

The Circular4.0 Project

Circular4.0 is an Interreg Alpine Space project that began in October 2019 and finishes in October 2022. It aims at improving the Alpine eco-system of innovation and its contribution to the transition to circular economy in the Alpine Area by SMEs and economic actors, exploiting the potential and the added value of the digitalization processes by SMEs. The project is mainly addressed to the representatives of the ecosystem of innovation represented by: policy makers, stakeholders, academia and research institutions, intermediary organizations, entrepreneurs and citizens. In the project life they have met and cooperated focusing on the digitalization processes addressed to SMEs, contributing to make the Alpine area a cleaner and greener environment, open to innovation and new business.

CIRCULAR4.0 focuses on digital technologies as enabler to strengthen digitalisation processes by SMEs to foster innovation processes and accelerate the transition to the circular economy in Alpine Space. Through a specific pilot action, every CIRCULAR4.0 partner defined a set of tools for the transition of a number of SMEs to the circular economy. Each partner selected a number of SMEs and assessed their approach to circular economy and to digital technologies. Every partner chose the most successful examples of assistance among companies selected for the pilot actions. This brochure gathers these successful cases.

CIRCULAR4.0 partners are:

- Tehnološki park Ljubljana d.o.o. — SLOVENIJA
- Technische Hochschule Rosenheim — DEUTSCHLAND
- Austria Wirtschaftsservice Gesellschaft GmbH — ÖSTERREICH
- Innovation Salzburg GmbH — ÖSTERREICH
- Business Upper Austria - OÖ Wirtschaftsagentur GmbH — ÖSTERREICH
- Veneto Innovazione S.p.A. — ITALIA
- Grand E-nov — FRANCE
- Auvergne-Rhône-Alpes Entreprises — FRANCE
- Institut Jožef Stefan — SLOVENIJA
- Fondazione Torino Wireless — ITALIA
- Confindustria Bergamo — ITALIA
- Camera di Commercio Industria Artigianato e Agricoltura di Venezia Rovigo — ITALIA
- Trägerverein Umwelttechnologie-Cluster Bayern e.V. — DEUTSCHLAND
- risingSUD - Agence de développement économique de la région Sud Provence-Alpes-Côte d'Azur — FRANCE
- bwcon GmbH — DEUTSCHLAND

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TPLJ - Technology Park Ljubljana (Tehnološki park Ljubljana)



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Beti adopted a sustainable business strategy in the year 2020, setting ambitious sustainable goals till the year 2025. Along with the strategy we designed an action plan, which includes development of new products and has a strong emphasis on the digitalization. For each development a comprehensive project is needed, and funding must be secured. As a small medium sized company outside support is always welcome to receive the support of the business transformation process.

When we came across the Circular 4.0 project, we immediately recognized the synergies between our strategy and the ambitious – and decided to join.

We got additional insights and knowledge in the area of circularity and sustainability, meaning we strengthened our competencies in this area. The Circular 4.0 team supported us in the project preparation process – they guided us through the initial steps as well as provided inputs and directions to improve our project and to align it better with the circularity goals. The circular 4.0 team with their competences provided valuable suggestions and directions.

Our final result is an R&D project called DICO 5. In the project we will develop a line of sustainable base layer garments, based on modular circular design and digital product identity to follow the product's life cycle. We submitted the application for co-funding of the project in May.

TUAS - Rosenheim University of Applied Sciences (Technische Hochschule Rosenheim)



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The Technical University of Rosenheim (TUAS), Germany, has coached and supported a SME from the region.

The company manufactured high-precision mirror mounts for laser measurement technology and research. The mirror mounts are produced with extreme precision.

The company took part in a 1:1 consultation because it had not yet really implemented the topic of sustainability. In a preliminary online conversation, the status of the CE was queried. Afterwards, the questionnaire "Check for linear risks and circular opportunities" (developed by Dr. Sonja Eser) was explained in more detail. After the company had completed the check, TUAS and the expert developed recommendations for action. The products in research must have high precision, the approach here would be "product life extension". High-precision adjustments and maintenance are carried out by the company for the customer so that the company can guarantee precision over a long period of time. In addition, the company was very interested in how to meet the sustainability needs of the customers. The company already produces very sustainably. Therefore, we focused more on packaging and shipping. After our 1:1 consultation, the choice of packaging material was introduced. The customer can now choose between new packaging and packaging that is already in use. In addition, paper straps and natural filling material are used. The whole thing has been offered for about 2 months now and almost 90% of the customers choose used packaging and find it good.

AWS (Austria Wirtschaftsservice Gesellschaft)



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ProtectLIB is an innovative start-up in the field of Lithium-Ion Battery Recycling. Our focus is to close the loop in the battery value chain while accelerating the transition to an electrified industry. Therefore, we are looking for ways to recover materials from spent lithium-ion batteries, but also design a sustainable process that includes using waste streams, waste energies, and green chemistry.

We learned about legal regulations (SDGs, EU battery regulation, EU chemical strategy, etc.) and how to apply them in a commercial sense. Furthermore, we discussed on ways to classify chemical waste, e.g., how to reduce and treat toxic and harmful waste.

We got a basic understanding of sustainability in general and the tools to measure the circularity during process development. This is meaningful, especially when bearing in mind the legal regulations and restrictions which are forcing us to design an energy-saving and sustainable process. Altogether we know how to design an environmentally friendly process that guarantees that spent LIBs are not just recycled but have a decent responsibility for the wholesome value chain by having high-quality products in the end.

Innovation Salzburg



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medPhoton GmbH – based in the heart of Salzburg, Austria - is a young, innovative, and international operating company which focuses on the development of medical devices and software in the field of X-ray imaging, image processing and radiation therapy. As a manufacturing model SME in the region, they joined the pilot action in order to get assistance in anchoring CE within their business strategy.

They participated in a 1:1 workshop lead by our external expert, Dr. Sonja Eser, together they performed the check for linear risks and circular chances. After the workshop they received the report with useful information on how to move on towards higher circularity. The SME is already using ecodesign-strategies for reduced material usage as well as optimized energy consumption in usage of the product. Circular product innovations and business models (e.g. business as a service) could be interesting for a sustainable development of the company.

As medPhoton is a really young company, the products they sold so far are at the beginning of their life cycle. One of the major outcomes of the check for linear risks and circular chances was, that the SME should build a clear strategy for the end of the product life. Additionally, they got recommendations on retraction of the product (e.g. closed-loop, open-loop). Using the innovative power of Circular Design will help to increase the whole products sustainability.

Business Upper Austria



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The Circular Assessment Score of this company is CIRCULAR FRONTRUNNERS with a score of 43.8 from 50 in terms of Circular business model potential. The company works in the plastic and bio packaging sector. They joined the pilots as they see high potential in their organization to be fully circular themselves but also produce products that can be brought back into circles.

The company is in close exchange to business upper Austria and therefore joints the pilots to evaluate their current status in terms of circularity and digital maturity and estimated how to improve their business models and technologies in order to become more circular.

Together with biz up the company went through a circular assessment of finding the current state of the art and potential and made a digital maturity assessment. Afterwards business upper Austria provided feedback and assistance on how to improve the performance to become fully circular.

Veneto Innovazione



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CIRCULAR4.0 pilot action analysed a plant for pyro gasification of plastics, capable of processing 50 tonnes/year of organic waste: it can be considered as a 'hybrid plant fuelled by partially biodegradable waste', so it falls under the regime of renewable sources.

The gasification (sublimation process) carried out on organic matrices, i.e. carbon compounds, results in: a gas (syngas) that, once purified, could be assimilated to light hydrocarbons; a solid phase consisting of ash and charcoal; and a liquid phase consisting of washing water. In the pilot plant, the syngas feeds a cogenerator to produce electricity.

The plant is complementary and optimised for separate waste collection systems, but it is also suitable for operating with heterogeneous mixtures. The most evident advantages offered by this technology are the possibility of treating large quantities of waste that can no longer be recycled, obtaining energy, with practically no harmful emissions and solid residues that can be further exploited in other uses or in any case resulting in very small volumes. In this way, it is possible to alleviate the impact on landfills/incinerators or the waste transport system, producing energy and obtaining maximum value from waste with a view to a total circular economy.

Grand E nov

Les étapes clés



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The mission of the association ENVIE Strasbourg is to put back on sale at reduced prices outdated or broken down household appliances, primarily to people in precarious situations. To do this, it relies on professional integration to carry out activities such as: collection & sorting • cleaning, repair, painting, testing • rental or sale of spare parts or reconditioned products • repair of equipment under warranty or not. The workstations and business software are obsolete, not adapted to a change of scale or to employees with little digital maturity who need to be supported in their work. In order to provide effective support to employees on integration programmes, to cope with the increase in the amount of equipment to be renovated (+20% by 2023), to increase the rate of equipment reuse, to diversify its activity into the sale of spare parts & to reduce its impact on the environment, the association needs innovative digital tools to: carry out predictive diagnostics to optimise home repairs, sort out the appliances that can be refurbished or the recoverable parts • manage the flow and traceability of appliances and parts from collection and sorting to sales and after-sales • manage thousands of rental and repair appliances • manage online sales (own sites, professional platforms or online sales) • facilitate integration through self-training. The Circular programme enabled the association to: carry out an Industrie du futur and Climaxion diagnosis • build a digital roadmap capable of supporting technological development (AI bricks, traceability, cobots), organisational and process innovation and the fitting out of new workstations • recruit various experts (Cical & Cobo4You) and financial support opportunities. The company has embarked on the integration of Co robots & automation, the development of Optical Character Recognition (OCR), Machine Learning (AI) & Programming Interface (API) technologies to identify refurbishable equipment from the pre-diagnosis stage and to pilot all activities. This should enable it to increase the rate of reuse of equipment and parts taken from wrecks for reuse in its repair operations and those of manufacturers (BOSCH, Liebherr, etc.), and to reduce the number of wrecks to be dismantled/recycled. The study also enabled Envie to identify a new Cryo-cleaning technology (eliminating de facto acid or basic products & descaling, soiled water) reducing its environmental impact. The company's approach has already been recognised by a prize: les Cas d'Or.

Auvergne-Rhône-Alpes Entreprises



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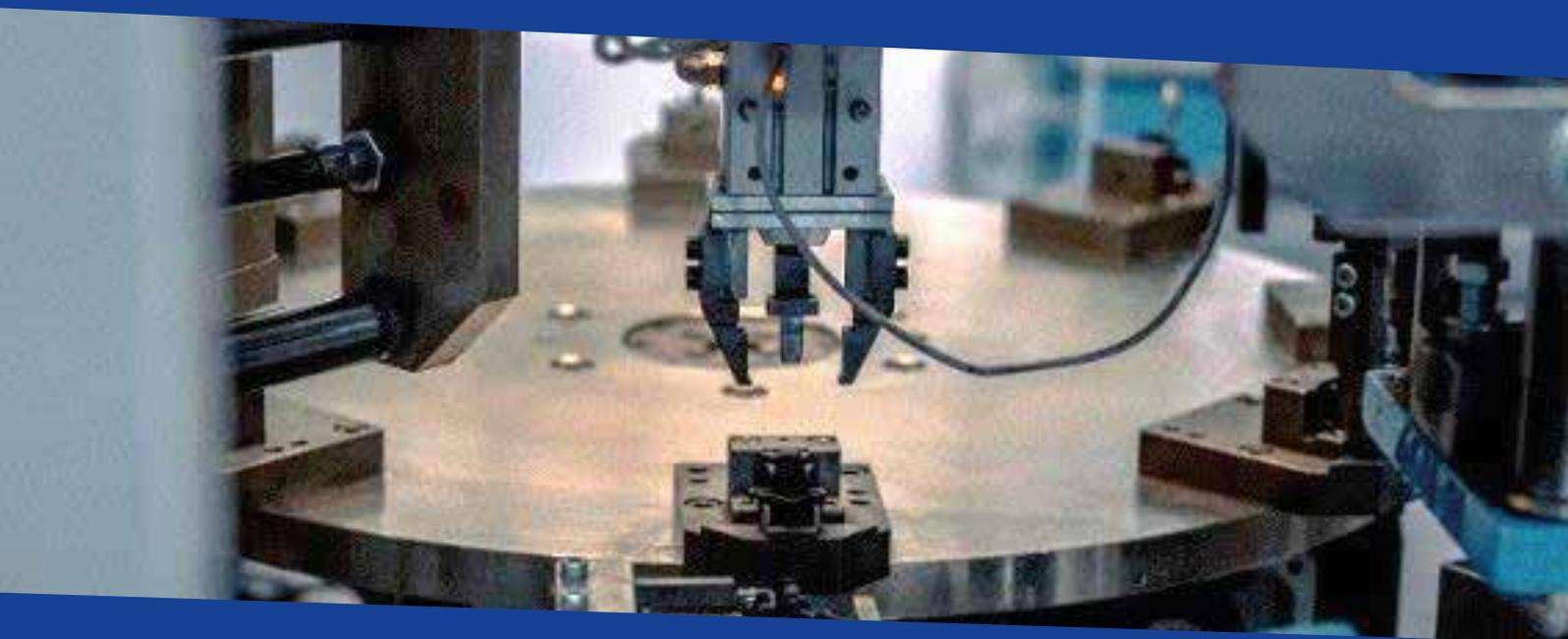
The SME Acousteam develops, produces and sell (or rent) tarps for protection against noise pollution in many different situations (building, public works, industry, traffic, events, ...)

The SME joined the Circular 4.0 pilot action proposed by Auvergne-Rhône-Alpes Entreprises in order to reflect on more local supplying with lower environmental impact. The company also wanted to identify eco-design tools for its products and in particular for its main product a tarp of 2,05 x 3,55 m, but with the constraint of keeping competitive prices.

The support for the company in the frame of the Circular 4.0 pilot action has allowed Acousteam to initiate an eco-design action thanks to the tools provided by the consultant. Acousteam is currently working on the redesign of its main product using a simplified life cycle analysis. The company is also working on the improvement of its environmental communication.

An additional benefit for Acousteam of its participation in the pilot action was the meeting with the company Chromelec during the training session organised in the beginning of the pilot action. The discussion between the two companies has allowed the establishment of an ecological synergy. Chromelec process metallic parts with chrome 6 and needs to protect certain parts of the metallic part. Acousteam has offered to provide manufacturing scraps of its tarps to Chromelec who use now the tarps instead of a specific covering paper.

Jožef Stefan Institute (Institut Jožef Stefan)



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During the pilot testing of the tools and training programme developed for SME's and operators in the scope of the Circular4.0 project a great interest in optimizing manufacturing production, for recovering value of waste materials and new product development, using digital technologies was shown by the company ELVEZ from Slovenia: an advanced manufacturing company specialized in providing clients worldwide with plastic injection components, metallised parts and cable harness solutions, providing a wide range of low to high volume multi-use injection moulding services, PVD metallised parts and complex made-to-measure cable harness solutions. They are suppliers of car parts and tools for worldwide top vehicles manufacturers. Elvez got first acquainted with the key principles of the circular economy with the materials provided in the scope of the Circular4.0 training programme for SME's- CAT4.0 and experts introducing the principles of circular economy and digital technologies. With the assistance of the Jožef Stefan Institute and contracted experts from Competence Center for Advanced Control Technologies and Giacomelli media, Elvez, along with 14 other SME's in the pilot training tested the digital maturity assessment tool and circularity assessment tool that enabled the company with the assistance of the advisors to develop two pilot projects to be invested into. The first one deals with optimizing energy use by building a solar electric plant on the premise that will drastically reduce existing company energy bill, mitigate rising costs of energy and enable to return excess of electricity into the grid and generate revenue. The second very prosperous pilot project addresses plastic production waste and recovery of materials and costs lost due to waste processing. They are introducing a "No waste policy", saving 100.000€ annually with repurposing waste, designing new products from reused plastic, extending a portfolio of products sold to the existing customers and gaining new market segments (domestic consumers) and create a higher value added products. This will also enable a recovery of some of the costs of storing waste with offering new "on-demand" services for smaller volume products. Through the pilots implementation Elvez was also introduced to the numerous funding options supporting their green investments.

Torino Wireless



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SAMEC Srl, small automation Machinery Manufacturing company from Piedmont, specialized in the manufacturing of End-of-Arm Tooling Systems for Robot Grips, and Modular Tooling Systems for Transfer Press in the automation industry, approached the Circular 4.0 project to further explore the potential for digital and circular development. The Circular4.0 path has served the company to have greater knowledge and awareness of the principles of circularity and circular business models. The analysis carried out (digital assessment and circular assessment) highlighted how the company implements efficiency practices in all three approaches: circular design, optimal use and waste recovery. The company has implemented a robotic island that can work unattended. It includes a compactor that allows to recover the lubricating coolants that are put back into circulation and compact the residual metal pieces, reducing the size of the waste in a proportion from 4 to 10. Consequently, it reduces the number of trips needed to manage the waste material in proportion from 4 to 6 times, which allows cost saving and less environmental impact.

Thanks to the Circular4.0 path, further possibilities for improvement the waste management process have emerged: such as the possibility to separate the different materials to be able to recover more value from the residual materials.

The increased awareness of the importance of sustainability also led the company to appoint a person responsible for the ecological transition, who will dedicate himself to improve processes focusing on sustainability. In this moment, the person is involved in specific training courses on the Green Transition and Circular Economy topics.

Confindustria Bergamo



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Sangalli S.p.A. is a top players nationwide for the design and implementation of road works, urban planning and road signs. As a reliable partner to public authorities, companies and private individuals, Sangalli S.p.A. always strives to find innovative solutions integrating technological advancements and sustainability.

As part of our pilot actions, Sangalli S.p.A. received 1:1 assistance by a team of researchers from the University of Bergamo in assessing their level of engagement towards the circular economy and the circularity potential of their business model. The company was classified as a champion, with both a high circularity potential, and high level of engagement, with a strong focus on research and development and projects focusing on the production of innovative and sustainable materials.

The main areas for improvements were found in terms of engagement. The team of researchers suggested that external communication on sustainability should be improved, for example by publishing a sustainability report. A materiality matrix could also be generated to identify stakeholder's priorities. Improvements have also been suggested in terms of collaboration along the supply chain and focusing on outreach by participating to public events on scientific and technological advancements.

Thanks to the assessment, the company had the opportunity get a different point of view on the directions that they could follow to continue leading the way as pioneers of circular economy in their sector.

Camera di Commercio Industria Artigianato e Agricoltura di Venezia Rovigo



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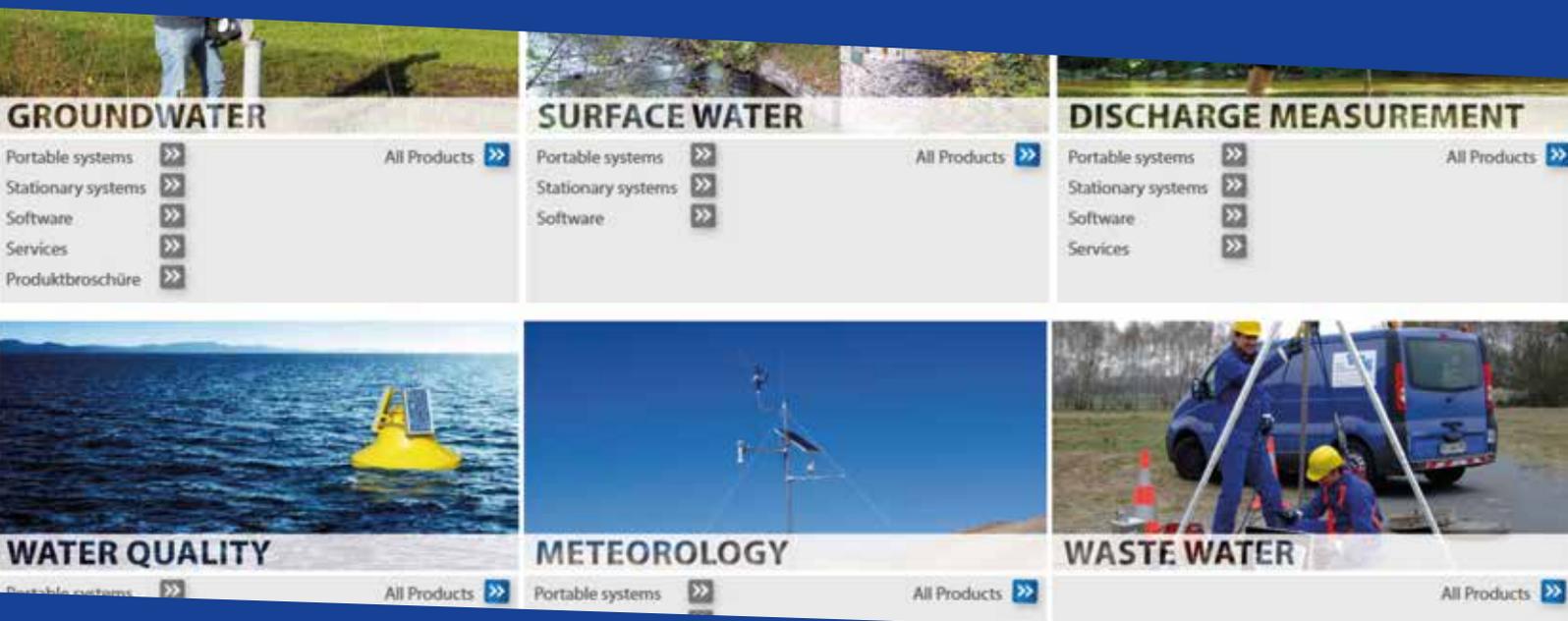
Easytech has developed CALDO SYSTEM TM, the first dynamic release electric heater. The primary focus was to create a system capable of responding effectively and efficiently to the new energy challenges that the world is offering us, lowering consumption and eliminating the problems of traditional hydronic systems.

Easytech has developed an innovative 100% Made in Italy technology: safe and simple to use. In this historical moment it is essential to create alternative, more efficient and virtuous systems. Construction is responsible for a large part of consumption and pollution worldwide; over 80% of the energy consumed by buildings is used to heat... water.

It is therefore essential to develop a sustainable solution that rationalizes the use of energy and resources, making the most of the availability of renewables. Why did Easytech participate in CIRCULAR 4.0? the company mission has always been to contribute concretely to the creation of a sustainable world that places the well-being of people and the planet at the center.

Easytech has always aimed at eliminating energy waste, respecting the environment, promoting sustainability in all stages of production, marketing and use. CIRCULAR 4.0 made it possible to measure this impact objectively and without "shortcuts", highlighting and giving further proof that the highly circular nature of easytech's business model really has foundation and value.

Umweltcluster Bayern



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For more than 50 years, SEBA Hydrometrie GmbH & Co. KG has been offering measurement solutions in the fields of groundwater, surface water, water quality, flow measurement, meteorology and wastewater and is one of the world's leading manufacturers. Since its foundation in 1967, SEBA Hydrometrie's mission is to develop robust, reliable and high-quality measuring technology "Made in Germany", technologically always one step ahead, with comprehensive advice, expert installation and commissioning as well as competent after-sales service. As part of our pilot actions, SEBA Hydrometrie received 1:1 assistance by Dr. Sonja Eser in assessing the circular opportunities and the linear risks of their business operation. On the risk-to-opportunity map the company was classified as a frontrunner with a Circular Business Model already in place. The company has already moved beyond mere compliance and eco-efficiency towards Circular product innovation and a first circular business model. Circular design strategies for their flow measurement products are already being applied. They are optimized for reparability and follow a modular design so that parts can easily be exchanged or upgraded. Additionally, SEBA Hydrometrie operates a service network in Europe, refurbishes returned products and keeps them in use e.g. for measurement campaigns. With specific, regional customers their products are already used as rental equipment. This is identified as a first circular business model on a small scale. As main areas for improvement Dr. Sonja Eser found the scaling of existing circular design and business model approaches. With the existing circular product design, the experience in the field of rental and the established service technician network, SEBA Hydrometrie could expand this circular business model even further. Only small changes seem to be necessary, such as informing & approaching customers and having service technicians proactively take back used appliances.

risingSUD



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France Construction designs and produces damping materials to cover all the risks in playgrounds, gyms, shooting ranges or industry since 1997. France Construction started reflecting on the impact of sustainability several years ago. They already used recycled (and recyclable) rubber. The company recycles around 800 000 used tyres per year and gives them a second life. France Construction wishes to close the loop and move up the value chain by recovering, grinding and recycling rubber waste. The objective is to avoid their disposal in landfill sites, strengthen their expertise on recovering and recycling of rubber waste as well as secure their supply chain.

What assistance did it get?

France Construction attended the online webinar “circular industry”. At the end of it they left with

- The keys to understand, rethink and accelerate their transition toward circular economy thanks to the online workshop
- A diagnostic report on their circular and digital maturity
- Information on the Circular4.0 project

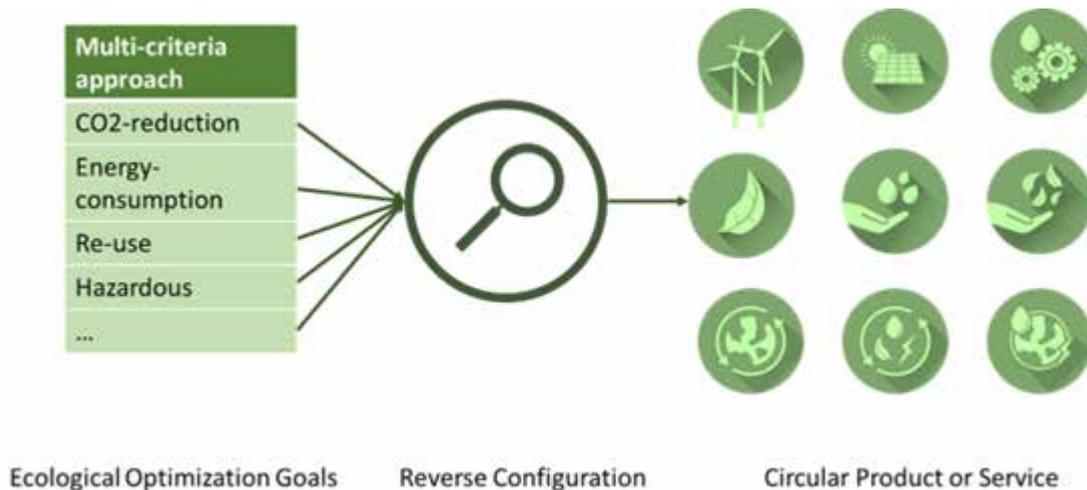
Afterward they applied to be part of the program consisting in two parts:

- one-to-one workshop to identify and validate the sources of circularity in their organisation and business model or an assessment of the potential of the transformation project, and design an action plan
- 5 days of consulting to implement one priority action

Which results did it reach?

At the end of the Circular4.0 coaching program, the company had a complete business plan to validate the technical and economical aspects of the project. France Construction met with the national agency for environment (ADEME) and Région Sud to present their project in order to improve potential aspects and look for potential funding sources. Finally, they joined the “Green Rooster community”, a network created by the Bpifrance and ADEME to foster ecological transition.

bwcon



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The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended. In practice, it implies reducing waste to a minimum. New process models and innovative business models are needed to achieve this objective. In the framework of the Circular 4.0 project, BWCON and experts from Pforzheim University accompanied regional businesses to explore opportunities offered by digital technologies for moving towards a higher circularity of their products and services. Several companies were interested in the development of a reverse configurator (tool-supported reverse-configuration process to semi-automatically identify best products or production approaches) and the tracking of circular product approaches using track & trace. With the help of a reverse configurator, environmental goals can be targeted in a multi-criteria manner (e.g. CO2 reduction, minimum energy consumption, durability). Existing approaches are suboptimal in reliability, efficiency, and maintainability, opening avenues for re-configuration based on ecological goals. Distributed ledger technologies are useful for meeting general tracking and tracing requirements. For very specific requirements (toxicity, hazardous, harmful, etc), one could use a special form of blockchain technology called NFTs. Based on these approaches, completely new business models are possible, which are likely to be supported by legal requirements (Supply Chain Act). Innovation projects covering those aspects shall be initiated as a follow-up to the initial support delivered within Circular 4.0.