ANNUAL REPORT

ACCREDITED RESEARCH CENTRE

CTP, ACCELERATOR FOR MATERIALS CIRCULARITY

www.ctp.be

2022

CTP

Chaussée d'Antoing, 55 – 7500 TOURNAI, Belgium

A NEW LOOK AND RECORD BUSINESS FOR 2022!

Stéphane NEIRYNCK
General Manager

Editorial

The three highlights of the year for the Centre were without doubt:

- **The adoption of a new logo**, which symbolises a return to basics for the CTP, not least in terms of the colours and the presence of the two inverted triangles (a mine and a mountain of waste) found in the Centre's original logo. This logo also embodies the future of the CTP, as the circularity of materials and, more broadly, the circular economy are at the heart of industrial and political strategies in Wallonia and Europe!
- The creation of **an innovation platform in the field of the circularity of mineral materials: REMIND WALLONIA** (see focus on page 21). For more information: www.remind-wallonia.be.

  This platform brings together the 3 key stakeholders in an innovation ecosystem: industrial entities (15), R&D (2 universities; 2 research centres) and the public sector (3).
  Nearly €23 million has been raised for projects (through the PNRR, the national recovery and resilience plan). The CTP is at the heart of these projects, with a total budget of over €3.5 million.
- The CTP's **total revenue** will exceed **€5,000k** for the first time, representing an **increase of 13%** compared with 2022.

  "Private" revenue - business support - rose by 18%, with two-thirds of this coming from customers outside Belgium. This is an excellent performance for the Centre, whose international image is growing stronger every year!
  "Public" revenue is also growing (+5%), mainly as a result of the increasing number of industrial collaborations - notably via the Greenwin competitiveness cluster.
  Collective research - the development of new skills - accounts for 23% of overall activity. A good balance, essential for the development of new high-level scientific skills within the Centre.

The financial results for 2022 are remarkable. The **cash flow generated is a record for more than 10 years**, with an **increase of 60%** compared with 2021, proof of excellent internal organisation.

The challenges for 2023 are many, starting with our presence in the new ERDF and INTERREG 2021-2027 programming. No fewer than 8 ambitious projects have been submitted. Let's hope the results are there!

Finally, a research centre is nothing without its staff, their skills, and their dedication. The figures speak for themselves, and I would like to take this opportunity to thank and congratulate every member of the CTP staff.

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About us

As an R&D and Innovation Centre serving companies in the environmental and materials fields, the CTP pushes back the limits of the treatment and recovery of solid materials, in particular ores, industrial by-products and post-consumer waste, in a circular economy approach, by providing innovative and profitable solutions for the world of industry.

The CTP's **mission** is to actively support companies (particularly SMEs) in their economic development by providing them with high-quality technological support, enabling them to grasp the innovations needed to guarantee them a secure future. This support takes the form of a scientific contribution through research projects and a professional and relevant service in terms of expertise and testing.

In 2025, companies that extract, manage and use primary and secondary raw materials throughout the world choose CTP as their R&D partner to construct innovative, efficient, sustainable solutions in order to supply and develop circular economy loops, helping to solve the societal challenges of resource availability and global warming.

Chèques-entreprises

Technology cheques are part of an integrated portfolio of grants dedicated to supporting business creation and innovation and promoting growth and entrepreneurship. They are targeted at SMEs in Wallonia and funded jointly by Wallonia and the European Regional Development Fund through the ERDF Wallonia-2020. EU operational programme (transition zone and more developed zone). In practice, our clients can benefit from several services through this measure. In the exploratory phase, our researchers carry out tests, calculations and initial analyses. This first phase can be followed by technical feasibility studies (conducting tests, optimising test protocols, laboratory tests etc.) or assistance with preparing for industrial scale-up (defining technical specifications, designing production frameworks etc.). The cheques can be used to finance up to 75 % of a project's costs, which are capped at a maximum of €60,000 excluding tax over three years (i.e. €45,000 in subsidies).
A total of 3 Walloon SMEs benefited from this scheme in 2022, for a total amount of €59,554.75, which was deposited and partially closed during the year.

More information at the website
https://www.cheques-entreprises.be/cheques/cheque-technologique/

CRÉDIT D'IMPÔT AGRÉMENT CIR RECHERCHE

CTP has approval for the French Research Tax Credit (CIR) issued by the Ministry of Education, Teaching and Research. This means French companies qualify for grants in the form of tax deductions when undertaking Research and Development activities. The renewal request covers a three-year period lasting until the end of 2023. Many of our French clients make use of this measure, which supports part of their research by reducing the financial investment required in the work submitted to us.

In 2022, the CTP obtained a renewal of its **ISO 9001 certificate** for three years! This is an essential label for our Centre, as it is one of the criteria for obtaining approval as a Research Centre in the Walloon Region.

This certification testifies to the company's approach to continuous improvement of its Quality Management System in order to meet the growing demands of its stakeholders.


BQA

QUALITY MANAGEMENT SYSTEM CERTIFICATE

ISO 9001 : 2015

CTP

member of EMRA

R&D projects, consulting, analyses and studies in the field of the circular economy: beneficiation of primary resources (ore, industrial minerals) and recycling of secondary materials (industrial or post-consumer waste) by "Mineral processing" and "Extractive Metallurgy", as well as their valorization, pre-treated or not, towards the raw material field.

D. SIMMONS
Director

***BQA sa** hereby declares that the quality management system of the company CTP, whose registered office is located Chaussée d'Antoing 55 - Tournai - Belgium, has been examined and found to comply with the ISO 9001 standard, 2015 edition.*


CTP

9,000 m^2 of pilot halls

1 Reception & Administration
Physics Laboratory
Extractive Metallurgy Laboratory

2 Chemistry Laboratory
Scientific Staff Offices

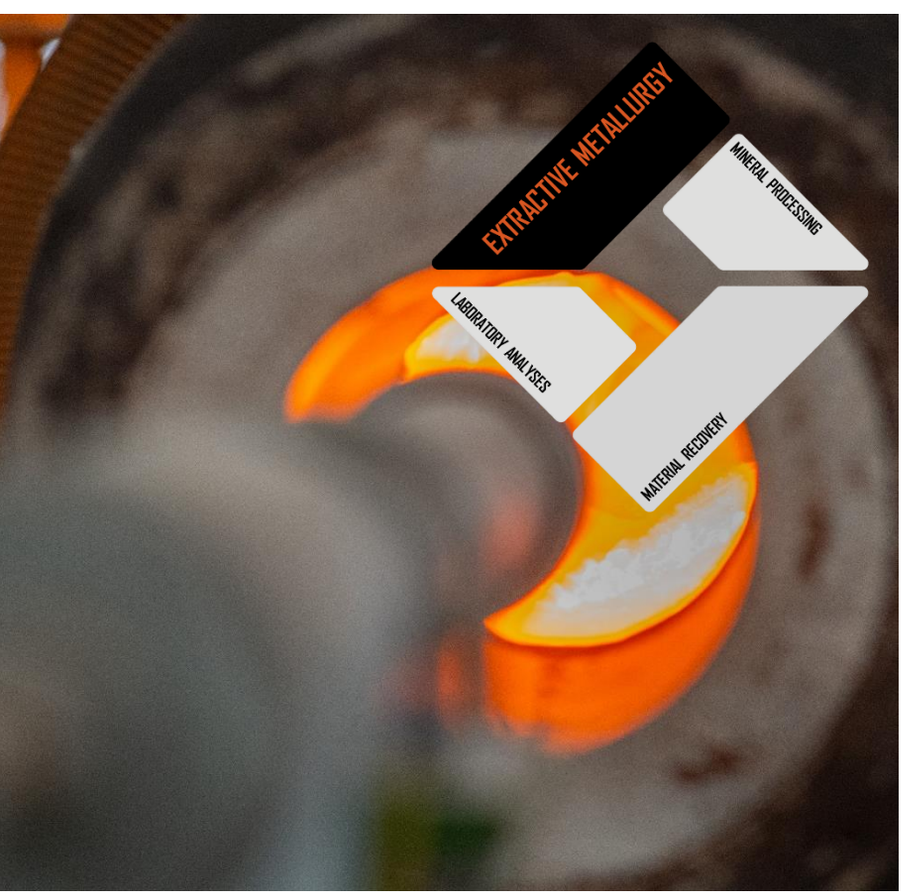
3 Materials Laboratory

4 -5 -6 Extractive Metallurgy & Mineral Processing
Pilot Halls

Mineral processing is a discipline that deals with the treatment of primary materials (ores, industrial minerals, rocks, etc.) and secondary materials (waste, production scrap, etc.) using physical and physico-chemical techniques involving particle size reduction (crushing, grinding, shredding, etc.) and separations based on contrasting properties between compounds. These contrasts apply as much to the size of the particles as to their density, their magnetic or conductive properties, their response to radiation or their surface state.

We study the sequence of operations to be implemented and, in this respect, define efficient and cost-effective treatment schemes. These flowsheets are often integrated upstream of extractive metallurgy or materials recovery operations, which require precise description of the products intended for them.

The CTP's Mineral Processing team carries out a wide range of tests, from laboratory to pilot scale, to define suitable processes in support of Industrial Entity mining projects or projects involving the recycling and recovery of materials. The team also carries out a large-scale customised production of batches, which includes companies' research and innovation initiatives.

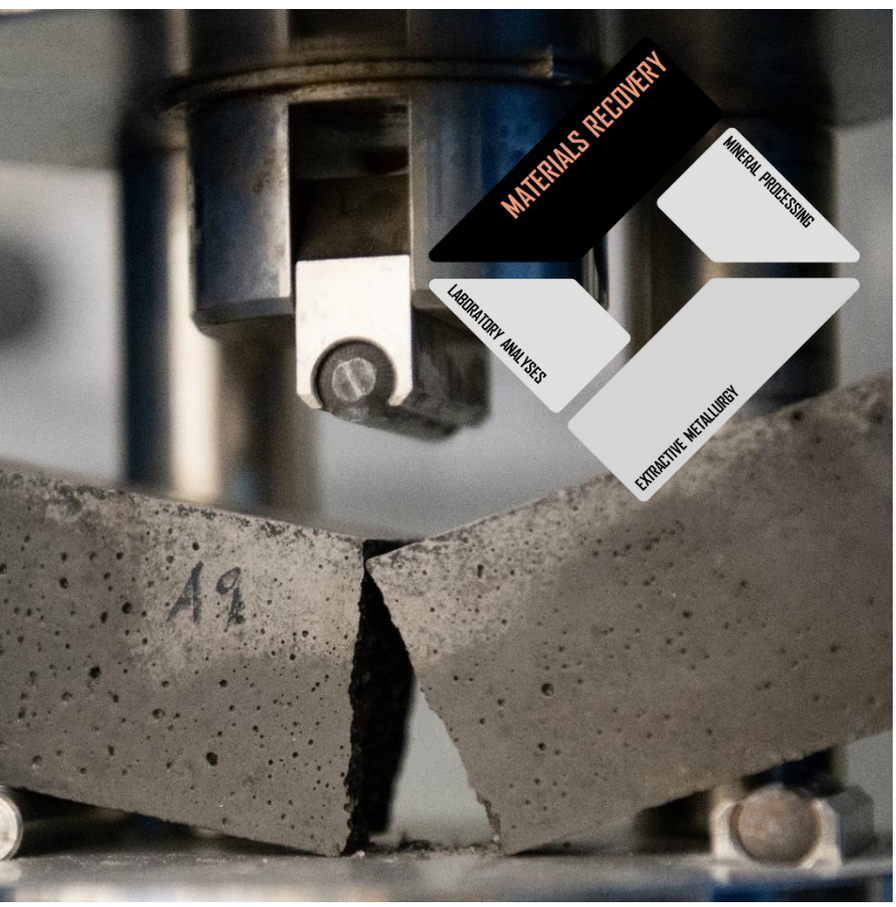


Extractive Metallurgy concerns all the tests and studies carried out with the aim of extracting and recovering one or more metals from an ore or a secondary material.

Potentially preceded by an initial concentration stage using physical methods, this activity stands out for its use of chemical processes to extract and obtain the metal. It has been growing steadily at the Centre for several years, with a highly diverse range of projects on behalf of companies both large and small, in Wallonia and abroad.

Our facilities and pilot tools offer upscaling possibilities that are very sought-after by our clients and constitute a major advantage.

Areas Of expertise



The CTP specialises in the treatment of waste and by-products, particularly of mineral origin, and has naturally turned its attention to their **recovery**, particularly in the building and public works sector. Materials whose particle size classifies them as gravel or sand contribute to the granular structure of materials, while fines, following chemical, thermal or mechanical processing to activate them, can be used as a partial substitute for hydraulic binders (cement, lime etc.).

To make this possible, CTP has acquired a series of tools for:

- activating fine materials to give them a latent pozzolanic or hydraulic quality (Siebtechnik eccentric vibrating mill, ZOZ attritor mill etc.);
- deploying materials containing different secondary raw materials (mixers, hydraulic press, vibrating table, flow table etc.);
- characterising physical parameters (Vicat prisometer, consistency and rheology measuring equipment etc.) and mechanical parameters (equipment for measuring longitudinal and shear elasticity moduli, bending and compression resistance, bearing capacity by determining the values of the CBR/IBI parameters etc.).

Since the aim is to recover secondary materials, the CTP is also equipped to carry out lixiviation tests on both monolithic blocks and materials that have undergone particle size reduction.

The analyses laboratories carry out chemical and physical characterisation of various solid matrices such as minerals, plastics, metals, etc. They have a wide range of equipment (ICP-OES, XRF, XRD, ATG, C-S, COT, etc.) and unique know-how built up over 25 years, enabling them to respond appropriately and precisely to the analytical challenges posed by our customers. New skills are frequently developed, this year for example, involving the characterisation of materials used in the lithium-ion batteries used in electric and hybrid vehicles. A wide range of customers, including SMEs, major groups and trading companies, place their trust in us and benefit from our services on a daily basis. Our laboratories also support all the CTP's areas of activity and are essential to the work we carry out in the fields of Mineral Processing, Extractive Metallurgy and Materials.

The buzz topic of 2022, our **RECYPALE** project!

FOCUS

Wind energy has been expanding rapidly since the early 2000s. Given a lifespan of around 20 years, it is estimated that the dismantling and recycling of wind turbine components will generate 50,000 t/year in Europe by 2022, with a further 500,000 t/year expected by 2050.

Although most of the materials used in wind turbines (concrete, metals, etc.) have clearly identified outlets, the blades are mainly made of glass fibre-reinforced thermosetting composites, with no industrial perspective other than energy recovery as an alternative to landfill.

Once the blades have been characterised, the CTP uses specific shredding techniques to release the various constituents of the blades (composite materials, wood, metals, etc.), which are then separated by a succession of stages including sieving, magnetic separation and gravimetric sorting. These stages recover the components of the composite materials in several forms (long or short fibres, polymer resin). These tests are also being reproduced on a pilot scale to confirm the robustness of the treatment process and to obtain sufficient material to study the various recovery options.

The various composite fractions thus produced are then incorporated into concrete formulations dedicated to road construction. Different types of cement are used as binders to optimise the mechanical reinforcement effect of the fibres in the materials. Similarly, iterative tests on the proportion of fibres or the use of additives are carried out to improve the mechanical properties of the materials (resistance to bending, splitting, etc.).

Wind farm operators are often institutions looking for global solutions for dismantling sites. By developing the recycling of blade materials, the industrial partner of the CTP could better position itself in this sector of activity. In addition, the project would involve the creation of a processing facility for these materials within the group.

Lastly, the recycling of composites in standard road construction materials means that these flows can be reused internally, boosting the Group's civil engineering business.

Key Events

Discovering CTP at the Mid-Term Event of the **NWE-REGENERATIS** project

02-02 to **03**-02-**2022**

A rewarding visit
by the Secretary of State for Recovery and Strategic Investment, Mr **Thomas Dermine**

23-03-**2022**

A mix of cultures during the visit of the General Delegate of Québec to Brussels, Ms **Geneviève Brisson**

07-10-**2022**

A "green" exchange when we had the opportunity to meet the Federal Minister for Climate, the Environment, Sustainable Development and the Green Deal, Ms **Zakia Khattabi**

23-11-**2022**

Support of business

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New customers

Laboratory analyses

With over 25 years' experience, the laboratory responds quickly and accurately to internal analytical needs, while offering a quality service to an ever-growing and diverse external clientele. The laboratory adapts to each specific request or sample, providing a complete service in line with the customer's expectations.

The laboratory's 2022 revenue is in line with previous years, with the slight increase simply corresponding to the various price indexations due to high inflation.

Expertise

Expertise essentially consist of consultancy projects contributing to industrial developments or expert opinions in the fields of materials, metallurgy or geology. The volume of business in this sector has fallen by 47 % in the space of a year, even though it accounts for only 6.2 % of revenue from business support services. This sector is mainly linked to one-off opportunities whose recurrence is uncertain.

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New customers

Studies & Tests

Year on year, services dedicated to companies are growing, with business volume jumping by a further 34% between 2021 and 2022, this time approaching €2 million. The extractive metallurgy business is the biggest contributor to this figure (58 %), and is up 20% on 2021. However, this activity is largely driven by a specific large-scale project requiring a large number of human and technical resources. Case files relating to Mineral Processing and materials also saw strong growth of 61 % between 2021 and 2022, taking the figure to an all-time high. **Studies and tests now account for 85 % (compared with 76 % in 2021)** of the assistance provided to the 91 companies that called on our services this year, with a total of 160 cases closed.

Collaborative Research

ERDF 2014-2020 Programme

EMRADEMO2FACTORY
IMAWA CLOSED
ECOLISER

INTERREG Va Programme

VALSE CLOSED
DOUDOU CLOSED

INTERREG NWE Programme

NWE – REGENERATIS
CIRMAP

Cornet Programme

ReIn-E

Win2Wal Programme

ECUME

In progress

EMRA-DEMO2FACTORY

Provision of demonstration units in the fields of materials, processes and the environment

The "EMRADEMO-CTP" project is designed to accelerate the introduction of circular economy principles in business, and particularly SMEs. This awareness-raising is achieved by providing demonstration units in the Centre, which enable waste to be transformed into a new recycled raw material.

The Centre turns a problem (waste management) into an opportunity (recycling and the creation of new materials). The public is also made aware of this new way of thinking about the economy via an online virtual tour of these units and the organisation of open days.
In 2022, the demonstration unit enabled the CTP to expand its collaboration with the local and cross-border economies.

ECOLISER

ECO-binders for soil treatment, waterproofing and roads

Partners: CTP, INISMa, ULiège, ULB, CRR, Certech, Materia Nova

The aim of the project portfolio is to develop alternative binders based on industrial by-products for use in soil treatment to improve certain geotechnical properties, in particular bearing capacity and/or waterproofing.

2022, the penultimate year of the project, was marked by the completion of the first trial trench in which a ladle slag-based eco-binder formulation was tested. The secondary materials were pre-treated at the CTP in sufficient quantities (around 4 tonnes for a test trench) before being mixed.

The trench, installed on the CTP site, was monitored in terms of mechanical performance using plate and pile-driving probe tests. At the same time, bearing capacity was checked on a laboratory scale. The installation of a percolation water collection well was used to verify the environmental safety of the mixture.

The trials proved conclusive and other boards will be installed in 2023.

NWE-REGENERATIS

REGENERATIon of Past Metallurgical Sites and Deposits through innovative circularity for raw material

Partners: SPAQuE, MPI, CTP, BRGM, ULiège, Ixsane, OVAM, Team2, TH Köln, BAV, Cranfield University

Although most of the waste generated by the modern metallurgical industry is recycled, waste from older sites is still stored or buried because it is considered too costly to treat. Today, this waste represents a major ecological and economic challenge. The remediation of former metallurgical sites requires a new model combining the remediation of polluted soils and the exploitation of the resources they contain in order to support sustainable economic development.

The NWE-REGENERATIS project (Interreg North-West Europe), coordinated by SPAQuE, aims to demonstrate that resources (metals, materials and land) can be recovered from Former Metallurgical Sites and Deposits (PMSDs) using Urban Mining techniques. Its aim is to help establish an economic model that will enable raw materials and land to be reintegrated into the regional economy. As part of this project, the CTP is assessing the potential for recovering metals from several metallurgical sites using Mineral Processing techniques.

Following the characterisation by non-intrusive geophysical prospecting (ULiège) of old merlons at Duferco's La Louvière steelworks site, three pockets of slag with a high metal content were identified. Assisted by Atrasol, the CTP and Duferco took several tonnes of material from each of these locations in order to carry out pilot-scale mineralurgical treatment tests (crushing, grinding, magnetic separation, etc.). The tests highlighted the possibility of recovering metallic fractions and recovering other fractions for road or civil engineering applications. To demonstrate that this approach is a real solution, a pilot trial will be carried out on 3,000 tonnes of slag in 2023 at the Duferco site.

Further information:**https://www.nweurope.eu/projects/project-search/nwe-regeneratis-regeneration-of-past-metallurgical-sites-and-deposits-through-innovative-circularity-for-raw-materials/**

CIRMAP

CIrcular economy via customisable furniture with Recycled MAterials for public Places

The aim of the project, which brings together a network of multi-disciplinary players, is to manufacture customised Urban, Memorial or Garden (UMG) furniture using 3D printing and secondary mineral materials, in particular recycled concrete sand (RFA: Recycled Fine Aggregates).
As part of this multidisciplinary cross-functional project, based on its know-how and expertise in the field of Mineral Processing, the CTP is responsible for the preparation of RFA streams on a pilot scale. More specifically, the CTP is applying mineralogical treatment to the fine fraction of recycled concrete aggregates in order to obtain several batches of materials suitable for incorporation as a key element in compositions intended for 3D printing. The treatment involves a combination of crushing, milling and screening (at 2 mm) at pilot scale. It is applied to quantities ranging from several hundred kilograms to several tonnes, ultimately processing up to 25 to 30 tonnes over the course of the project.
CTP also characterises the particle size distribution of the fraction produced to adapt operating conditions to its partners' needs.
In 2022, the CTP processed more than 20 tonnes of RFA, which it supplied to various project partners.

Further information: **https://www.nweurope.eu/projects/project-search/cirmap-circular-economy-via-customisable-furniture-with-recycled-materials-for-public-places/**

ReIn-E

Recyclable Integrated Electronics

Partners: CTP, SIRRIS, Hahn-Schickard, INM

The ReIn-E project is a European CORNET-type research project conducted in partnership with Sirris and 2 German research institutes. It targets designs of electronic parts that incorporate the electronics and circuits directly into the polymer. This technology enables new designs and leads to reductions in weight and the quantity of materials used. However, it makes it more difficult to recover the metals at the end of the product's life. The project responds to this risk by testing an eco-design that includes an intermediate layer between the electronics and the polymer, which should make it easier to separate them and thus recover the metals. CTP is examining the recyclability of this new type of electronics by testing the effectiveness of the intermediate layer and its impact on metal recovery. In particular, the CTP is comparing the action of different types of shredder (shredder, knife shredder) depending on the shape of the support, the shredding mesh and the presence of the intermediate layer. Tests are also being carried out on metal recovery by comparing different dry and wet processes: electrostatic separation, densimetric separation, and morphological classification.

ECuME

Circular Economy and Electric Mobility: functional recycling by electro-hydraulic fragmentation, electro-leaching and anti-solvent precipitation of lithium ion batteries

Partners: ULiège, CTP, Comet Traitements

As the Belgian and European car fleets move towards electrification, the recycling of end-of-life Li-ion batteries has become a major concern. CTP has come together with the GeMMe and GreenMat university laboratories to propose an innovative recycling process using a fragmentation technique that could enable a better separation of the battery's constituents and hydrometallurgy techniques that are more economical in reagents and energy to recover the metals contained in the black mass. The goal is to be able to produce precursors for the manufacture of new cathodes.

Hydrometallurgical tests carried out at the CTP have demonstrated high Co-Ni recovery yields by black mass electrolixiviation, as well as the feasibility of antisolvent precipitation of high-purity Co-Ni mixed salts. Over the next year, battery cathode precursors will be synthesised on a laboratory scale from the mixed salts supplied by the CTP.

Closed

IMAWA

Innovative MAterials for WAllonia

Partners: INISMa, CTP, CRIBC, UCL, UMons, CRM, ULiège

Comprising two projects (MATSUB and ECOVAL), this portfolio aims to propose innovative solutions for substituting and processing the raw materials needed to manufacture refractory materials and for recovering waste from advanced ceramic materials. The CTP was involved in both projects in this portfolio, which were completed by 31/12/2022.

The aim of the **MATSUB** project was to study the use of alternative raw materials for the ceramics industry, to replace imported materials that are subject to price or tax fluctuations and whose supply is not always under control. To ensure the pre-treatment of alternative materials, the CTP developed mineralurgical processes such as:

- combining density separation and electrostatic separation in a dry process;
- combining particle size separation by density separation in a wet process.

The MATSUB project also focused on developing LIBS (Laser Induced Breakdown Spectroscopy) technology with a view to implementing it on a materials processing line.

In addition, as part of this project, the CTP developed processes for the mechanochemical activation of industrial residues used as ceramic precursors in order to promote certain reactions or the formation of certain phases during subsequent heat treatment. In this context, a number of promising results were obtained, in the sense that the mechanochemical treatment effectively made it possible to lower the heat treatment temperature, enabling the synthesis of refractory phases of the calcium aluminate type.

The **ECOVAL** project focuses on the eco-design of sustainable energy recovery units that require the use of shaped or unshaped refractory materials (often based on silicon carbide: SiC). Because of the operating conditions inherent in the incineration process (high temperatures, presence of chlorine from incinerated plastic waste, pressure, etc.), these materials are subject to deterioration that reduces their lifespan and requires regular maintenance.
However, recycling of these materials is underdeveloped. In this context, the CTP has taken on the task of characterising these materials by developing a high-performance methodology for analysing SiC-SiO_2-C mixtures, and by developing effective processes for reducing the particle size of these refractory materials.

In conclusion, it was found that, although conventional mills (percussion, ball, hammer, impact, etc.) give good results for the selective grinding of used SiC-based refractories, the autogenous mill proved to be particularly effective, while avoiding the problems of mill wear and grinding media (balls, hammers, etc.) associated with the abrasive nature of SiC.

Selective electrical discharge fragmentation (SELFRAG) technology has also proved highly effective on SiC refractories, but its weakness is that it is still underdeveloped on an industrial scale.
Used SiC-based refractory materials can be reused in the manufacture of new refractory materials, used as an abrasive or as a foundry additive.

VALSE

New cross-border resources: towards the validation of scenarios for the reuse of sediments

Partners: ISSeP, ARMINES, BRGM, Ineris, DGO2, University of Lille 1, CTP, SPW mobility and infrastructure, industrial partner

The goal of the Valse project was to validate cross-border channels for material recovery (dredged sediments and excavated earth). The project tended towards the operational level by building full-sized structures (landscaped mound, cycle path) with a focus on integration into the landscape and the sustainable use of materials. CTP was involved in the characterisation, preparation and treatment of dredged materials so that they could be used for three types of target applications – a concrete formulation for building a cycle path, the production of lightweight aggregates and the production of pozzolans. CTP also led the final module of the project, which aimed to transfer the experience acquired by the consortium with dredged sediment to the issue of excavated earth.
The year 2022 was marked by the inauguration of the cycle path made from concrete containing sediment. The Walloon Minister for Climate, Energy, Infrastructure and Mobility, Philippe Henry, was present for the occasion.
During the symposium, the CTP presented its main achievements, which included the development of flowsheets for pre-treating dredged sediments before incorporation into concrete (dry treatment) or incorporation into expanded clay aggregates or clinker substitutes (wet treatment).
Additionally, the symposium covered a comparison between excavated soil and sediment, along with the transposition of sediment expertise to excavated soil.

The implementation of the cycle path is shown in the following video:
https://www.youtube.com/watch?v=cBjZUKvteT8

Further information: **https://valse.info/**

DOUDOU

Cross-border development of innovative materials or how to add value to plastic waste?

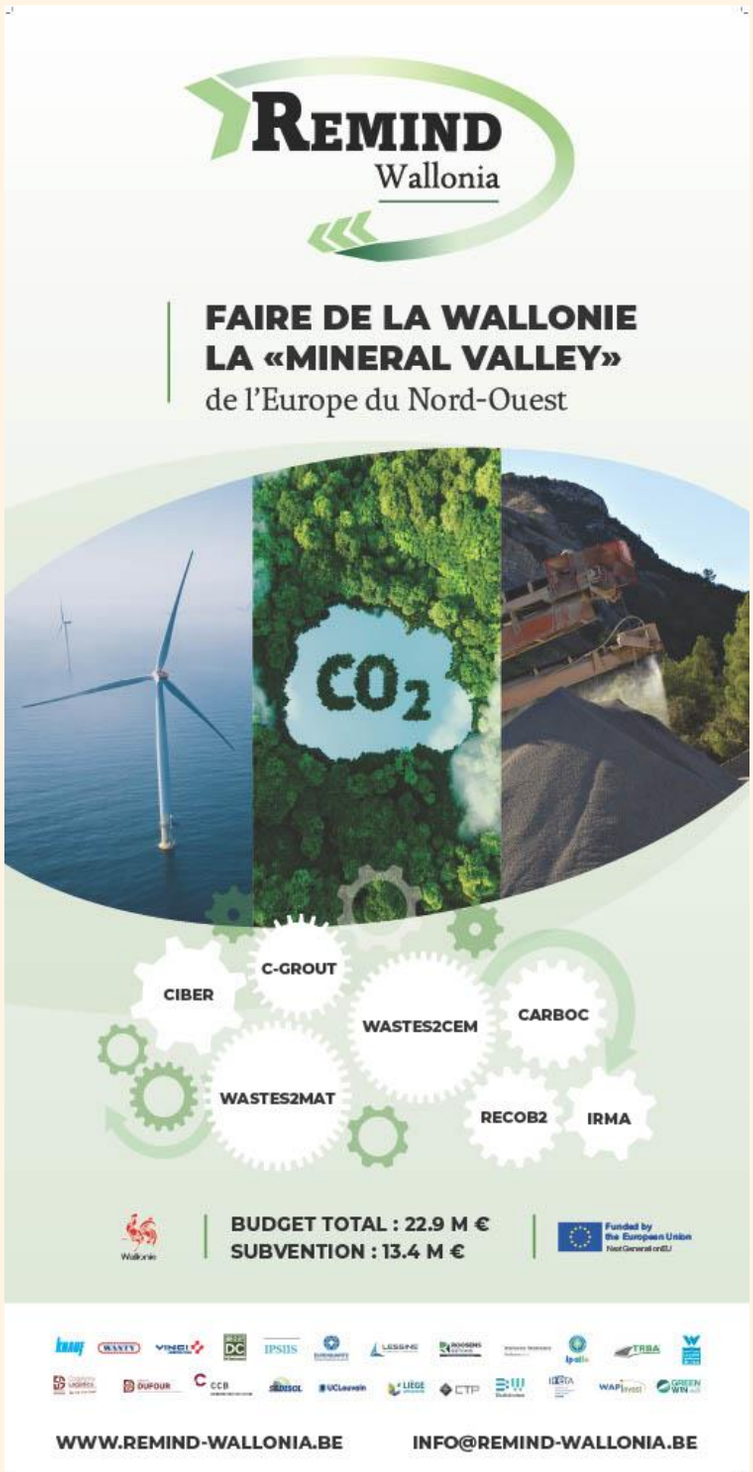
Partners: IMT Nord Europe, CTP, CERTECH - Shareholders: Plastium, Team2, PlastiWin

Since 2019, the CTP has been participating in the INTERREG DOUDOU project, which aimed to support the development of additive manufacturing by promoting the use of materials derived from recycling. This cross-border project between France, Wallonia, and Flanders was carried out in cooperation with IMT Nord-Europe and Certech.

As part of the promotion of the use of recycled materials for additive manufacturing by 3D printing, a total of nearly 90 companies from both sides of the cross-border area were made aware of this issue. A closing event was organised on 18 October at ITM Nord-Europe, to present the identification of cross-border deposits of interest in various polymer materials, such as PP, HDPE, PMMA, PA, PS, PC, ABS, PET, etc.

In this context, the CTP used its technical capabilities to prepare materials to make them compatible with 3D printing. In this way, grinding, sorting and purification operations were once again carried out on batches of secondary materials such as production offcuts, yoghurt pots, construction site helmets, and so on. Various separation processes were also used: aeraulic separation, densimetric table, eddy current separator, screens, etc.

All these operations, which are essential for bringing materials of very diverse origins and shapes into batches that are perfectly calibrated in terms of granulometry and purity, are necessary for the partners to manufacture granules or filaments that can be fed into 3D printers. Parts of various sizes and shapes were produced to check their geometric and mechanical properties, in order to validate their potential use in this application.



FOCUS

A new innovation platform dedicated to the circularity of mineral materials was officially launched in Wallonia last October.

The primary mineral industry, including quarrymen, cement manufacturers, furnace manufacturers, and others, is currently confronted with significant challenges that could potentially impact its long-term survival. These challenges arise from the depletion of primary natural resources and the need to address its carbon footprint. Simultaneously, the secondary mineral industry, encompassing demolition, mineral industrial waste, polluted soil, and dredging sediments, faces its own set of difficulties. It must overcome obstacles related to the recovery of secondary raw materials while prioritising those with the highest added value to ensure profitability. Additionally, the gradual ban on landfill sites (French: CET, or Centres d'Enfouissement Technique) poses further challenges to this industry. These two major Walloon business sectors now need to work together to secure their future, as the technological needs are similar and the issues complementary. The idea has therefore arisen of setting up a genuine Walloon 'mineral' cluster, supported by industrial players and also bringing together the research operators concerned.

The aim of the project is to create, in Wallonia, a platform of industrial, technological, and scientific excellence, creating added value and jobs, and gaining international recognition. By bringing together complementary Industrial Entity players in these value chains, the deployment of the circular economy will be accelerated in Wallonia. By pooling existing flows and industrial potential, many new industrial projects will be able to see the light of day, boosting the economy and the manufacturing industry, creating sustainable and non-relocatable jobs, and moving sectors towards a decarbonised Walloon industry.

In short, the aim is to **accelerate/increase the circularity of construction materials, whether primary (natural resources) or secondary (waste)**, within the sector itself but also by broadening the areas of use of these processed and/or 'up-graded' materials.

The REMIND platform brings together fifteen industrial entities, two universities (UCL, ULIEGE) and two research centres (CTP, BUILDWISE). A **budget of €23 million** has been released to fund **seven pilot projects**. Fourteen million of this comes directly from the Walloon recovery plan and nine million from the partners themselves. The seven projects should lead to concrete Industrial Entity processes being implemented in Wallonia within four years.

Industrial Research

Reverse Metallurgy

ATHENA

National Recovery and Resilience Plan

« Deploying the circular economy in Wallonia»

CARBOC NEW
CGROUT NEW
CIBER NEW
IRMA NEW
WASTES2CEM NEW
WASTES2MAT NEW

CISTEMEEC NEW

C-WALity Programme

APEROFIN
RECYPALE CLOSED
RESA
DIB2JOULE CLOSED

Walloon Recovery Plan « Waste Resources»

VALOCELL NEW

Marshall Mobilisation Programme

MINERAL LOOP
COSMOCEM

New projects

CARBOC

Capture and storage of Co_2 by carbonation of bottom ash and concrete with reduced cement content

Partners: ULiège, CTP, Remind, Roosens Béton, TRBA, Ipalle

The demographic and economic growth of recent decades has led to a surge in industrial activity, resulting in a considerable increase in greenhouse gas (GHG) emissions, which are responsible for major climate change. The European Union has set itself a target of a net reduction in European emissions of at least 55% by 2030, in order to achieve carbon neutrality by 2050. In this context, the Industrial Entity partners in the project (Ipalle, TRBA and Roosens bétons) have logically identified a convergent interest in using CUSC technology (Capture, Use and Sequestration of CO_2) to reduce the carbon footprint of their Proceeds by partially replacing cement with carbonated phases. It was against this backdrop that they sought scientific support from the CTP and the GeMMe and PEPs laboratories at the University of Liège to investigate the development of road materials or prefabricated concrete materials capable of sequestering industrial CO_2.

C-GROUT

Pre-treatment of waste and by-products of mineral origin with a view to their integration into material formulations intended mainly for the offshore wind industry

Partners: CTP, ULiège, UCLouvain, Remind, Euroquartz, Lessines

The project involves the development of complex grouts or mixes for low-, high- and ultra-high-performance concretes for use in offshore applications, which stand out from those of their competitors by incorporating pre-treated secondary mineral materials (SMM) (industrial waste and by-products) into their compositions. This diversity of materials will enable industrial partner Euroquartz to offer a global approach to the sector's manufacturers, as well as being able to consider a wide range of inputs whose quality can vary greatly. For example, a secondary material with variable properties could be preferentially integrated into grouts for low-performance concretes such as filler grouts and, conversely, a constant input into a grout for Ultra High Performance Concrete (UHPC). In order to make the best choice for the development of new MMS-based materials depending on the type of offshore application, the project plans to adopt a rational eco-selection process based on the definition of performance indices that will be established on the basis of technical, economic and environmental properties derived from Life Cycle Assessment (LCA).

Within C-GROUT, the CTP will contribute its expertise in the treatment and recovery of secondary mineral materials so that they can be incorporated into offshore mix formulations without adversely affecting their performance in terms of rheology, mechanical strength, anti-washout behaviour, chemical resistance, etc.

CIBER

CIrcularity of prefabricated concretes

Partners: Wanty, Dufour, Cogetrina, Roosens Bétons, CTP, ULiège, UCLouvain

To cope with the high consumption of natural aggregates in the construction sector, the increasing use of recycled aggregates is becoming a necessity. To this end, Wanty and Dufour, who have recently developed a process for recycling deconstruction flows as part of the research carried out with the CTP (SOVALMIN and OPTIDEMO projects), will be working with Roosens to improve the quality of the aggregates produced so that they can be used in higher added-value outlets such as prefabricated concrete for large-scale structural components (bridge decks, lintels, filler blocks, floors, modular deconstructable blocks).

In addition to their existing use in structural components available on the market, the partners are actively pursuing the development of novel and highly innovative structural construction elements. These elements will take the form of large, modular blocks, with the objective of enhancing their usability and making dismantling them easier (following the principles of eco-design) to enable reusability. By adopting this approach, it becomes feasible to envision a circular recovery system that extends beyond the mere reuse of aggregates. The aim is to enable the reuse of finished products within the construction sector, following the principles of the Cradle to Cradle approach.

The CTP has begun to support Wanty and Dufour in the selection and sampling of representative material flows (demolition sites, CIW sorting line). The CTP will treat these materials using the same processes currently being implemented by Wanty and Dufour to obtain concrete aggregates that will be recycled in prefabricated concrete.

IRMA

Manufacture of non-combustible insulating materials and refractory materials by recovering inert industrial waste, deconstruction waste and other recycled resources

Partners: CTP, BBRI, ULiège, UCLouvain, Remind, Ipsiis, Vinci

The aim of the IRMA project is to develop new insulating, non-combustible and refractory products from inert waste from industry and the deconstruction sector. The process to be used is based on the IPSIIS patent. It enables the production of insulating and non-combustible foams from mineral materials.

IPSIIS is currently marketing a product for the industrial furnace and still markets. This product is obtained from a natural raw material. Substituting part of the raw material with waste and by-products will make the products more competitive in terms of cost. IPSIIS foams could thus find other applications corresponding to larger volumes, including building insulation in particular.

In this project, the CTP is involved in the pre-treatment of secondary mineral materials to make them compatible with the process developed by IPSIIS. The materials are supplied by the partners REMIND and VINCI.

The processed materials are then used by our partner IPSIIS to develop formulations that produce stable foams that meet the technical requirements of the targeted applications.

The other partners are involved in the following aspects:

- characterisation of foams and development of application protocols (CSTC)
- assessment of the quality of Proceeds based on life cycle and carbon footprint criteria (REMIND, ULiège-PEPs, UCLouvain, BBRI)
- marketing the developed products (IPSIIS, VINCI)

WASTES2CEM

Alternative circular binder based on slag and fly ash

Partners: CTP, ULiège, UCLouvain, Remind, CCB, Duferco Wallonie, DC Environment

At present, the main challenge facing Walloon cement manufacturers is to remain competitive in the face of competition from imported clinker and to meet their commitments to reduce CO_2 emissions.

In this context, the WASTES2CEM project proposes two approaches:

- The first is to minimise the environmental impact of clinker by incorporating secondary mineral materials (SMM) into the raw meal.
- The second involves reducing the clinker content of cement by adding reactive additions derived from Industrial Entity by-products (MMS).

The secondary mineral materials studied come from historical deposits. Initially, the CTP's role will be to bring them into line with cement manufacturers' specifications, depending on the intended application. The CTP will also help carry out clinkerisation tests on a laboratory and pilot scale, as well as characterising the new cements.

WASTES2MAT

Alternative ettringite-based circular binder

Partners: Remind, CTP, ULiège, Sedisol, SWDE, Ipalle

Several Walloon companies, including Sedisol, SWDE and IPALLE, are facing difficulties when it comes to managing their waste. It turns out that the pooling of some of these wastes leads to the formation of a particular hydraulic phase that can be used as a binder in the synthesis of materials with limited bearing capacity, such as re-excavable self-compacting materials (RSCM) or sub-base materials. More specifically, these materials have great potential for development because, although they meet a real need, they are currently little used in the Walloon Region. In addition, the phase synthesised stabilises the inorganic pollutants present in the waste and captures a large number of water molecules, thereby helping to stiffen the materials.

The aim of this project is therefore to develop eco-materials whose load-bearing capacity is provided by this particular phase. The originality of the project is further enhanced by the fact that the reagents used to synthesise this phase are all of secondary origin, which will make it possible to avoid sending them to landfill sites.
The CTP will be involved in this project in the characterisation of secondary mineral materials, as well as in the development phase of the eco-material based on these materials and containing the specific hydraulic phase. The eco-material will serve as the basis for the formulation of MAR and sub-base materials by another partner.

CISTEMEEC

Industrial Entity Value Chains, Energy Transition, Electric Mobility and Circular Economy

Partners: ULiège, CRM, CTP, Comet Traitements, Reverse Metallurgy

A structuring project within the RM+ (Reverse Metallurgy) portfolio, Cisteemec is part of the NRP and is being carried out in collaboration with a number of Walloon industrial partners, the Metallurgical Research Centre (CRM) and the University of Liège (GeMMe, GREEnMat, PEPs).

Cisteemec tackles various aspects of the challenges associated with the management and recycling of critical objects and materials used in electric mobility and energy transition technologies. Its ambition is to accelerate the deployment of Walloon industries that will become active in the recycling of this type of material. More specifically, the CTP is involved in the project to recycle the lithium-ion batteries (LIBs) used in electric vehicles, bicycles and scooters, among other things. The aim of our developments is to set up a demonstrator for recovering 'black mass' (the active material in LIBs) from battery modules, and we will also contribute to the development of a hydrometallurgical process for synthesising metal precursors from this black mass in order to manufacture new LIB cathodes.

VALOCELL

Recycling and recovery of cellular masonry blocks

Partners: CTP, industrial partners

The aim of the project is to develop a comprehensive system for collecting, sorting and recovering cellular concrete masonry blocks from non-incinerable bulky waste from the construction sector. By isolating them from deconstruction flows such as rubble and plasterboard in particular, these blocks will be 'upcycled' into value-added concrete formulations after treatment and functionalisation.

The CTP will be testing various dry sorting and separation techniques to isolate cellular concretes from non-incinerable waste. The crushing techniques needed to incorporate cellular concretes into concrete formulations will then be studied by the CTP.

In progress

APEROFIN

Enhancing Road Performance through Fines Recycling

Currently, recycling centers and deconstruction material facilities are actively seeking methods to recover the finest fractions of their material flows. To explore new avenues for recovery processes, the APEROFIN project, the industrial entity that initiated the project enlisted the expertise of CRR and CTP to develop technical solutions. The CTP devised an efficient and high-performance washing station at a laboratory scale to extract the fine fractions. Subsequently, the two research centers collaborated to examine the composition and geotechnical behaviour of these flows on a laboratory scale. The objective is to develop a road base material suitable for light traffic and a cement-treated fine material for trench backfill applications. Through the laboratory study, a formulation has been established, and an experimental trial is presently underway at the industrial entity's site. The purpose is to evaluate the material's performance on a pilot scale and assess its feasibility in meeting the required performance criteria for use.

RESA

Highly cost efficient REfractory SAnd Filler for low carbon steel ladles - New, more cost-competitive filler materials for low carbon steel ladles

Conducted in collaboration with INISMa, this CWALity project is studying the use of alternative chromite sands or sands with lower qualities for the constitution of plugging masses for the steel ladle casting channel. These alternative materials could provide a competitive advantage not only in terms of price but also in terms of diversifying supplies in the context of securing critical materials in Europe. However, the quality standards for filler materials remain very demanding, and the CTP is involved in studying the treatments needed to give alternative chromites the qualities required to make filler materials that meet the standards. The phase of testing the thermal and mechanical properties of these new masses is still in progress at laboratory scale, with the prospect of being able to test the new formulations under real conditions in a blast furnace.

MINERAL LOOP

Capture and sequestration of Industrial Entity CO_2 by carbonation of mineral waste

With the goal of developing a circular economy for mineral waste, the Mineral Loop project aims to design, develop, install and operate a pilot industrial unit for transforming mineral waste into secondary raw materials that can be reused in a variety of applications. The processes to be implemented will be based, among other things, on the principle of carbonation, i.e., the capture and fixation of CO_2 in alkaline mineral materials that have been stabilised and reconditioned in this way.

The partners pre-selected potentially carbonatable streams and the CTP's work consisted in assessing the capacity of these mineral materials to fix CO_2. This assessment involves studies in static mode and then in dynamic mode, the efficiencies of which are determined by physico-chemical and mineralogical characterisations, also carried out by the CTP.

COSMOCEM

The CosmoCem project is a “Plan Marshall” project that has been accredited by the Greenwin cluster. Its aim is to transform Walloon industrial waste and by-products into new mineral additives for cement. These additives would constitute an alternative secondary raw material able ultimately to replace thermal power plant fly ash and blast furnace slag, whose production is constantly decreasing.

In this project, the role of the CTP is to select the most appropriate activation method (mechanical or thermal) depending on the nature of the secondary materials.

At this stage of the research, the technical feasibility of both treatment methods has been demonstrated on a laboratory scale. While thermal treatment is more specifically shared with clay materials, mechanical activation can be applied to a wider range of secondary materials.

The next stage of the project involves validating the laboratory results by setting up pilot units capable of performing these two types of activation. The effectiveness of the activation treatments applied will be verified using mechanical and rheological tests.

ATHENA

Production of zinc salts

The previously developed treatment schemes have been optimised both in terms of production costs, which have been improved through the used of alternative reagents, and in terms of implementing intermediate purification stages, which has enhanced the purity of the final product. The possibility of new sources of raw materials implies the development of specific processes. An innovative alternative multi-stage process is currently being studied. Initial laboratory tests are promising and should soon lead to pilot-scale trials.

Closed

DIB2JOULE

Developing a waste recovery unit to convert industrial waste containing hydrocarbon chains into fuel

This CWALity project studied the feasibility of treating heterogeneous plastic streams by catalytic cracking, with the aim of producing a liquid fraction that could be re-introduced into the petroleum cycle for the manufacture of conventional hydrocarbons (fuel), as well as recovering secondary fractions (gas and tanks). The CTP supported the partner company throughout the project in the phases of characterising the deposits of materials, improving their quality and carrying out catalytic cracking laboratory tests. Oils were produced and evaluated by the petrochemical industry. This work validated the relevance of the method while highlighting the need for robust control over the composition of plastics intended for treatment. Despite the impossibility of setting up a continuous pilot plant, it was possible to draw up specifications for the materials to be used in the process, based on the cracking tests carried out during the laboratory phase.

RECYPALE

Mechanical recycling and recovery process for composite elements in wind turbine blades for use in concrete or hydrocarbon-type road materials

As part of this project, the CTP developed a process aimed at eliminating exogenous elements (metals, wood, foam) from wind turbine blades, then implementing differential grinding to obtain a fibrous fraction. Tests were then carried out jointly by the CTP and the industrial entity to develop mortar and concrete formulations incorporating fibrous fractions into road materials, with the aim of enhancing their mechanical properties. Given the current market, the economic model is not viable for the immediate industrialisation of a blade recycling process. However, this situation could change very quickly, and the Dufour Group is already planning to dedicate space to this activity at its new recycling site in Froyennes.

Notable equipment

In 2022, the analyses laboratory will be equipped with a latest-generation ICP, which will be faster and more accurate, enabling the analyses of trace chemical elements in highly charged matrices.

Speed and low power consumption mean that, on average, overall energy consumption per sample analysed can be halved.

+ 830

News followers

Comms

With social networks playing such an important role in our daily private and professional lives, the CTP is gradually enhancing its image.

In 2021, we were riding the LinkedIn wave.

In **February 2022**, we reached our target of **1,000 followers** on LinkedIn, a great first step in the development of communication at the CTP.

Alongside this, the CTP members actively participated in voting for a new logo that is more representative of the Center's activities. This decision marked a return to the Center's roots, resulting in substantial preparations for the official change, scheduled for early 2023.

Get in touch !

Shooting photos by WAPICT

Our shareholdings

Financial

sa labotour

Specialist in the characterisation of road and construction products

Reverse Metallurgy

Provides governance for the **"Reverse Metallurgy"** project, the aim of which is to create an internationally recognised platform of industrial, technological and scientific excellence in reverse metallurgy in Wallonia, creating added value and jobs.

REMIND Wallonia

"Reverse Mineral Industry" in Wallonia is a **platform of industrial, technological and scientific excellence**, accelerating the circular economy in Wallonia.

Other

Chèques-entreprises

GREEN WIN FROM INNOVATION TO BUSINESS

PÔLE MECATECH LE PÔLE DE COMPÉTITIVITÉ WALLON EN GÉNIE MÉCANIQUE

Wal-Tech

CCI WALLONIE PICARDE

SIM Société de l'industrie minérale

SME Society for Mining, Metallurgy & Exploration

CHOQ EN WALLONIE PICARDE

Wallonie picarde

HUB CRÉATIF wap's hub WALLONIE PICARDE

Publications & Events

Fairs and exhibitions (visitors)

2022-03-24 Participation in Intersed **"Recovery of dredged sediments - State of the art and innovations"**, Lille

2022-05-12 Sim technical day at the BRGM on "The French WEEE recycling industry: from waste collection to metal production" + visit to the BRGM halls, Orléans

2022-05-30 to 2022-06-03 IFAT trade fair, Munich

2022-06-07 Circular Economy Fortnight, REPLIC event, Pecq

2022-06-09 Visit to the CTP organised by TEAM² for the CEFR (French recycling equipment manufacturers' club)

2022-06-23 Participation in the SIM technical day on sampling, Paris

2022-09-29 Participation in the **"Innovation meetings for the circular economy"** organised by TEAM², Lille

2022-10-07 Conference on **"Circular design in plastics"** organised by Canopea, Denuo, essenscia, GreenWin and Plastiwin, Namur

2022-11-10 Roadshow on recycled aggregates in Wallonia organised by Feredeco, Mons

2022-11-15 and 16: Participation in the **"2nd National Conference on Sediment Recovery",** Lille

2022-11-30 Sim technical day organised jointly by the District Grand-Est and GMB-Sim on the dismantling of the Chooz A nuclear power plant and a visit to the Leffe quarry

Courses

2022-04-25 & 26 Training course on Membrane filtration - IFTS, Angers

2022-06-10 Training course on **"Sampling of fragmented materials"**, Christian Lucion, CTP

2022-06-10 Training course on "The role of an ore beneficiation laboratory", Christian Lucion, CTP

Publications and conferences

Article **"Mineral Processing Techniques Dedicated to the Recycling of River Sediments to Produce Raw Materials for Construction Sector"** to be published in 2023 in the journal Mining

Presentation at the round table "Sediments: excavated soil like any other?" at the VALSE project final conference (15/03/2022)

Senior Management

Board of Directors

Frédéric DUFOUR
Deputy Director
DUFOUR Group
CTP President

Thomas PARDOEN
UCL Professor – Advisor to the Rector for business relations
CTP Vice President

Christophe BONCHOUX
Chief Executive
IDETA

Céline THILLOU
Director of Research Administration and Transfer
UMONS

Aurore DE BOOM
Scientific Advisor
ULB

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IPALLE

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Jacques RENNOTTE
Chief Executive
INISMa-CRIBC

Stéphane NEIRYNCK
Chief Executive
CTP

Emmanuel DELHAYE
Qualified Attaché Research and Innovation Specialist - DGO6

Eric PIRARD
Full Professor
ULiège

Annual General Meeting

UCLouvain

Dominique OPFERGELD
UCLouvain represented by Frédéric BRODKOM
Christian LUCION
Jean-François THIMUS
Xavier LEPOT

ALC

ALC Tournai represented by David NAESSENS
Philippe BUSQUIN
FEDIEX represented by Michel CALOZET
IMALC represented by Michel BODSON
DUFOUR Transports et Manutentions
represented by Frédéric DUFOUR

ULB

ULB represented by Aurore DE BOOM

IDETA

Christophe BONCHOUX
IPALLE represented by Vincent VAN LEYNSEELE
Pierre STADSBADER
Frédéric SEYNHAEVE
Pierre VANDEWATTYNE

UMons

UMons represented by Céline THILLOU

Management Committee

There's a new recruit to the Management Committee! In December, we welcomed Barbara Michiels to the position of HR Manager.

Stéphane Neirynck
General Manager

Jérôme Meerseman
Manager

Antoine Masse
Manager

Benoît Grymonprez
Manager

Sébastien Legat
Manager

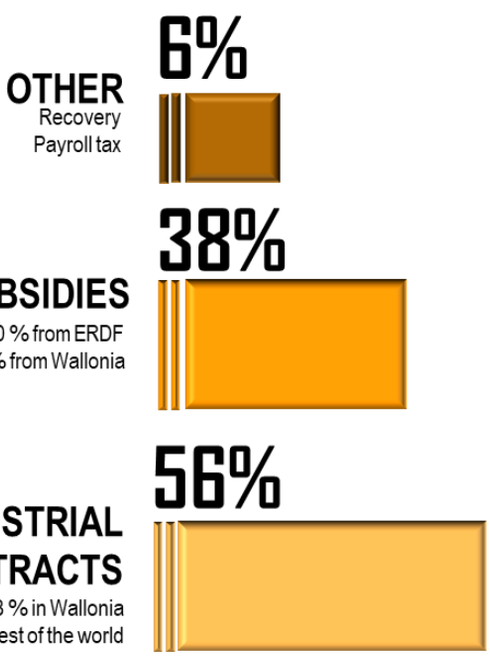
Barbara Michiels
RH Manager

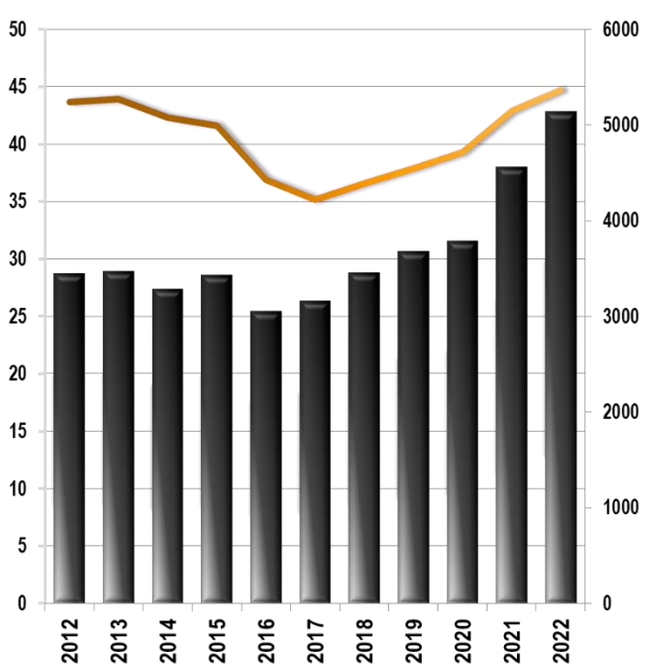
Philippe Descamps
Manager

Balance sheet

	2022	2021
Assets		
Client invoices	2.860	2.421
Operating subsidies	1.947	1.860
Other assets	333	278
TOTAL	**5.140**	**4.559**
Liabilities		
Supplies	459	454
Misc. services and goods	1.326	1.135
Staff	2.928	2.661
Depreciation, provisions and write-downs	226	182
Other liabilities	53	75
TOTAL	**4.992**	**4.507**
Cash flow	**374**	**234**
Investments	**808**	**192**

Investment subsidies (equipment and buildings)



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