Newsletter – October 2018

RRfW programme news

The organic waste gold rush: optimising resource recovery in the UK bioeconomy

RRfW has released a new policy and practice note 'The organic waste gold rush: optimising resource recovery in the UK bioeconomy'. Drawing on 5 years of research, the note highlights where changes in policy are necessary to promote circular economy approaches in the bioeconomy.

Key recommendations include:

- There is a need to have joined up, cross-departmental policy in resource use to promote circular economy practices across Defra (agriculture, resources and waste) and BEIS (bioeconomy, energy and climate change), to align efforts towards delivering the overarching strategic aims of the UK government, and internationally, for clean growth and sustainable resource use.
- Policy should look to incentivise diversity in the mix of resources obtained from organic wastes, in order to be able to respond to evolving resource demands as new technologies emerge and industrial processes decarbonise.
- Government departments should move to using new modelling approaches that integrate a range of metrics across social, environmental, economic and technical domains. These approaches provide a more comprehensive assessment of the impacts associated with resource and waste management decisions and help maximise the total benefits gained.
- The government should fund business support to disseminate knowledge and skills and promote industrial symbiosis. This would support the integration of complementary systems and sharing of biowastes from one industrial process that become valuable feedstocks for another recovery process.

This policy and practice note and a previous one focusing on recovering metals from industrial wastes are both available from the RRfW policy webpage.

Extension of deadline for RRfW Research Topic in Frontiers journal to 12 November

The submission deadline for manuscripts for the Resource Recovery from Waste Research Topic with the Frontiers family of journals has now been extended to 12 November.

The Research Topic aims to bring together research works falling under, but not limited to, the following areas: Waste streams; RRfW technologies; “Whole system” design and improvement; Methodological approaches to resource/waste value appraisal; and Waste management/use associated impacts. We strongly encourage participation from across the research community to raise visibility and drive momentum in the resource recovery from waste area.

Further details, including participating journals, can be found in our Research Topic blog. If you are interested in contributing to this Research Topic, please contact us to receive a direct email with the full participation details.

Resource Recovery from Waste Community webpage now up

We are now coming towards the last 6 months of the Resource Recovery from Waste programme (RRfW) and all its contributing projects (AVAnD, B3, CVORR, INSPIRE, MeteoRR and R3AW). However, the wide ranging body of work coming out of RRfW would not have been possible without the extensive community of researchers and practitioners who have taken part in its delivery.

As a thank you and well-deserved acknowledgement, all the people who have contributed to this effort are now listed on the RRfW community webpage. Together this demonstrate the multidisciplinary expertise and experience that exists in this area. I do hope that we have managed to include everyone who has contributed. If you spot anyone missing, please contact Juliet Jopson so this can be corrected.

Hydrometallurgy contacts available in Africa

The B3 team in Birmingham have established connections with potential collaborator groups in Botswana, Zimbabwe and South Africa in the area of hydrometallurgy.

Botswana and Zimbabwe have many abandoned mines and the mining communities have become ghost towns. There are opportunities for developing metal recovery from the wastes left behind as well as protecting the environment and helping the local communities and local prosperity.

This is not an area the Birmingham team will be pursuing going forward but if anyone wants to continue this work/collaborate then please get in touch with Lynne Macaskie and she will make the connection with these 'live' contacts.

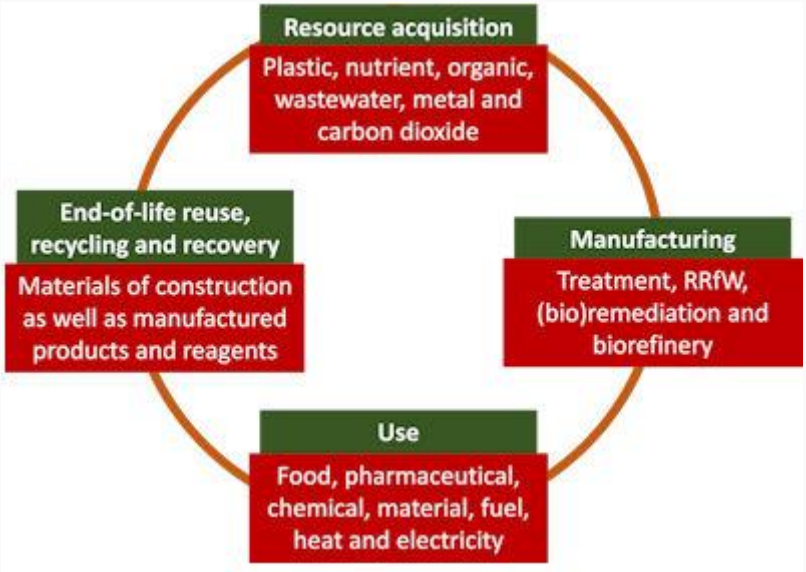
TESARREC™: Tool for techno-economic and sustainability analysis of resource recovery technologies for Circular economy

The Centre for Environment & Sustainability (CES) at the University of Surrey is embarking on the next phase of the development of the computer software prototype TESARREC™. The software, developed as part of RRfW,

uses a 'Life Cycle Sustainability Assessment' approach to evaluate the triple-bottom-line sustainability of processes and products, and is intended for use in:

- evaluating the economic, environmental, social and policy implications of organic compounds productions from waste;
- accessing datasets of metal and organic pollutant concentrations in residential, municipal and industrial wastewater streams;
- optimising the operational, economic, social and environmental performances of biorefinery processes and resource recovery technologies.

The working principle of the prototype is sustainability assessment across the life cycle of a service or system as illustrated below (image ©Jhuma Sadhukhan, 2014). For more information, please contact Jhuma Sadhukhan.



RRfW meetings

Resource Recovery from Waste Conference 2019: Resource Recovery for a Clean, Low-Carbon and Resource Efficient Economy

16th January 2019, One Great George Street, London

Registration is now open for the final conference for the Resource Recovery from Waste programme. The conference will bring together five years' of research to highlight the relevance of resource recovery for a clean, low-carbon and resource efficient economy.

The key achievements of the programme will be showcased during the day covering: technologies and approaches to recover resources from industrial, mining and organic wastes; novel assessment tools to optimise the value created in resource recovery systems across multiple domains (economic, technical, environmental and social); and a shared vision for the transition a the circular economy, bringing together academic, government and industry perspectives.

The conference will highlight where changes in policy will be needed to realise the full benefits envisaged for the UK economy, society and environment. It will also look forward to identify future challenges and research needed in this area.

Confirmed external speakers and panellists:

- Laura Sandys, runs 21st Century Energy Regulatory Commission with Imperial College, is Deputy Chair of the Food Standards Agency, and is working on the Resources Sector Deal
- Tim Wheeler, Director of Research & Innovation, Natural Environment Research Council
- David Tompkins, Head of Knowledge Exchange & Innovation, AquaEnviro
- Peter Quinn, Head of Climate Change, Environmental Policy and Strategy, Tata Steel
- Andy Rees, Head of Waste Strategy, Welsh Government
- Adam Read, Director of External Affairs, SUEZ Recycling & Recovery UK, and incoming President for CIWM
- Jim Wharfe, Independent Environment Consultant
- Jacqui Murray, Deputy Director – Faraday Battery Challenge, Innovate UK

The conference will also hear from heads of the six projects that make up the Resource Recovery from Waste programme: MeteoRR, B3, R3AW, INSPIRE, AVAnD and CVORR. An exhibition will provide further opportunity to find out more about the work undertaken by the programme, including its policy work. A drinks reception will follow the conference to allow time for networking and we hope you will join us there to raise a toast to the community of researchers and partners that made RRfW possible.

For further details, including how to register, please visit the RRfW 2019 Conference webpage. Please note that there are a limited number of free places available to project members and public/third sector organisations, please contact Juliet Jopson directly to apply for these.

European Biosolids & Organic Resources Conference

13-14th November 2018, The Royal Armouries, Leeds

Registration still open for the European Biosolids and Organic Resources Conference, with a jam-packed programme showcasing the latest innovations, best practice, cutting-edge technology and research in the waste water and resource management sectors.

The full programme has now been released and is available to view at Biosolids conference webpage.

The conference includes:

- Two days of insights from industry experts with 60+ technical presentations
- Networking with over 250 attendees from around the world
- Two site visits to see Anglian Water's HPH process and AB Agri's AD gas-to-grid plant
- Exhibition of 30 companies showcasing the latest technologies on the market
- Socialise and network at the every-popular conference dinner

RRfW is a supporting organisation for the event and Dr Rachel Marshall from the AVAnD team will be giving a talk on the first day in the circular economy session on "The organic waste gold rush: optimising resource recovery in the UK bioeconomy".

Publications and Presentations

RRfW programme publications

The following RRfW papers and reports have been published:

Delivering Radical Change in Waste and Resource Management: Industry Priorities. Velenturf and Purnell (2018). RRfW has been working with academia, government and industry to develop a shared vision for the transition to a circular economy: this report captures the industry perspectives. Six key actions for industry were identified along with a range of important barriers that need to be overcome: roles for both governmental and academic partners were highlighted. The report is discussed in more detail in the following RRfW blog. View report

Making the business case for resource recovery. Velenturf and Jopson (2019) Science of The Total Environment, doi: 10.1016/j.scitotenv.2018.08.224. This article outlines how to write business cases for resource recovery. Resource recovery experts identified drivers, barriers and actions for resource recovery as part of the Resource Recovery from Waste annual conference in 2017.

Participatory Situational Analysis: How can policy and regulation support resource recovery? Synthesis workshop report. Velenturf *et al*. (2018). Four workshops were held to address the question: "If we wanted to realise resource recovery in the UK, how would it be possible within our policy and regulatory context?" This report captures the resulting insights into the diverse legislative areas that need to be integrated and aligned when aiming for a more circular economy, the ways in which policy and regulation enable this, and which particular actors need to be involved and the actions they should take. An action plan with seven key elements is recommended. View report

Evolution of Mechanical Heat Treatment for resource recovery from Municipal Solid Waste in the UK. Velenturf *et al*. (2018). The report reviews the trends driving change in the composition and volume of residual municipal solid waste in the UK, and the evolution of the waste infrastructure required for its management. Analysis of a number of economic scenarios identifies the potential for recovering resource from the residual waste stream using this emerging mechanical heat treatment technology. However, further research is required to fully assess the opportunities and challenges associated with each scenario. View report.

For the full list of RRfW publications, please see our publications page. For the policy and practice note mentioned in the news section above, please see our policy page.

The following publications have come out on the RRfW projects:

B3

Characterization of palladium nanoparticles produced by microwave-injured bacteria with enhanced catalytic activity Gomez-Bolivar *et al*. Proc 19th Int Microscopy Congress 9-14 Sept 2018, Sydney, Australia. Abstract.

Probing the viability of palladium-challenged bacterial cells using flow cytometry. Omajali *et al*. (2018). J Chem Technol Biotechnol. *In press*. doi: 10.1002/jctb.5775

The evolution, current status and future prospects for using biotechnologies in the mineral extraction and metal recovery sectors. Johnson, D. B. (2018) Minerals 8, 343; doi: 10.3390/min8080343. This was based on a presentation given at 5th International Symposium on Microbial Sulfur Metabolism, Vienna, Austria, April 2018

In addition, Prof Barrie Johnson, Bangor University, was an invited speaker at International MineXchange conference. Lampeter, UK, September 2018, giving a presentation on: **Harnessing Resource Recovery to Off-Set Costs of Metal Mine Water Remediation**.

CVORR

Closing the loop on plastic packaging materials: What is quality and how does it affect their circularity? Hahladakis and Iacovidou (2018). Science of The Total Environment. 630, 1394-1400. doi: 10.1016/j.scitoenv.2018.02.330

Quality of resources: A typology for supporting transitions towards resource efficiency using the single-use plastic bottle as an example. Iacovidou *et al*. (2018). Science of The Total Environment. 647, 441-448. doi: 10.1016/j.scitoenv.2018.07.344

INSPIRE

Towards Greener Lixiviants in Value Recovery from Mine Wastes: Efficacy of Organic Acids for the Dissolution of Copper and Arsenic from Legacy Mine Tailings. Crane, R. and Sapsford, D. (2018). Minerals, 8(9), 383. doi: 10.3390/min8090383

Sorption and fractionation of rare earth element ions onto nanoscale zerovalent iron particles. Crane, R.A. and Sapsford, D.J. (2018). Chemical Engineering Journal. 345, 126-137. doi: 10.1016/j.cej.2018.03.148.

Altered chemical evolution in landfill leachate post implementation of biodegradable waste diversion. Warwick.*et al*. (2018). Waste Management and Research. doi: 10.1177/0734242X18785723.

MeteoRR

Social Hotspot Analysis and Trade Policy Implications of the Use of Bioelectrochemical Systems for Resource Recovery from Wastewater. Shemfe *et al*. (2018). Sustainability, 10(9), p.3193. doi: 10.3390/su10093193. This paper examines the potential social risks of Bioelectrochemical systems (BES) for wastewater treatment and resource recovery from wastewater, focusing on the social risks associated with the import of requisite BES components to the UK. Copper showed a strikingly higher social risk than other BES commodities, thus its use as current collectors should be reconsidered.

R3AW

Options for managing alkaline steel slag leachate: a life cycle assessment. Gomes *et al*. (2018). Journal Cleaner Production. 202, 401-412. doi: 10.1016/j.jclepro.2018.08.163.

All project journal publications are listed on the RRfW project pages: AVAnD, B3, CVORR, INSPIRE, MeteoRR, and R3AW. You can also find further publications and presentations on our Researchgate page.

Other news

Sustainable futures for solar and battery systems - Developing whole systems approaches to recycling and waste

The Sustainable Futures for Solar and Battery Systems project is a 6 months networking initiative supported by UKERC's Whole Systems Networking Fund. It aims to bring together interdisciplinary researchers and practitioners working in the area of solar PV and battery waste management, recycling and innovation to identify and progress whole systems approaches and future research agendas.

3 Workshops will be held in Nairobi, Kenya (end of November), Kota, India (beginning of December) and Durham, UK (28-29th January) and further activities are currently being planned.

This networking project is being led by Dr Britta Turner, who is a Human Geographer currently based at the

Department of Anthropology at Durham University. She is very interested in talking to researchers who are doing work in the area of solar PV and battery waste and related areas (e.g. e-waste, repair, reuse, recycling, circular economy). For more information and to get involved, please contact Britta Turner.

Broadway Initiative is inviting comments until end of October on blueprint for the Environment Act

The IEMA's Broadway Initiative have prepared a blueprint for the Environment Act which is available for comment until the end of October. The general principles in the blueprint apply to all UK nations with a focus on the Westminster Act announced by the Prime Minister. Comments are welcomed in order to develop the blueprint and make any changes necessary to make sure that it works for all parts of UK society.

The Broadway Initiative aims to generate ideas on governing the environment after EU exit in order to advise governments on how to enable all parts of society to play their part in achieving long term societal objectives. Members come from the worlds of business, NGOs, professional bodies, governance, policy making and academia.

For further details and to comment, please see visit the IEMA Broadway Initiative web page.

Mainstreaming Life Cycle Assessment

From nappies to supermarket carrier bags, for any product and service, life cycle assessment (LCA) has become an essential tool for informed decision making by organisations and Governments to estimate the environmental impact of a product or service throughout its life cycle, from cradle to grave.

The Centre for Environment and Sustainability (CES) at the University of Surrey is offering a Continuing Professional Development course on LCA to enabled creation of LCA base in industry. The LCA course goes beyond the environmental dimension, to social (S-LCA) and economic (life cycle costing, LCC) dimensions, following from the ISO 26000, and covers the latest resources on life cycle sustainability assessment (LCSA) and absolute sustainability science. The module provides hands-on experience based on the extensive resources available at CES on LCA.

Learners do not need to have an engineering or even science background, but need to have an appetite and keen interest in confronting the world's greatest challenges to meet the needs for sustainability. For more information, please contact Jhuma Sadhukhan.

Funding calls

EPSRC Manufacturing investigator-led highlight notice - NetworkPlus

The Engineering and Physical Sciences Research Council invites proposals for its manufacturing investigator-led NetworkPlus call. The call aims to bring together experts from across all relevant research disciplines to identify research challenges, opportunities and priorities, kick-start new collaborations and build pathways to impact.

The priority areas are circular economy and resilient manufacturing.

Network activities must be UK-wide, open to all relevant researchers, highly multidisciplinary, and include relevant non-academic stakeholders to provide the expertise required to co-create and implement manufacturing solutions.

A total of £5 million is available for five proposals for between three and four years duration. Funding may be used for salaries of the PI and up to four co-investigators, travel and subsistence, administrative support, organisation of activities, and research.

Deadline: Letters of intent by 24 October 2018; full proposals by 11 December 2018. Further details.

Web page for EC Horizon 2020 Circular Economy focus area

A Circular Economy focus area web page is now available that draws together all the Horizon 2020 calls on Circular Economy, allowing you to search for both open and forthcoming calls. Background documents on the Circular Economy focus area and Work Programme for 2018 - 2020 are also available.

The Horizon 2020 Circular Economy focus area supports the Commission's ambitious Circular Economy package. The focus area prioritises sustainable production and consumption, addressing the important problem of plastics, as well as initiatives for a cleaner environment. It aims to reduce waste and decouple growth from increased extraction and consumption of resources, energy, water and primary raw materials.

Events listing

ISWA 2018 Kuala Lumpur, 22-24 October 2018

European Biosolids and Organic Resources Conference. Leeds, 13-14 November 2018

Identifying the industrial opportunities for UK Catalysis Workshop. Innovate UK KTN. London, 29 November 2018

Sustainable Futures for Solar and Battery Systems 3 Workshops between end of November 2018 and January 2019. See other news section above for further details.

RRfW final annual conference. London, 16 January 2019

IBioIC's Annual Conference 2019: Industrial Biotechnology for a Sustainable Future. Glasgow, 30-31 January 2019

Keep up to date with forthcoming meetings via our Events page.

Any news, events or funding calls to include in our next newsletter in October 2018? Email S.J.Jopson@leeds.ac.uk

Join our network on LinkedIn and Twitter to get the latest news!