktig verdikjeden og samarbeid langs verdikjeden er
Sirkulær økonomi er når man gjenbruker produkter igjen og igjen istedenfor å hente ut nye ressurser fra naturen.	Jeg setter opp den digitale flyten av resirkulerte produktene. Sørger for at vi kan spore produktene.	Part of used recycled materials in the production in relation to total amount of material (Certificated use: ISCC)	More difficult to handle recycled materials compared to virgin materials (especially tracking)

Consume or use less, by reusing the existing.	Traceabilities, digital platform	Being an observer "company" we measure increased knowledge of CE through dialogues, articles and activities performed in the research project. Maybe we should also work with own company for CE.	There are a lot of concerns to make when making a multi-material product when it comes to its possibility for recycling afterwards. Lack of industrial recycling solutions in Norway for some materials
An economy where products/ resources are reused or recycled for same or other purposes in the same or other parts of the value chain, or other businesses instead of being discarded/going to waste	New fractions	For eksterne prosjekt, er som sagt sirkulær økonomi et overordna tema. Vi måler ikke dette direkte, men det er et kontrollspørsmål i intern prosjektdialog.	It is critical to involve all stakeholders through the supply chain. A change one place can affect somewhere else
is to return product back to the loop and to support for sustainability	Optimal ressursbruk	Our production data on recycled materials	That it does not matter if you recycle plastic, if no one uses it
Recycling	To integrate the CE as top priority for business decisions	We measure the amount of recycled plastic material used in new (high quality) products.	Material technology
A way to work to keep the material resources in the loop for as long as possible	Knowledge, data and properties of recycled materials. Giving input to the recycling process and the properties of the product.	By use of tools to map all materials flows, as well as reliability in performance of constructions	We are enlightened the importance in changing the ways of thinking.
A profitable and lasting value chain for all actors involved	At nye sirkulære valg skal være det riktige valget, i forhold til både ressursutnyttelse og utslipp, slik at det sirkulære løpet kan fortsette «uendelig»	Received vs sold volume of used materials, and the financial results from this business.	How can you implement CE in practice, and what kind of barriers you can meet
Re-use material	More use of recycled materials in the aqua culture value chain. High quality of the recyclate is required.	The amount of waste	The massive amount of plastic waste from the industry and the many possibilities to reduce this
To secure that materials-products are used as long as possible with minimum eco-footprint and loss of resources	Recycling plastics, finding uses for recycled plastic, documenting the environmental effects of shifting from virgin to recycled materials	Amount of recycled material produced. Amount of incoming waste sorted and sent to material recycling plants.	That all parties in the chain have different issues that needs to be solved for making a lasting business model. Both financially and practically.
Holde ressurser i et sirkulært kretsløp	Understanding (characterization, testing) and use of recycled materials in aquaculture.	We look into the use of recycled and reused products to register the use, and we implement the way of thinking to our customer and internally in our company.	The complexity of changing traditional linear business models.
Resource efficiency	Trying to make recycling a profitable case that can sustain itself economically	Using Life cycle assesment tools -LCA for env assessment, S-LCA for social assessment, and LCCost accounting	more knowledge and information on fish farming system -> strategies for reducing, reusing and recycling of materials
More efficient use of resources, increased economical value per kg material. Hoping for reduced need for new raw materials	Increasing understanding of challenges that are within businesses transforming into circular economy actors.	We help customers to achieve their circular economy and sustainable goal, and try to make an impact that way	CE is very complex, but possible with focus on details. For [project] CE changes the business of aquaculture and probably other industries. CE is crucial for sustainable production.
It is an economy which manage resources in accordance with reuse reduce recycle principles.	Reduce the plastic waste, reduce overall overuse of plastic, increase recycling and reuse through bringing confidence (and affordability) in reused materials.	Vi måler det ikke direkte. Internt i selskapet har vi fokus på gjenbruk og det å kjøpe brukt. Trenger vi møbler, glass, kopper eller annet, er prosedyren å sjekke bruktmarkedet først. (Forts)	That CE is not only recycling, but also change in form of reduce and different design.
Re-use material in an application	Design of quality control processes for use of non-virgin materials in products	Leaving or changing of internal specific coding and establishment of new types and networks of communication	More knowledge about pipe- and fish farming equipment standards, the complexity of change and more in-depth about polymer properties in virgin and recycled plastics
System thinking	CE strategy and implementing in the company	By having it as a focus in each project.	Learned about the aquaculture and that there is a long way to implment circular economy there. Solutions won't be easy and will not come for free what may limit implementation.

Flow of materials, goods and profit in a closed loop, with reuse or recycle of rests and bi-products.	Technical aspects / control of processes and materials, creating value for sustainable value chain and reliability in Standards and constructions	we participated in more and more work, especially on recycling development and design of recycling	Its reliance on will for cooperation and leaving the quest for internal control and achievements only, towards common gain.
Changing a linear value chain and all spectes to circular - by making design changes	Promote the change and possibilities this businessmodel gives. Invest in equipment and knowledge which allow using and upgrade used values till new possibilities for s second or third life	We do have PBI models edtablised	That cooperation with all the value chain is very important.
Gjenbruk av ressurser . I lineær økonomi vil et produkt starte med jomfruelig råstoff, blir produsert, solgt og brukt, før det brennes eller havner på deponi. (Forts i nytt svar)			Commitment from the whole value chain is very important to achieve the target of circularity
business models based on the worldview there is no waste, and we will not produce any waste as a consequence of our activity. It is not equal to a sustainable society but should be part of strategies			Large percent of plastic materials within aquaculture can be recycled/reused. Processes to recycle, and to design the equipment to be recycleable require planning,collaboration and effort
I sirkulær økonomi baseres nye produkter på gjenbruk av produkter og/eller råmaterialer. Ved slutten av produktets levetid gjenbrukes materialene til nye/nytt produkt.			Material technology
			How crucial logistics is in circular economy, and that the new circular services requires a lot more sharing of information
			Circular economy are important for the world in the future.
			Complex and dependent on many different companies, people and public departments, but do-able
			Recycling of plastic
			We need to be 1 united team to deliver on changing the standards
			That it is possible to achieve through cooperation.