

RESOURCE RECOVERY FROM WASTE: PROJECT CO-ORDINATION REPORTING TEMPLATE

Please fill in the sections below with the required information. Electronic copies of evidence for some outcomes will be required and should be attached to this form if available.

Project name	Life Cycle Sustainability and Policy Analyses of Plausible Systems for Resource Recovery from Waste (RRfW)
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Report prepared by	Dr Jhuma Sadhukhan
Date	02/03/2019

PROJECT UPDATE

Overview of progress since last PCT. To include issues/potential risks affecting delivery.

- Key achievements **including environmental values considered/ environmental benefits enabled now or in the future**
- Issues encountered (if any)
- Remedial actions undertaken (if needed)
- Lessons learned (if any)

We were able to complete the deliverables as planned as follows:

1. A robust set of sustainability metrics of RRfW systems.
2. Web-based software prototype for wider exploration, outreach and impact generation.
3. A report on evidence for policy work for RRfW systems in UK and in Malaysia.
4. At least 3 academic papers in peer-reviewed archive journals on robust sustainability metrics of RRfW systems and UK's and Malaysia's country specific analyses including policies.

DATA MANAGEMENT

Datasets in preparation	Datasets are available within the software TESARREC™
Datasets submitted to EIDC	Protected for commercialisation
Date on which data management plan last updated	Same as above

OUTCOMES

Outcome	Date	Details	Evidence
Publications	2018	Chowdhury, R., Sadhukhan, J., Traverso, M. and Keen, P.L., 2018. Effects of residence time on life cycle assessment of bioenergy production from dairy manure. <i>Bioresource Technology Reports</i> , 4, pp.57-65.	Environmental
		Shemfe, M., Gadkari, S. and Sadhukhan, J., 2018. Social Hotspot Analysis and Trade Policy Implications of the Use of Bioelectrochemical Systems for Resource Recovery from Wastewater. <i>Sustainability</i> , 10(9), p.3193.	Social
		Jaye, I.M., Sadhukhan, J. and Murphy, R.J., 2018, May. Integrated Assessment of Palm Oil Mill Residues to Sustainable Electricity System (POMR-SES): A Case Study from Peninsular Malaysia. In <i>IOP Conference Series: Materials Science and Engineering</i> (Vol. 358, No. 1, p. 012002). IOP Publishing.	Techno-economic
		Shemfe, M., Gadkari, S., Yu, E., Rasul, S., Scott, K., Head, I.M., Gu, S. and Sadhukhan, J., 2018. Life cycle, techno-economic and dynamic simulation assessment of bioelectrochemical systems: A case of formic acid synthesis. <i>Bioresource technology</i> , 255, pp.39-49.	Technical (fundamental), environmental and economic
		Sadhukhan, J., Martinez-Hernandez, E., Murphy, R.J., Ng, D.K., Hassim, M.H., Ng, K.S., Kin, W.Y., Jaye, I.F.M., Hang, M.Y.L.P. and Andiappan, V., 2018. Role of bioenergy, biorefinery and bioeconomy in sustainable development: Strategic pathways for Malaysia. <i>Renewable and Sustainable Energy Reviews</i> , 81, pp.1966-1987.	Policy, technical, economic, environmental and social
Collaboration and partnerships	2018	Across the whole RRfW team as well as LifesCO2R project and partners in Malaysia and India	In above journal publications
Further Funding (applied for and granted)	2018	Innovate UK ICURe	To develop business model

Engagement activities (workshop, seminar, visit to organisation)	2019	Waste to Wealth W2W Workshop at Swindon and London on 11 and 15 March, respectively. https://rrfw.org.uk/results/events/waste-to-wealth-workshops/	Industrial R&D and policy needs for circular economy
Influence on policy, practice and public	2018	Contributed to “The organic waste gold rush: optimising resource recovery in the UK bioeconomy”, RRfW Policy and Practice Notes, 2018.	Policy supported by sustainable RRfW research
Research tools and methods		Detailed technical multiscale modelling simulation, dynamic simulation Life cycle assessment Life cycle costing Techno-economics Social life cycle assessment	Holistic and thorough analysis enabling development of sustainable systems
Research database and models	2017	TESARREC™ software contains databases and models of technical modelling, life cycle assessment, life cycle costing, techno-economics and social life cycle assessment.	Holistic and thorough analysis enabling development of sustainable RRfW systems
Intellectual property and licencing	2017	The database rights are protected. TESARREC™ UK Trademark: UK00003321198 includes Goods and Services under the Class: 9, 40 and 42. A few of this exhaustive list include: Computer software for use in evaluating the economic, environmental, social and policy implications of organic compounds productions from waste; Computer software for use in accessing datasets of metal and organic pollutant concentrations in residential, municipal and industrial wastewater streams; Computer software for use in optimising the operational, economic and environmental performances of biorefinery processes and resource recovery technologies.	Policy, technical, economic, environmental and social sustainability

Software and technical products	2017	TESARREC™ software (T ool for techno-economic and sustainability analysis of resource recovery technologies for C ircular economy)	Holistic and thorough analysis enabling development of sustainable RRfW systems
Spin outs			
Awards and recognitions			
Use of facilities and resources			
Other outputs & knowledge/ future stops	2019	A NERC Follow-on fund is highly needed for helping commercialisation of TESARREC™ software (T ool for techno-economic and sustainability analysis of resource recovery technologies for C ircular economy) and spin out	Business model being developed through the Innovate UK ICURe fund

FORTHCOMING EVENTS

Waste to Wealth W2W Workshop at Swindon and London on 11 and 15 March, respectively.

<https://rrfw.org.uk/results/events/waste-to-wealth-workshops/>

VALUE ADDED BY PCT

Any benefits derived from overarching programme activities, team and/or network.

If there were no benefits, how can this be improved?

Benefits in outreach and by contributing to policy papers. Staying at the cutting edge of the R&D and business in RRfW.