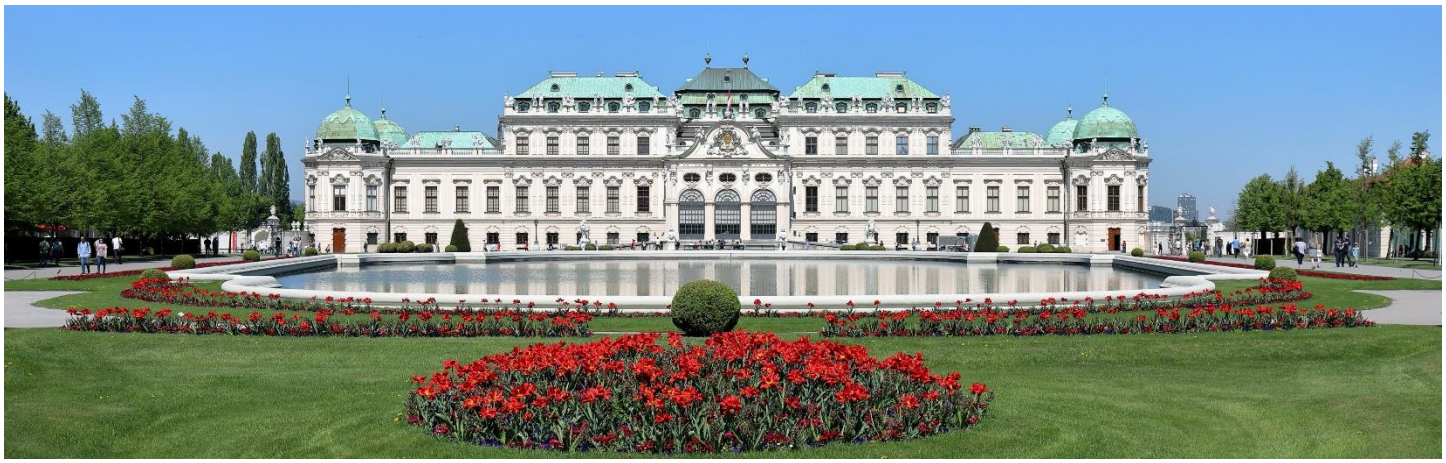
4th European Sustainable Phosphorus Conference (ESPC4)

with Nutrient Recovery Technology Fair
and 5th European Phosphorus Research Meeting (PERM5)
20 – 22 June 2022, Vienna Austria - and online (hybrid)

Andaz Vienna Am Belvedere (Hyatt), Arsenalstrasse 10, Vienna, Austria.
v23/3/2022 Programme updates and registration https://phosphorusplatform.eu/espc4



ESPC4 – Day 1 - Monday 20th June 2022

9h00 – 10h15 – Plenary - Opening and keynotes – Climate, nutrients and eutrophication

- Climate, energy, agriculture: What has to be done about phosphorus and nutrients?
  Franz Josef Radermacher, Research Institute for Applied Knowledge Processing (FAWn), Germany
- Interactions between climate change, phosphorus losses and eutrophication:
  Wenfeng Liu, China Agricultural University.

10h15 – 11h00 – break – posters – stands - Tech Fair - networking

11h00 – 12h45– Plenary – EU, regional, national and city phosphorus policies

- What the Green Deal means for EU policies on nutrients
  Virginijus Sinkevičius European Commissioner for Environment
- Implementation of Germany's 2017 P-recycling regulation and of Switzerland's 2016 P-recycling regulation: ***Sibylla Hardmeier, Swiss Federal Office for the Environment (BAFU): Overview of developments, case studies***
- Implementation of Germany's 2017 P-recycling regulation:
  Andrea Roskosch, German Federal Environment Agency (UBA)
- Case study Switzerland: ***Leo Morf, AWEL Zürich***
- Vision for implementation of the German P-recovery obligation by a regional water operator:
  Uli Paetzel, Emschergenossenschaft and Lippeverband
- Case study Switzerland: ***Leo Morf, AWEL Zürich***
- Perspectives for nutrient policy and action for the Baltic, ***Lotta Ruokanen, HELCOM***
- Towards national phosphorus recycling policy in Austria: ***Arabel Amann, Wien Energie***
- Case study: Vienna City (5"), ***Florian Huber, Vienna City Administration, with Wien Energie***

12h45 – 14h15 – lunch - posters – stands - Tech Fair - networking

14h15 – 15h45 – Parallel sessions

List of speakers for parallel session below

- **Nutrient recovery operating experience technology showcase**
  (companies in ESPP-DPP-NNP Nutrient Recovery Technology Catalogue)
  Moderator/rapporteur: Karyn Georges, Isle Utilities & Bertrand Vallet, EurEau
- **Phosphorus recovery from ashes**
  Moderator/rapporteur: Paulo Pavinato, University of São Paulo & TBD
- **Biochars and hydrothermal carbonisation**
  Moderator/rapporteur: Céline Vaneeckhaute, Université Laval, Québec, Canada & TBD

15h45 -16h30 - break– posters – stands - Tech Fair – networking

16h30 – 17h45 – Business perspectives for nutrient sustainability

- Reports from parallel sessions, questions and discussion

  Business vision statements from nutrient sustainability leading companies
  Jean-Christophe Ades, Kemira
  Matt Kuzma, Ostara
  Wim Moerman, NuReSy
  José María Gómez Palacios, Biomasa Peninsular
  Henk Aarts, N2 Applied
  Hubert Halleux, Prayon
  Marina Ettl, Yara
  Matthias Staub, Veolia
  Christian Guillaume, Sulzer Pumps
  Leoni Boller, Ductor
  Hanane Mourchid, OCP
  Andreas Orth, MO Group
- The fertilisers industry, phosphorus sustainability and the Green Deal
  Jacob Hansen, Fertilizers Europe
- Market perspectives for phosphate fertilisers and other uses of phosphorus, and place of recycling:
  Alberto Persona, Principal Analyst Fertecon/HIS

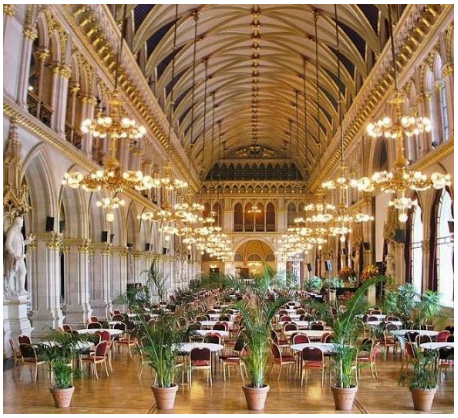
19h00 Evening networking event:

Vienna City Town Hall festivities hall (Rathaus Festsaal)

30'' by metro, 50'' by foot from Andaz hotel.

19h00 Pre-dinner drinks. 20h00 Conference dinner,
Viennese music interlude.

22h00 Big John Whitfield & The Vienna Soul Society



ESPC4 – Day 2 - Tuesday 21st June 2022

9h00 – 10h30 – Plenary - EU Policies

- Implementation of the nutrient loss reduction target set by the Green Deal Farm-to-Fork and Biodiversity Strategies: European Commission, DG Agriculture (tbc)
- Phosphorus and Organic Farming productivity, Green Deal targets for Organic Farming and perspectives for recycled nutrients
- Business vision statements from nutrient sustainability leading companies
- Update on EU water policies, ***Michel Sponar, Deputy Head of Unit, Marine Water and Water Industry, European Commission DG Environment***

- Industry innovation in phosphorus chemistry and sustainability perspectives: ***Clariant***
- Towards an integrated EU approach, the proposed INMAP (EU Integrated Nutrient Management Action Plan). ***European Commission DG Environment***

10h30 – 11h15 – break – posters – stands - Tech Fair - networking

11h15 – 12h45 – Parallel sessions

List of speakers for parallel session below

- **New fertilisers for nutrient sustainability**
  Moderator/rapporteur: Alzbeta Klein, International Fertilizer Association &
  Hans Ingels, Head of Unit Bioeconomy – Chemicals – Cosmetics, European Commission DG GROW
- **Emerging nutrient recovery technologies**
  Moderator/rapporteur: Erik Meers, University of Gent and Biorefine Cluster Europe & Ana Soares, Cranfield University, UK
- **Policies and regional actions for phosphorus sustainability**
  Moderator/rapporteur: Lukas Egle, European Commission JRC (Joint Research Centre) & Geneviève Metson, Linköping University, Sweden

12h45 – 14h15 – lunch - posters – stands - Tech Fair - networking

14h15 – 15h30 – Plenary – Visions and Actions

- Reports from parallel sessions, questions and discussion
- Vision statements from ESPC4 sponsors
  Pär Larshans, Chief Sustainability Officer, Ragn-Sells Group / EasyMining
  Wolfgang Hofmair, Borealis Group

Experience and future objectives of the nutrient platforms in Europe and worldwide
- Chris Thornton, European Sustainable Phosphorus Platform (ESPP)
- Matt Scholz, Arizona State University US Sustainable Phosphorus Alliance
- Jacob Jones, North Carolina State University, for STEPS (US National Science Foundation's new Convergence Research Center for Phosphorus Sustainability
- Eiji Yamasue, Ritsumeikan University, Japan Phosphorus Industry Development Organisation (PIDO)
- Tabea Knickel, German Phosphorus Platform (DPP)
- Nathalie Tijdink, Netherlands Nutrient Platform

15h30 – 16h15 – break – posters – stands – Tech Fair - networking

16h00 – 17h00 – Plenary – Perspectives and Conclusions

- Perspectives for global nutrient management and 'Our Phosphorus Future'
  Mahesh Pradhan, United Nations Environment.
- Horizon Europe Mission "Soil Health and Food"
- Panel discussion on perspectives for phosphorus sustainability policies

17h00 – ESPC4 Conference Closure

Tuesday evening social event:

TBC 19h00 – 22h00 The Third Woman – An immersive city adventure in Vienna's underground sewer system inspired by the classic movie "The Third Man", 21.06.2022, 19:00, only for registered attendees.

Wednesday 22nd June 2022

- **Optional excursion:** Vienna municipal sewage treatment works, new sewage sludge incinerator, urban vegetable farmers using waste heat from sludge incinerator. **Max. 80 participants**. Free.
- **5th Phosphorus in Europe Research Meeting (PERM5):** 9h00 – 16h30, Andaz Vienna Am Belvedere (Hyatt). Programme https://phosphorusplatform.eu/espc4 NOTE: additional registration fee required.
- **Young scientists and R&D networks event:** 17h – 18h30 and Wednesday evening social**.**

Selected speakers for ESPC4 parallel sessions June 2022

Day 1: Monday, June 20th 2022, 14:15 – 15:45 CEST

Parallel Session #1:
Nutrient recovery operating experience technology showcase

***Limited to technologies presented in the ESPP-DPP-NNP Nutrient Recovery* Technology Catalogue**
Confirmed to date

Marc Sonveaux, Prayon, Belgium
Leon Korving, Vivimag – WETSUS, The Netherlands & Bengt Hansen, Kemira – Sweden
Christian Kabbe, EasyMining (Ragn-Sells) – N, P, and K recovery technologies
ICL Fertilisers
Henk Aarts, N2 Applied: Plasma treatment of slurry and digestate, sustainable fertiliser from air and electricity
Arttu Laasonen, ENDEV nutrient recycling technologies

Parallel Session #2: P-recovery from ashes

Werner Preisig & Friedrich Studer, ERZO, Switzerland: The Leachphos-REALphos process
Beatrice Decker, MFPA Weimar, Germany: Resin-in-Pulp technology, an adapted holistic approach for nutrient and P-recycling from sewage sludge ashes (Abonocare)
Florian Benedikt, Technische Universität Wien, Austria: P-recycling from sewage sludge with fluidized bed incineration applying in-situ heavy metal removal
Theresa Sichler, BAM, Germany: European sewage sludge ash monitoring
Lasse Fabian Köhl, Fraunhofer IKTS, Germany: Decentralised phosphorus recycling from sewage sludge using dust firing and in-situ heavy metal separation (DreiSATS)
Laura Fiameni, University of Brescia and INSTM, Italy: Heavy metal stabilization in sewage sludge ash with poultry litter ash to enhance phosphorus recovery

Parallel Session #3: Biochars and hydrothermal carbonisation

Marc Buttman, TerraNova Energy, Germany: TerraNova®ultra - hydrochar from sludge, P-recovery and carbon sequestration
Helmut Gerber, Pyreg, **Germany**: Biochar from biosolids: the climate-positive alternative to conventional phosphorus fertilizer
Lisa Röver, Deutsches Biomasseforschungszentrum gGmbH, Germany: P-recycling via hydrothermal carbonization and the use of complexing agents and acids (Abonocare)
Raquel Zambrano Varela, TreaTech, Switzerland: Phosphorus recovery from hydrothermally treated sewage sludge. Closing the P cycle.
Clara Kopp, University of Copenhagen, Denmark: Activation of P-rich biochars and ashes to increase plant P availability
Maurizio Volpe, Carborem & Enna Kore University, Italy: Phosphorus Recovery from Digested Sludge Hydrochars Produced via Carborem C700 Continuous Hydrothermal Carbonisation Plant

Day 2: Tuesday, June 21st 2022, 11:15 – 12:45 CEST

Parallel Session #4: Emerging nutrient recovery technologies

Pim De Jager, Aquacare, Netherlands: BioPhree: next generation solution to remove and re-use phosphate in surface & effluent waters to ppb-level.

Álvaro Mayor Pillado, Cetaqua, Spain: Turning wastewater treatment plants into biorefineries: global value chain from bioresources to valuable products (LIFE Enrich)

Anders Øfsti, Hias How2O AS, Norway: Sustainable Phosphorus Removal with the Hias Process

Rubén Rodriguez-Alegre, LEITAT Technological Center & Universitat Politècnica de Catalunya, Spain: Innovative integration of membrane technologies for nutrient recovery from high organic load streams (FERTIMANURE)

Sabolc Pap, University of the Highlands and Islands, UK: New technology to recover phosphorus from wastewater within the Circular Economy: a Scottish case study (Phos4You)

Lidia Paredes, BETA Technological Centre (UVIC-UCC), Spain: Recovering nutrients from aquaculture industry by-products for the production of bio-based fertilizers (Sea2Land)

Sergio Lloret Salinas, EGEVESA, Spain: New urban wastewater treatment based on natural coagulants to avoid phosphorus pollution (LIFE Newest)

Parallel Session #5: Policies and regions for phosphorus sustainability

Katharine Heyl, Research Unit Sustainability and Climate Policy, University of Rostock, Germany: Sustainable phosphorus management under the future Common Agricultural Policy?

Francesco Avolio, HERA Spa, Italy: Feasibility and sustainability assessment of struvite recovery solutions in Bologna, WWTP Italy

Lisa Harseim, Albert-LudwigsUniversity of Freiburg, Germany: Cities revisited: Out-of-the-box governance of phosphorus flows in food

Fabian Kraus, Kompetenzzentrum Wasser Berlin, Germany: Mandatory P-recovery from sewage sludge (ash) in Germany – a multiple-goal conflict?

Esa Salminen, AFRY, Finland, Nutrient balance and handprint of the Finnish forest industry

Anna Muntwyler, European Commission JRC Ispra: Modelling phosphorus dynamics in European agricultural soils and assessing phosphorus policy goals

Sophia Schüller, FiW e.V. at RWTH Aachen University, Germany: The funding measure RePhoR - Regional Phosphorus Recycling

Parallel Session #6: New fertilisers for nutrient sustainability

Else Bünemann, FiBL, Switzerland: Bio-based fertilizers as efficient alternative phosphorus sources for closing nutrient cycles (Lex4Bio)

Farida Dechmi, Agrifood Research and Technology Centre of Aragon, Spain: Assessing phosphorus soil status and fertilisers management in the Ebro river intensive irrigated area (Spain)

Alicia Hernandez Mora, University of Natural Resources and Life Sciences Vienna (BOKU), Austria: Developing fertilizer compliance test methods for recycled P fertilizer products (Lex4Bio)

Julia Santolin, University of Antwerp, Belgium: Comparative consequential LCA: microbial fertilizers grown on potato wastewater, common organic fertilizers: and mineral fertilizers

Berta Singla, BETA Technological Centre (UCC-UVIC), Spain: Nutrient recovery from pig slurry – Production and agronomic quality assessment of added value bio-based fertilisers (Fertimanure)

Pauline Welikhe, Phospholutions Inc. / State College PA, USA: Corn Phosphorus Uptake and Yield Response to Reduced Phosphorus Rates Applied in Combination with RhizoSorb®

Kari Ylivainio, Natural Resources Institute Finland (Luke): Phosphorus losses from different soil types caused by bio-based fertilisers (Lex4Bio)

Wednesday June 22nd, 2022

9h00 – 10h30 : Phosphorus recycling research & technology update

Housekeeping and meeting networking tools
Lapo Braconi, ETA Florence Renewable Energies

Welcome. Outcomes of PERMs 1-4. Meeting objectives and outputs
Ludwig Hermann, President, ESPP

Introducing the Nutrient Recycling Community: a platform to exchange knowledge and good practices between research projects dealing with nutrient recycling in EU.
Ana Robles Aguilar, Ghent University

Questions and discussion I

Phosphorus recovery technologies
Erik Meers, Ghent University and Biorefine Cluster Europe

LIFE projects: from R&D to pilot testing and implementation
Federico de Filippi, CINEA

Questions and discussion II

Vision Statements from ESPP R&D Members

Simone Maccaferri, Alma Mater Studiorum – Università di Bologna, Italy

Adriana Romero, CETAQUA, Spain

10h45 – 12h15 : Parallel breakout sessions I

- **New and recycled phosphorus fertilisers**

  Moderator: Leonardus Vergutz, Mohammed VI Polytechnic University, Morocco

  Rapporteur: Bernard Wern, IZES, Germany

  Assessment of P availability and efficiency of recycled P fertilizers – Recommendations for pot trial standardisation

  Aleksandra Bogdan, Ghent University, Belgium

  Agronomic effectiveness of Actinobacteria-based biofertilizers on cereal plant growth under phosphate / potassium rocks fertilization

  Kenza Boubekri, Mohammed VI Polytechnic University, Morocco

  Effectiveness of a potential biofertilizer derived from new Phosphate solubilizing bacteria for sustainable agriculture production

  Fatima Chouyia, Hassan II University, Morocco

  Microbial phosphate solubilization: A potential alternative for increasing soil phosphorus sustainability

  Wissal Elhaissoufi, Mohammed VI Polytechnic University, Morocco

  Assessment and comparative analysis of willingness-to-pay for bio-based fertilisers in the European Union

  Sergio Garmendia Lemus, Ghent University, Belgium

  Reduced nitrous oxide emissions in a pot trial with novel organic NP(K)-char fertilizers

  Carolyn-Monika Görres, Hochschuole Geisenheim University, Germany

  Phenotypic and genotypic screening of potato cultivars for phosphorus efficiency

  Hazarika Mousumi, University Rostock, Germany

- **Iron – phosphorus interactions in phosphorus recycling (coordinated by WETSUS)**

  Moderator: Leon Korving, Wetsus, Netherlands

  Rapporteur: Bengt Hansen, Kemira, Finland

  Biological and chemical drivers over P availability from different P forms: an incubation experiment

  Ángel Velasco Sánchez, UniLaSalle Rouen, France

  Insight into direct phosphorus release from simulated wastewater ferric sludge: influence of physiochemical factors

  Aseel Al Nimer, Wilfrid Laurier University, Canada

  The impact of P on Fe(II) catalyzed ferrihydrite transformation under oscillating redox condition

  Xingyu Liu, University of Bayreuth, Germany

  Potential of recycled vivianite as P and Fe fertilizer – from a mechanistic point of view

  Rouven Metz, University of Vienna, Austria

  Research on Fe-P interactions at Wetsus for P recovery

  Thomas Prot, TU Delft, Netherlands

  How phosphorus removal technologies in WWTP can impact the phosphorus recovery from sludge?

  Marie-Line Daumer, INRAE, France

- **Nutrient recovery from dairy industry processing wastewaters (coordinated by REFLOW)**

  Moderator: TBD

  Rapporteur: TBD

12h15 – 14h00: Lunch Break

14h00 – 15h30 : Parallel breakout sessions II

- **Phosphorus interactions i** *Pending Confirmation of Speakers, Moderators and Rapporteurs*

  Moderator: Victoria Barcala, Deltares, Netherlands

  Rapporteur: Jakob Santner, BOKU, Austria

  Improved soil testing system in the Czech Republic, valuation of P-content in carbonate soils

  Pavel Čermak, Crop Research Institute, Czech Republic

  Simulating long-term phosphorus, nitrogen, and carbon dynamics to advance nutrient assessment in dryland cropping

  Bianca Das, University of Queensland, Australia

  Soil phosphorus mining in agriculture – Impacts on P availability, crop yields and soil organic carbon stocks

  Stefaan De Neve, Ghent University, Belgium

  DOC Addition Increases Phosphate Adsorption in Mediterranean Soils

  Yaniv Freiberg, Volcani Center, Israel

  Soil phosphorus turnover in soils under long term P management

  Olha Khomenko, Teagasc / University of Limerick, Ireland

  Changes of phosphorus forms in soil as a function of different fertilizing strategies

  Martin Kulhanek, Czech University of Life Sciences Prague, Czech Republic

  The Effect of soil pH on phosphate solubility in soils

  Klara Mrak, BOKU Vienna, Austria

  Watershed Scale Field Demonstration of Novel Nano-enhanced Phosphorus Adsorptive Media – Non-point Source Applications

  Ed Weinberg, ESSRE Consulting, USA

- **Regional policies for nutrient stewardship**

  Moderator: Felix Ekardt, University of Rostock, Germany

  Rapporteur: Kimo Van Dijk, Wageningen Environmental Research, Netherlands

  A material flow model for the implementation of phosphorus recovery in a model region

  Jan-Hendrik Ehm & Hiep Le, RWTH Aachen, Germany

  Nutrient Content of Manures and Potential for Valorisation: Case Study of Monaghan and Tipperary, Ireland

  Rosanna Kleeman, University College Dublin, Ireland

  Impact and opportunities for the urban water cycle of the 'fully circular in 2050' target of the Netherlands – Circular Water 2050

  Kees Roest, KWR Water Research Institute, Netherlands

  Closing the loop of Phoshorus cycle in the Visegrad Group (V4) countries

  Marzena Smol, Polish Academy of Sciences, Poland

  Sustainable agriculture as a vehicle of corporate reputation: sustainability within the value chain of food and agricultural production as a core element of business strategy

  Michael Stopford, Ca' Foscari University Venice, Italy

  Mapping the availability of nutrient-rich side-streams – mission impossible?

  Elina Tampio, LUKE, Finland

  Technical and Economical Appraisal of Regional Concepts for Sewage Sludge Utilization and Phosphorus Recovery

  Harald Weigand, THM Uni Giessen, Germany

- **New technologies for nutrient recovery**

  Moderator: Matthias Zessner, Technical University of Vienna, Austria

  Rapporteur: Francesco Fatone, Università Politecnica delle Marche, Italy

  Vacuum degasification/acidic-neutral absorption for nitrogen recovery from agricultural digestate

  Johannes Koslowski, KWB, Germany

  Technical comparison of phosphorus recovery technologies from wastewater

  Hanna Kyllonen, VTT, Finland

  A novel process for an efficient phosphorus utilization from cereal by-products in feed industry

Natalie Mayer, Hamburg University, Germany

Phosphorus Recovery From Sewage Sludge Using The Stuttgart Process: Large-Scale Operating Experience (MSE-Mobile)

Carsten Meyer, ISWA Stuttgart, Germany

Flashphos – Thermal behaviour of sewage sludge aiming at white phosphorus recovery

Arnout Sander, InsPyro, Belgium

Yellow phosphorus production from secondary phosphorus resources by carbothermic reduction

Huafang Yu, Tohoku University, Japan

Acid-induced phosphorus release from hydrothermally carbonized sewage sludge

Carla Perez, University of Umea, Sweden

NPHarvest – Calcium based P recovery process as a pre-treatment for N recovery

Juho Kaljunen, Aalto University, Finland

15h30 – 17h00 : Perspectives *Pending Confirmation of Speakers, Moderators and Rapporteurs*

Nutrient R&D objectives under Horizon Europe.

Katja Klasinc, European Commission DG RTD.

INTERREG R&D initiatives on nutrients

TBD

Market uptake activities for nutrient recovery innovation in EISMEA

TBD

Summaries of outcomes of each breakout sessions (research needs)

Sessions Rapporteurs

Questions and Discussion

Key take-aways from the day identified by experts:

TBD

Close