What contributes to high impact of published research?

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With the publication of increasing volumes of scientific and technological research come the issues of implementing the ideas and results in practice, as well as continuing further research, based on the previous results. The main obstacles before this are related to understandability and practicality of what is published. There is also the problem with the viability in terms of economy and public perception.

These issues are particularly important for the research in the area of sustainability—in which Clean Technologies and Environmental Policy (CTEP) mostly publishes. Unlike applied research targeting mostly profit or fundamental research mainly aiming at developing the understanding and knowledge of basic concepts or natural phenomena, sustainability research tends to involve elements of both fundamental and applied science. This is due to the redefinition of the concepts of benefit and profit, accounting for the various impacts of human activities. In this context, profit has been considered in an extended version, which includes, in addition to the purely economic component, the benefit or damage to the environment or quality of life, resulting from the evaluated activity.

The above reasoning is quite well supported by a simple analysis of the most cited articles published in CTEP. Citation rate is the most widely accepted indicator for quantifying the impact of research. A search in Scopus (www.scopus.com) performed on 15 March 2017 shows

the results partly extracted in Table 1. The content and the style of all four articles in the selection have similar features, pointing to a pattern.

The main features of these papers can be summarised as follows:

1. TRACI 2.0. This paper presents a software tool (TRACI) for environmental impact evaluation and improvement, provided by the US-EPA. It describes the rationale, scope and functionality of the tool in a very clear way, also pointing to the URL at which the tool can be downloaded.
2. Biodiesel from algae. This article presents a thorough study of the production of biodiesel from CO₂ in industrial flue gases, via algal sequestration. The provided description starts from making the case for the algae route of biofuel production, also presenting a complete algorithm to be followed, further explaining each of the steps—including the transesterification of the algal oil, material reuse and recovery, heat integration, evaluation of the process economics.
3. Regional biorefineries. This work presents a complete model for optimising regional networks for the supply of energy and other products based on renewable bioresources. The description provides the background reasoning, problem formulation, a detailed and traceable mathematical model, supplemented with a reproducible and convincing case study.
4. Targeting of waste discharge. This paper provides an algebraic targeting procedure for minimising waste discharge in industrial process networks, minimising the waste via material reuse and recycling. The presented procedure and model, supplemented with a case study, allow completely reproducing the results and implementing the procedure for other case studies.

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Table 1 The four most cited articles in CTEP since 2005 (as of 15 March 2017)

	Title	Year	Citations (Excl. self-citation)
1	TRACI 2.0: the tool for the reduction and assessment of chemical and other environmental impacts 2.0	2011	107 (105)
2	Design and analysis of biodiesel production from algae grown through carbon sequestration	2010	94 (90)
3	Synthesis of regional networks for the supply of energy and bioproducts	2010	91 (60)
4	An algebraic approach to targeting waste discharge and impure fresh usage via material recycle/reuse networks	2005	72 (67)

The common features of these examples can be summarised as:

- (a) Important and intensively developing topic, still relevant years after the publication.
- (b) Content that is directly useful to the readers or can be reproduced and extended.
- (c) Clear presentation telling a consistent story.

These features are related to high citation rate. One can argue that these are factors contributing to high interest, to comprehension and, apparently, to high citations. Other factors are at play as well—most notably making one's name well known and respected in association with particular research areas, or building partnership networks, to mention a few. However, such promotional efforts would be futile without the foundation of selecting highly relevant research topics, sound methodology and clear presentation.

From the viewpoint of reviewers and editors for several journals, another important factor seems important, too. Scientific journals are one of the channels via which research ideas can be exchanged and CTEP is no exception. In this light, adopting a positive attitude towards authors, helping them to improve their research and its presentation, has proved beneficial. This often helps to advance the scientific discourse better by going beyond simply judging the relevance and value of a submission. Even when a manuscript has to be rejected, providing

appropriate feedback and encouraging the authors to resubmit their work after the necessary improvement plays an important role.

In summary, selecting and disseminating the research of high-quality requires actively encouraging authors to improve the presentation of their research results. This should include clearly explaining the introduced concepts, models and algorithms, showing the opportunities for direct application and further extension. Such a process of knowledge development and the transfer would also greatly benefit from the existence and constant evolution of a community of researchers, consultants and decision makers, which plays a synergy role. An excellent example of this practice is the Conference on Process Integration for Energy Saving and Pollution Reduction—PRES (www.conferencepres.com), started in 1998 and celebrating this year its twentieth anniversary. The conference has been providing such a multidisciplinary community platform for diverse stakeholders, effectively multiplying the effect of the initial conception of the Process Integration method by its extension and cross-fertilisation. Similar efforts have been undertaken by the ICOSSE (icosse.org/2017) and SDEWES (dubrovnik2017.sdewes.org) conferences in the areas of sustainability assessment and advancement. The CTEP journal has taken an active part in this evolution, benefiting and contributing in its turn.