

GreenWin International Conferences on **Green Chemistry & White Biotech**



**TOWARDS A FOSSIL-FREE ENERGY :
CHALLENGES AND OPPORTUNITIES FOR R&D AND INDUSTRY**

**2 ONLINE MASTER SESSIONS
20 & 27 MAY 2021
from 9.30 till Noon**



Feel inspired

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GreenWin

Accelerating innovation in green chemistry, sustainable building materials and environment sectors.

GreenWin is a catalyst for innovation. It is one of the 6 innovation clusters of the Walloon Region.

GreenWin nurtures the development of technology partnerships and projects, focusing on three strategic sectors:

- > green, leanly-managed chemistry
- > sustainable materials & construction
- > environmental technologies
(recycling; clean water, soil and air).

The purpose of the cluster is to support innovation and encourage the development of collaborative research and development (R&D) projects with a view to boosting the growth of the industrial fabric of Wallonia and creating jobs in key markets.

By striving to bring more efficient environmental technologies to the market, GreenWin focuses its work on improving the lifecycle of products by saving materials and energy, recycling, and using renewable resources.

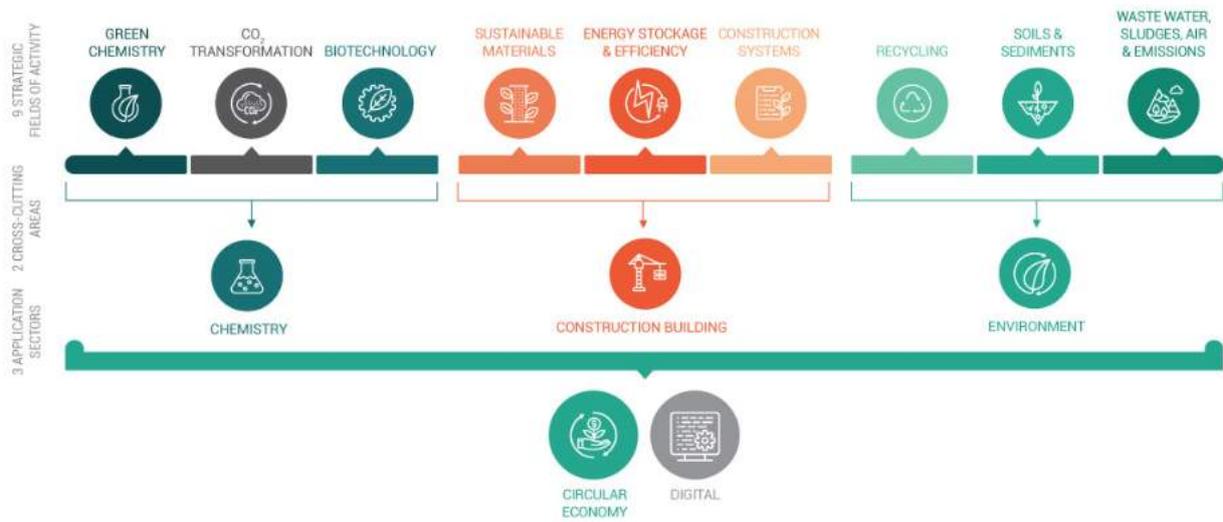
As part of its main priorities GreenWin endeavours to tackle major technological challenges, such as green chemistry, white biotechnology, the storage of chemical energy, the reduction of CO₂ emissions, sustainable development, and processing waste and effluents and recycling them as new raw materials.

GreenWin encompasses a network of around 200 members, 130+ of which are companies (75% SMEs), including several world leaders, 140 university departments, 16 industrial and certified research centres, 6 training providers and communities. They are all involved in boosting the green economy and motivated by the opportunities presented by the pooling of skills and the sharing of resources.

Target countries are: Belgium, Canada, France, Germany, Italy, Luxembourg, Spain, Switzerland, the Netherlands, the Nordic countries, the UK...



GreenWin: Accelerating innovation in green chemistry, sustainable building materials & environment sectors.



GREENWIN Facts & Figures

1 **200+**
MEMBERS
of which

2 **150+**
CORPORATES.

3 **4**
INTERNATIONAL
PARTNERS

4 **5**
INTERNATIONAL NETWORKS
OF WHICH GREENWIN IS
A MEMBER

5 **+64%** (+146% FOR SMES)**
EMPLOYMENT
GROWTH RATE

6 **64**
PROJECTS

7 **5**
EUROPEAN ONES.

8 **3**
TECHNOLOGICAL
PLATFORMS

9 **800**
INTERNATIONAL CONTACTS
THROUGH GREENWIN'S
NETWORKS

10 **+32%** (+36% FOR SMES)**
ADDED VALUE
GROWTH RATE

11 **€175+ M**
BUDGET INVESTED
INTO OUR PROJECTS

12 **9**
STRATEGIC FIELDS
OF ACTIVITY

13 **3**
APPLICATION SECTORS.

14 **2**
CROSS-CLUSTERS
THEME LEADERSHIPS :
ECOCIRCULARITY
& CARBON NEUTRALITY

15 **85 000***
DIRECT EMPLOYMENT
(26% OF INDUSTRIAL EMPLOYMENT)

16 **160 000***
INDIRECT
EMPLOYMENT

17 **€15 B ***
EXPORTS
(36% OF WALLONIA EXPORTS)

*GreenWin's industrial sectors figures
** Since 2006



Marc VAN DEN NESTE
Chairman of the
GreenWin Board

Currently Chief Technical Officer of AGC Glass (world leader in flat glass), he is also Deputy Chairman for Technology and Innovation (T&I) and CTO of AGC EU.

A Materials Science engineering specialist from UCL (University of Louvain) and holder of the Advanced Management Programme diploma from Harvard University, Marc VAN DEN NESTE started his career at Cockerill Sambre (steelworks), then joined Glaverbel, where his expertise in technological innovations would take off. His specialty was then ceramic welds (FOSBEL), refractories, glass and fusion. He holds an Executive Education Certificate in Territorial Strategy, Microeconomics & Competitiveness from Université Libre de Bruxelles, obtained in 2019.

Passionate about innovation, research and development, he was Deputy Chairman of GreenWin under the previous terms of the executive board and is also Chairman of the EPL advisory committee, co-president of Materia Nova, and member of the Board of Directors of INISMA, SAMBRINVEST and Kinestral.

Véronique GRAFF is Managing Director of GreenWin, having joined the dynamic team of the GreenWin innovation cluster in 2012.

Throughout her career, she specialised in projects building and management by developing R&D innovation project for an agro-biotech cluster, and by joining the National Contact Point of the European Commission for the EU Framework Programme for Research and Innovation. Her fields of expertise were then life sciences, eco-innovation, environment, food/agriculture and biotechnology. She also undertook field missions in GIS (Geographic Information System) and quality of surface waters in Belgium, Latin America and Africa.

She has therefore accumulated over 15 years' experience in the development and management of innovative collaborative projects at regional and international levels.

Raised in a family of entrepreneurs, she has an MSc. in Agro-engineering (water and forestry - FUSAGx, ULg-GxABT, 1998). She also holds a Certificate in Innovation Management (LSM –

UCLOUVAIN, 2015), a Certificate in Management and Local Development (2001, IGEAT-INAMP-ULB & Solvay B. School) and an Certificate in Territorial Strategy, Microeconomics & Competitiveness from Université Libre de Bruxelles, since 2019.

Ir. Véronique GRAFF
Managing Director of
GreenWin



Tineke VAN HOOLAND is Deputy Secretary-General of bio.be/essenscia, the Belgian federation that represents the biotech and life sciences industry with the aim of boosting innovation and industrialisation in Belgium and beyond. She graduated in Industrial Pharmacy from Ghent University, and for the last 16 years has held a number of positions of leadership in biopharmaceutical companies at corporate level. She is also a founder and CEO of Epic 10, a boutique consulting firm specialising in External Affairs in Life Sciences. Owing to her dynamic and no-nonsense approach she is often consulted as a board member, and is regularly invited to appear as a keynote speaker at different events.

Tineke is also an advocate for female leadership, having authored a number of opinion pieces on the empowering of women. She lives by her motto: 'Nothing great was ever achieved without enthusiasm' (Emerson).



Tineke VAN HOOLAND
Moderator
Deputy Secretary-General
of bio.be/essenscia

Gilles COLSON

Host

**Head of International
Affairs & Marketing
GreenWin**



Having obtained his Degree in Political Science at UCLouvain, and a Diploma in Business Management at TAFE NSW, a technical institute in Australia, **Gilles COLSON** gained 8 years' experience in management consulting while working for companies where he mainly developed an expertise in project management.

He also worked for EUKICA, the Brussels liaison office of the European Union Chamber of Commerce in Korea (EUCCK), an organisation key to the fostering of two-way economic, commercial, and industrial relations between the EU and the Korean Peninsula.

In 2013, he integrated GreenWin's operational team as International Affairs Manager. He is now Head of International Affairs and Marketing.

TOWARDS A FOSSIL-FREE ENERGY: CHALLENGES AND OPPORTUNITIES FOR R&D AND INDUSTRY

2 ONLINE MASTER SESSIONS

PROGRAMME >

MASTER SESSION #1 : 20 MAY 2021

focus of the day: **CCU – Mineralisation – Hydrogen**

Marc
VAN DEN NESTE

Chairman of GreenWin's Board
CTO of AGC Glass

WELCOME

Jean **JOUET** &
Jean-Yves **TILQUIN**

from **John Cockerill Group** - Belgium &
from **Carmeuse Group** - Belgium

KEYNOTE SPEAKERS

CO₂ Capture & H₂ open up the Route to Fossil-Free Fuel

Vincent
FLON

from **FLUXYS** - Belgium

Shaping Hydrogen and CO₂ Infrastructure to sustain Industry Decarbonisation

Prof. Guy
DE WEIRELD

from **UMons** - Belgium

CO₂ Carbon Capture from Cement Plant and Utilisation in the Production of Synthetic Natural gas: Techno-economic and Environmental Assessment

Guy **DAVISTER** &
Fabrice **ORBAN**

from **De Smet Engineers & Contractors** &
from **Hamon Group**- Belgium

NEUTRAL-KERO Project: The Way to CO₂ -Neutral Airplane Fuel

MASTER SESSION #1 : 20 MAY 2021

focus of the day: CCU – Mineralisation – Hydrogen

Dr Richard
HEYN

from SINTEF - Norway

**Introduction to the COZMOS Project: an Efficient
CO₂ Conversion via Multisite Zeolite-Metal
Nanocatalysts to Fuels and Olefins**

Dr Michael
KÖPKE &
Babette
PETTERSEN

from LanzaTech - USA

**Stepping on the Gas towards a Circular Economy:
Carbon-Negative Chemical Production via Gas
Fermentation**



TOWARDS A FOSSIL-FREE ENERGY: CHALLENGES AND OPPORTUNITIES FOR R&D AND INDUSTRY

2 ONLINE MASTER SESSIONS

PROGRAMME >

MASTER SESSION #2 : 27 MAY 2021

focus of the day: **Energy storage and battery recycling**

Gilles
COLSON

Head of International Affairs & Marketing at GreenWin

WELCOME

Philippe
QUIRION

from **CIRE**D (Centre International de Recherche sur l'Environnement et le Développement) - France

KEYNOTE SPEAKER

How Sensitive are Optimal Fully Renewable Power Systems to Technology Cost Uncertainty?

Frédéricq
PEIGNEUX

from **WATT4EVER** - Belgium

Circular Batteries in Belgium from E-Mobility : Powering the Energy Transition of Industries

Patrick
HENDRICK

from **ULB** (Université Libre de Bruxelles) - Belgium

Daily and Seasonal Energy Storage : is there a case study for Energy Communities ?

Prof. Sandeep
PANDA

from **Suleyman Demirel University (SDU)** - Turkey

Biotechnological application for the recycling and recovery of metals from Waste Printed Circuit Boards and Li-Ion Batteries

Philippe
HENRY

from **Hydrometal by JGI** - Belgium

Hydrometal : a future key player in the recycling of new generation batteries

Meet Jean JOUET & Jean-Yves TILQUIN

Jean JOUET is a civil engineer from the Ecole des MINES de NANCY with 32 years' experience in the steel industry in France, Belgium and the Ukraine. In the early 80s, at a time when the first and second oil crises hardly impacted the industry, he worked in R&D at IRSID. From 1987 he held various positions at Sollac Florange in production: supply chain, technical relations for the automotive market (at Sollac Paris), and plant management.

In 2001 he integrated Cockerill-Sambre as COO, before becoming plant director in Dunkerque, then CEO at ArcelorMittal Ukraine. In 2010 worked for NLMK Europe Strip Products as COO.

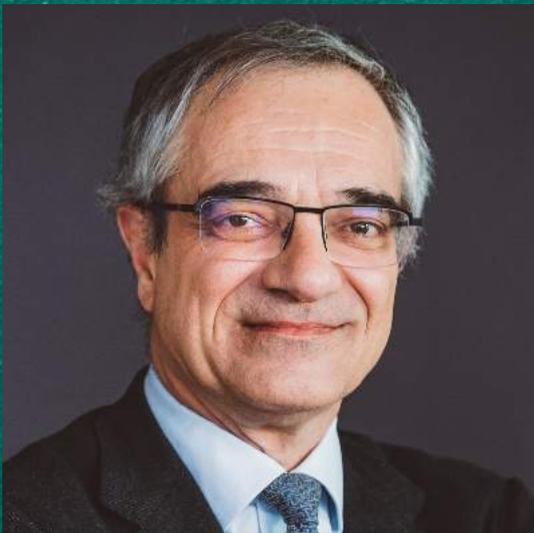
Finally, with CMI becoming John Cockerill he joined the group as CTO 9 years ago.

He is fully convinced that industry remains key for our economy and that the global warming challenge can be overcome, thanks to science, technology, and common-sense behaviour!

Jean-Yves TILQUIN obtained a PhD in Chemistry from Université Catholique de Louvain in 1991.

He spent 10 years as an academic researcher in Belgium and abroad, after which he decided to turn to the Walloon industry by joining one of Wallonia's major industrial and international companies, Carmeuse Group, in 1997.

The CO₂ emissions challenge has been at the heart of his work and activities for more than 10 years, not only as Group R&D Director for Carmeuse Group, but also as one of the founding members of the GreenWin Innovation Cluster, and of CO₂ Value Europe, where he has been respectively appointed as executive board member and as Deputy Chairman.



**CO₂ CAPTURE & H₂
OPEN UP THE ROUTE
TO FOSSIL-FREE FUEL**



A reduction in CO₂ emissions is key to reaching climate targets in 2050. Industry, which accounts for 30-40% of emissions according to evaluations, has a role to play. If technical solutions are implemented for car transport or domestic heating, most of them are still at an early stage for industry. This is due to high temperatures, or process-related emissions. Nevertheless, a wide variety of solutions are tested, with a focus in 3 areas: electrification firstly, then use of H₂ as a fuel or reductive agent in processes, and thirdly carbon capture, as CO₂ will remain unavoidable. At the end, a combination of solutions will be used, particularly in the transition period. In this evolution, carbon capture will play a key role, because it is necessary to achieve carbon neutrality; carbon is a key component for many industries and CO₂ combined with H₂ may be the new source for hydrocarbonates. Columbus, a joint project between ENGIE, Carmeuse, and John Cockerill, is a good example of the so-called 'Power to X' route, one way to get rid of CO₂ emissions. Let us open up this route !

Meet Guy DAVISTER & Fabrice ORBAN

Guy DAVISTER

Education: Civil Engineer (ULg)

Occupation: Member of the Board of De Smet Engineers & Contractors - DSEC, Director of AWEX

Past positions:

CEO-Managing Director of De Smet Engineers & Contractors
General Manager and Director of SNC-Lavalin SA

Key experience: Worldwide expertise in the execution of industrial projects - Project financing

Fabrice ORBAN

Education: Ecole Polytechnique (L'X); ULiège

Occupation: CEO Group Hamon

Past positions:

Member of the Extended Executive Committee at John Cockerill;
various roles at Mc Kinsey & Company

Key experience: Worldwide expertise in technologies and industrial projects



NEUTRAL-KERO PROJECT: THE WAY TO CO₂ -NEUTRAL AIRPLANE FUEL



RESA-HAMON-ULg (2 Professors) and **DSEC** have decided to combine their expertise to develop a project for the production of CO₂ -Neutral Kerosene: The challenge being tackled is the delivery of a high density renewal fuel to meet the demand for a "defossilised" airplane fuel.

The chosen method is based on the close integration of 3 main steps: the Production/utilisation of green hydrogen, CO₂ capture (industrial fatal CO₂, or from the Atmospheric Capture of CO₂ directly), and the Fischer-Tropsch synthesis. The development includes a thorough research phase in order to optimise the operation of such a production complex and demonstrate its economic feasibility (obviously including the valorisation of the reaction energy that represents about 25% of the overall energy of the system).

The ultimate step is the construction of a demonstration plant located in Wallonia: the project also integrates 2 additional objectives: the re-industrialisation of the region and the rehabilitation of industrial wasteland, such as the disused site of Chertal, that could be ideally located near Liège Airport, with nearby sources of fatal CO₂ and with the possibility to utilise/valorise the reaction energy thanks to an existing urban heating network.

Meet Prof. Guy DE WEIRELD

Guy DE WEIRELD is a professor in chemical thermodynamics, the environment, industrial processes, and sustainable development at the Faculty of Engineering of the University of Mons. His main research field is adsorption in porous materials and catalysis. He has experience in CO₂ capture, gas separation, gas purification (removing of acid compounds from natural gas, VOC from exhaust air) and CO₂ conversion to fuel, as well as in techno-economic and environmental assessments in the field of carbon capture, utilisation and storage. Since 2019 he has been the coordinator of the H2020-MOF4AIR project: Metal Organic Frameworks for carbon dioxide Adsorption processes in power production and energy Intensive industries.



CO₂ CARBON CAPTURE FROM CEMENT PLANT AND UTILISATION IN THE PRODUCTION OF SYNTHETIC NATURAL GAS: TECHNO-ECONOMIC AND ENVIRONMENTAL ASSESSMENT

Carbon Capture Utilisation and Storage (CCUS) technologies are receiving increased interest. Within this context, Power-to-Gas technologies (PtG) are very promising, allowing for the storage of excess renewable electricity, and valorising captured CO₂ for the production of Synthetic Natural Gas (SNG), amongst others.

The aim of this work is to evaluate the interest of an integrated PtG system converting CO₂ from cement plant flue gases. More specifically, the process chain implemented (the CO₂ capture and CO₂ catalytic conversion into Synthetic Natural Gas (SNG) process, using H₂ produced by electrolysis) is designed to capture almost 1 ton per hour of CO₂ emanating from a conventional cement plant equipped with the best available techniques. Economic assessment and Life Cycle Analysis are undertaken to estimate the investment and operational costs of the process chain, and to identify the main environmental hotspots (the net CO₂ emissions into the atmosphere and the contribution to fossil depletion) while comparing two scenarios (cement plant with and without the integrated CO₂ capture-conversion process).

ORGANISATION

UMONS
Université de Mons

SHAPING HYDROGEN AND CO₂ INFRASTRUCTURE TO SUSTAIN INDUSTRY DECARBONISATION

H₂ & CO₂ pipeline backbones are key to supporting the sustainable decarbonisation of industry and the further development of industrial activities.

Pipeline infrastructure allows for an efficient and cost-effective transmission of the gases between production/emission and demand/usage zones. Enabling running activities to be kept in place and allowing for the further development of industrial plants in the most appropriate locations for each industrial activity, the pipeline is the perfect bridge for conveying the molecules and achieving optimal industrial symbiosis.

Fluxys is ready to build the gas network of the future. Its H₂ & CO₂ transmission infrastructure, with transparent and non-discriminatory access conditions, and cost-efficient repurposing opportunities, will unlock new solutions for the industry in its efforts to achieve sustainable recovery and growth. Fluxys intends to roll-out the necessary infrastructure from 2024, through close collaboration with the industry. The development will start with local pipeline networks in different clusters to support the development of circular re-use of carbon (CCU projects) and to enhance other industrial synergies.

ORGANISATION



Meet Vincent FLON

Vincent FLON holds a Masters degree in Mechanical Engineering, with specialisation in Energy, from the Catholic University of Louvain. During his Masters, he also studied at the Delft University of Technology.

He started his career at Fluxys in 2016 as Project Manager for the development and construction of one of the largest LNG tanks in Europe and gas compression facilities in Zeebrugge.

Since January 2020, he has been working as Innovation Projects Developer at Fluxys and is currently in charge of developing hydrogen and CO₂ transmission and conversion projects. One of his leitmotifs is "turn challenges into mutual opportunities".



Meet Dr Richard HEYN

Richard H. HEYN received his Ph. D. in organometallic chemistry from the University of California, San Diego, in 1992. After two post-doctoral appointments and a brief sojourn in industry, he joined SINTEF in 1998. His main research area is carbon dioxide utilisation (CCU), specifically the development of homogeneous catalysts for the conversion of CO₂ to value-added organic chemicals. He has over 70 publications (h = 29) and was Associate Editor of the Journal of Coordination Chemistry. He is currently a member of the Industrial Research and Innovation Advisory Group (IRIAG) of the Horizon Europe private-public partnership Processes4Planet (formally SPIRE). Richard is coordinator of the H2020 project C123 - Methane oxidative conversion and hydroformylation to propylene, and is Dissemination and Communications Manager of the H2020 project COZMOS - Efficient CO₂ conversion via multisite Zeolite-Metal nanocatalysts to fuels and Olefins.



INTRODUCTION TO THE COZMOS PROJECT: AN EFFICIENT CO₂ CONVERSION VIA MULTISITE ZEOLITE-METAL NANOCATALYSTS TO FUELS AND OLEFINS

The COZMOS project - Efficient CO₂ conversion via multisite Zeolite-Metal nanocatalysts to fuels and Olefins - aims to develop a one-step process for the conversion of CO₂ and H₂ to C₃ hydrocarbons.

Through the judicious choice of CO₂ hydrogenation catalysts to methanol and methanol-to-hydrocarbon catalysts, the project will exploit Le Chatelier's principle to use methanol directly for the production of C₃ hydrocarbons, thus increasing CO₂ conversions. Close collaboration between process development and catalyst development will provide an as-efficient process as possible. The technology will be verified at TRL5 in an industrial setting. This presentation will provide an overview of the COZMOS project including an update of the catalyst development work.

ORGANISATION



Meet Michael KÖPKE & Babette PETERSEN

Dr Michael KÖPKE is a pioneer in Synthetic Biology in the field of carbon fixing microbes. A seminal study led by him provided a first genetic blueprint of anaerobic gas fermenting microbes, and a demonstration that these gas fermenting microbes can be reprogrammed for the synthesis of fuel and chemicals directly from greenhouse gas emissions and waste resources. As Vice President of Synthetic Biology at LanzaTech - a company that is revolutionising the way the world thinks about waste carbon by treating it as an opportunity, rather than a liability - Michael is at the helm of LanzaTech's genetic tools and strain development efforts, and is also responsible for a number of R&D collaborations with both industrial and academic partners. He holds a PhD from the University of Ulm and has over 15 years' experience in the Biotech field. He is one of the recipients of the Presidential Green Chemistry Challenge award for Greener Synthetic Pathways, has filed over 100 patents and authored over 40 peer-reviewed articles. Michael serves as adjunct lecturer at Northwestern

University, and is scientific advisor to/ board member of a number of organisations such as the Engineering Biology Research Consortium or the Joint Genome Institute, amongst others.

Babette PETERSEN is VP Europe for LanzaTech, a pioneer in carbon capture technology that turns waste streams into ethanol that can be used for fuels and chemicals. Before joining LanzaTech, Babette was Director of Business Development at Ginkgo Bioworks, an early-stage leader in synthetic biology. Prior to that, she had been Chief Business Development Officer at Capricorn Venture Partners, Chief Commercial Officer at BioAmber, and VP New Business Development for Performance Materials at Royal DSM. Previously, Babette had held marketing and new business development roles in different industry groups at Dow Corning for over 20 years. Babette has a BSc in Biology from Wellesley College, USA, and an MBA from INSEAD, France. She is currently based in Brussels.



**STEPPING ON
THE GAS
TOWARDS A
CIRCULAR ECONOMY:
CARBON-NEGATIVE
CHEMICAL
PRODUCTION
VIA
GAS FERMENTATION**

LanzaTech



The climate crisis and rapid population growth pose some of the most urgent challenges to mankind, intensifying the need for the deployment of carbon capture and utilisation technologies. Gas fermentation using carbon-fixing microorganisms offers a solution with unique feedstock and product flexibility, compared to other available gas-to-liquid technologies. LanzaTech has pioneered the commercialisation of a gas fermentation process for the conversion of steel mill emissions into ethanol. Advancements in process technology and synthetic biology enable a broad range of feedstocks, including emissions from various industries, or syngas generated from any waste biomass resource, to be converted into a wide range of molecules, realising a circular economy. Acetone and isopropanol are important industrial bulk and platform chemicals, exclusively produced from fossil resources today. By engineering the gas fermenting biocatalyst, we have developed a new sustainable route that offers over 160% greenhouse gas savings. Through a combination of modelling, strain engineering and process development we have optimised flux to achieve commercially relevant production rates and scaled the process.

Meet Dr Philippe QUIRION

Philippe QUIRION is a French National Research Centre Director and a researcher in environmental and resource economics.

He has authored and co-authored 130+ publications and papers on the subjects.

His publications can be accessed [here](#).



HOW SENSITIVE ARE OPTIMAL FULLY RENEWABLE POWER SYSTEMS TO TECHNOLOGY COST UNCERTAINTY?

Many studies have demonstrated the feasibility of fully renewable power systems. Yet the future costs of key technologies are highly uncertain, and little is known about the robustness of a renewable power system to these uncertainties. To analyse this, we build 315 cost scenarios by varying the costs of key technologies, and we model the optimal renewable power system for France, simultaneously optimising investment and dispatch.

We add to the literature by studying a consecutive 18-year weather period; by testing all combinations of technology costs rather than changing them one at a time; and by calculating the regret from optimising the energy mix on the basis of cost assumptions that do not materialise.

Our results indicate that the cost of a 100% system is not that sensitive to uncertainty. Admittedly, the optimal energy mix is highly sensitive to cost assumptions: across our scenarios, the installed capacity in PV, onshore wind, and power-to-gas varies by a factor of 5, batteries and offshore wind even more. However, in every scenario the total production and storage cost is similar to or lower than the current cost.

ORGANISATION



DAILY AND SEASONAL ENERGY STORAGE : IS THERE A CASE STUDY FOR ENERGY COMMUNITIES ?

The feasibility (from a technical and an economic point of view) of installing and using energy storage at a daily-rate level and/or a seasonal-rate level in energy communities will be briefly presented and analysed (using a common (1 unit), or a distributed storage system for this community).

ORGANISATION



Meet Patrick HENDRICK

Dr Patrick HENDRICK is a Professor at the Faculty of Engineering at ULB. He is Head of the ATM (Aero-Thermo-Mechanics) Department. He is a specialist in energy storage, more specifically Pumped Hydro Energy Storage and Hydrogen (green and pink), as well as in Systems studies and Techno-Economic studies on Energy Storage.



Meet Philippe HENRY

Philippe HENRY has been General Manager of JEAN GOLDSCHMIDT INTERNATIONAL (JGI) S.A in Brussels since 2015. The company specialises in the trading and recycling of complex materials. It is 100% owner of HYDROMETAL SA, a recycling plant located in Engis, Belgium, specialised in the recycling of complex metals, that produces a.o zinc sulphate and other chemicals and intermediate products from secondary materials; it is also 100% owner of JGI Thailand which specialises in the production of Pb battery alloys; it also owns 50% of Harz Oxid GMBH , a Waelz kiln located in Germany. Philippe is a member of the Board of JGI SA and of HYDROMETAL. He has been a member of the Prayon-Cybelle Group since 2011, and from 2019 has been a board member of the CTP (Centre Terre et Pierre) research centre. Since 2017 he has also been guest Professor at UCLouvain on their LM APR 2141 Metals Processing and Recycling course.



HYDROMETAL : A FUTURE KEY PLAYER IN THE RECYCLING OF NEW GENERATION BATTERIES

Established over 30 years ago in Engis near Liège (Belgium), HYDROMETAL is a major recycling and recovery centre for a very wide range of materials (over 70,000t / year), by-products, and complex residues containing non-ferrous metals, in particular Zn, Ni, Cu, Pb, Sn, Co, as well as other minor metals, precious metals and rare earths. HYDROMETAL's expertise is based on different hydrometallurgical processes, unique in the world, which consume very little energy and generate only small amounts of CO₂ and ultimate waste. Its industrial activity is strongly linked to the Zn element with the production of pure Zn salts. The recycling of Co, Ni and Li also forms part of its know-how.

HYDROMETAL's Battery Recycling project is an innovative alternative to existing state-of-the-art techniques. We are developing an improved and innovative full hydrometallurgical recycling process for the "black mass" derived from the pre-treatment of spent Li-ion batteries, which allows for the recovery of multi-elements (Ni, Co, Mn), including lithium and graphite, that can be integrated as secondary raw materials in existing production lines.

ORGANISATION



BIOTECHNOLOGICAL APPLICATION FOR THE RECYCLING AND RECOVERY OF METALS FROM WASTE PRINTED CIRCUIT BOARDS AND LI-ION BATTERIES

The demand for key metals such as Cu, Co, Li and Ni (referred to as E-mobility metals in the battery & EV manufacturing sector) is constantly rising. Among the different types of secondary post-consumption wastes (e-waste, spent batteries, slags), e-wastes count among the fastest growing and most problematic waste streams in the world. The main reason is due to their geographical distribution, highly heterogeneous nature and poorly understood “mineralogy”.

The presentation will briefly discuss the recycling of two urban mine wastes i.e. waste printed circuit boards and spent Li-ion batteries using a non-traditional bio-based approach under the scope of the ongoing BaCLEM project funded through the ERA-MIN2 2019 call.

ORGANISATION



Meet Dr Sandeep PANDA

Dr Sandeep PANDA is currently working as Assistant Professor at the Department of Mining Engineering (Mineral – Metal Recovery and Recycling Research Group) at Suleyman Demirel University, Turkey. His main research areas include: (Bio) hydrometallurgical approaches for metal extraction from primary and secondary resources, Bio-desulphurisation, Bio & Chemical approaches for Mine Water treatment and application of eco-friendly approaches for sustainable mineral-metal waste recycling and management. Since 2009, he has been involved as a Principal/Co-Principal Investigator or a Team Member in many R&D and Industrial research projects (at both National and International level). As of 2020, he has published 46 International journal papers, 4 book chapters, and 3 Editorial Books that have received over 950 citations with an h-index of 19. His research work has attracted the attention of many press and media outlets and seen him presented with several academic awards. He is an active member of a number of prestigious professional bodies, a reviewer and board member of reputed International journals, and has also served as a technical/scientific committee member in various reputed international conferences.



Meet Frédéricq PEIGNEUX

Frédéricq PEIGNEUX holds a Masters in Applied Economics and Business Management (UNamur), and a Masters in Work and Industrial Psychology (Dublin City University). He has been active in the Environmental sector since 1999 in a number of roles - including, amongst others, as Site Manager in Waste Paper at Interseroh Group (1999), Director of the Belgian Confederation of Recycling Companies (Coberec) (2002) and Board Member of Groupe Comet (2005) - and has held numerous positions in Management and Circular Economy Consulting Companies and organisations (GreenWin (2014) , Bridgestone, CTP, Febelauto, Carmeuse and others). He is founder of Intigo srl, Shence Management srl, and co-founded WATT4EVER srl in 2020.



CIRCULAR BATTERIES IN BELGIUM FROM E-MOBILITY: POWERING THE ENERGY TRANSITION OF INDUSTRIES

The recent advancements in the automotive sector reflect the fast-growing role played by E-vehicles, a role reinforced by the resolute policy of the EU.

High efficiency standards for the E-Powertrain Automotive applications, with quite HighVoltage batteries, as well as the Producer Responsibility Compliance Scheme in the EU, pose significant challenges for the industry in terms of the End-of-Life Management of these batteries.

To address these issues, the global "recycling value chain" can follow different paths. However, according to Lansink's Ladder, it is the "waste prevention" mode that should be given the highest priority.

WATT4EVER intends to offer the automotive industry the dedicated solution to help it achieve this prevention mode, at the same time offering other industries and households 2ndLife Batteries, and the opportunity to store or optimise their energy profile, enabling them to become participants in the energy transition towards 2030-50.

ORGANISATION



GreenWin is proud to present its special partner:

DE SMET ENGINEERS & CONTRACTORS - DSEC : Reliability Through Experience

De Smet Engineers & Contractors (DSEC)

is a leading engineering and general contracting company.

Founded in 1989, DSEC is a limited liability company owned by the Moret Group, together with the SRIW (*Société Régionale d'Investissement de Wallonie*).

DSEC carries out projects from their initial conceptual stage (feasibility studies) up to their complete delivery (EPCM or EPC mandate), including commissioning and performance demonstration.

DSEC is specialised in projects for the following agro-industrial sectors:

- > Sugars
- > Vegetable oils, Feed and Protein
- > 1G/2G Biofuels
- > Bio-based chemicals / Bio-refineries
- > Agro-nutrients

Since the beginning of its activities, DSEC has dedicated particular attention to the intimate integration of unit operations of implemented processes to achieve:

- > robust energy optimisation
- > cogeneration system improvement
- > proven safety & security integration
- > compliance in feed and food requirements.

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This expertise, accumulated in biofuels and in energy savings dedicated to industrial complexes, naturally drives DSEC to consider its involvement in new generation fuels based on H2 and captured CO2.



DSEC's know-how in those fields is specifically oriented towards:

- > design & construction
- > integration need of multistep processes
- > global energetic approach of whole industrial complexes.

Currently, DSEC is active in many countries worldwide, and to support such development has subsidiaries in Argentina, India, France, Germany, and Mauritius.

DSE has delivered more than 400 industrial plants/complexes in more than 65 countries.

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GreenWin is proud to present its special partner:

essenscia wallonie

the Chemical Industry Federation in the French- and German-speaking Belgium

essenscia wallonie is the regional division of essenscia, the Belgian federation of the chemical industry and life sciences sector. Representing 200 Walloon companies, the organisation offers its members a tailor-made service, providing expertise and advice on sectoral issues. essenscia wallonie also represents the sector in the media and defends the interests of chemistry, plastics, pharma & biotech at a political level.

The chemical and life sciences sector is one of the most important industrial sectors in Wallonia, accounting for a quarter of industrial turnover, and more than a quarter of added value. The sector is also the leader in terms of Walloon exports and innovations, with almost 50% of total exports and two thirds of total private expenditure on research and development. Moreover, the sector is growing rapidly: turnover has doubled over the last ten years.

To access our website, please [click here](#).



essenscia
wallonie

About half of the 29,000 employees in the sector work in the province of Brabant-Walloon, where the pharmaceutical industry is strongly represented. The chemical industry is mainly located in the province of Hainaut, more precisely in the Feluy-Manage-Seneffe triangle. The biotech clusters for their part are more active around Liège and Charleroi. Other chemical and plastics companies are spread throughout Wallonia.

GreenWin is proud to present its special partner:

Shaping together a bright energy future



We are committed to continue building a greener energy future for the generations to come. People, industry, and societies all need energy to thrive and progress. Fluxys accommodates this need: through our infrastructure, we put energy in motion. We move natural gas, while paving the way for the transport of hydrogen, biomethane, or any other carbon-neutral energy carrier, as well as carbon dioxide, and to accommodate the capture, usage and storage of the latter.



together

The energy eco-system is complex, and the demand for more energy in the service of human progress, combined with a global need to make energy more sustainable, is a challenge that requires collaboration. Re-designing the energy system will not be easy, but it can be done if we work together. 'Together' refers to all our stakeholders: our employees, our shareholders, our industrial partners, our customers, ordinary citizens, and all those actively involved in the energy system. At Fluxys, we actively believe in this collaboration.



bright

There is a good deal of discussion around the role of natural gas and its place in the future energy landscape. 'Bright': with optimism, we dare to say that our infrastructure, with its energy storage capacity and other forms of gas, such as hydrogen and biomethane (green gas), will play a substantial role in the transition to a carbon-neutral energy future for all.



future

The word 'future' encompasses a responsibility. With our unique capabilities as a European gas infrastructure company, we owe it to ourselves to contribute to a greener energy future for generations to come.



fluxys.com

GreenWin is proud to present its special partner:

John Cockerill Group :
200+ years of entrepreneurial
spirit & of innovation passion



Driven, since 1817, by the entrepreneurial spirit and passion for innovation of its founder, the John Cockerill Group develops large-scale technological solutions to meet the needs of its time. Providing answers to the climate challenge is core to its activities, and John Cockerill develops various solutions to address the energy transition, in the power generation area as well as in the industrial sphere

Improving efficiency remains a key lever for reducing energy consumption, which in turn reduces CO₂ emissions. For years John Cockerill has been improving the efficiency of HRSG (heat recovery steam generators) for combined cycle power plants.

It will continue with this activity, as the use of natural gas will keep increasing until the implementation of renewables is widespread. In the industry, there is huge potential for energy efficiency and waste heat recovery. John Cockerill, for example, installed a steam generation system with water cooled from the supporting beams at the Ghent Hot Strip Mill. Such a system is not standard, and in many units the hot water is still simply air-cooled and lost. The John Cockerill Group has been developing renewable energy solutions for several years. Solar receivers for CSP towers are now operating in various parts of the world (South Africa, China, Chile) and a receiver will soon be operational in Dubai. Molten salt as a heat carrier allows for daily storage, permitting for power generation 24 hours a day.

More recently, John Cockerill launched two new business units. Thanks to MIRIS, a 2MWc PV powered micro grid located at its headquarters, equipped with 4 different type of batteries (Li-ion, Vanadium & Iron/Zinc flow batteries, and NaS), John Cockerill teams developed an Energy Management System and are ready to offer Integrated Renewable Solutions.

As a player committed to the energy transition, John Cockerill invests and innovates to support the development of green hydrogen. With a design capacity of 350MW/y of electrolyser production, the CJH Suzhou workshop presently has the world's largest manufacturing capacity. In addition, and to support the growing European market, a new facility will be installed in France for cell manufacturing, and in Wallonia for the final assembly. John Cockerill's priorities lie with the mobility market, the project at Liège Airport being an example, and with the industry as well, where John Cockerill already has hundreds of references, and meets client's expectations with its DQ1000, a 5MW stack delivering 1000M³/h of clean H₂.

More information available on johncockerill.com/en/group & h2.johncockerill.com/en



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in partnership with



with special thanks to the members of our steering committee :

