EUROPEAN UNIVERSITY OF TECHNOLOGY

EUt+

European University of Technology

Deliverable D47

D4.2.1b Analysis research/challenges - D4.2.2b Challenge-based laboratories

Del. Rel. D4.7

WP 4

Description: Conduct an in-depth analysis of EUt+ partner's research alignment with grand societal challenges, then development report ; Creation of The Pan-European Sustainability laboratory (1st), Mobility laboratory (2nd) & Energy laboratory (3rd) Especially extension of the PhD in sustainable sciences

Comments: The current document is provided in its English version to be succinct. Translations in other languages will be provided upon request.

Dissemination level: **PU**-Public

https://www.univ-tech.eu/phase-1-results

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This initiative has received funding from the European Union's Erasmus+ programme under grant agreement 101004088 — EUt — EPP-EUR-UNIV-2020.

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h_da darmstadt university of applied sciences · Технически университет София · Cyprus University of Technology · Universitatea Tehnica din Cluj-Napoca · utt Université de Technologie Troyes · Dublin · Riga Technical University · Universidad Politécnica de Cartagena

EUt+

Foreword to deliverable

EUt+'s academic contribution to sustainability efforts will be made through a new European Research Institute called the European Sustainability Science Lab (ESLab+)[1]. It will be a multinational, multi-campus, trans- and interdisciplinary research institute.

ESLab+ is about better understanding the paradigms behind current and new technologies, stepping back from regular production and exploring new socio-technical paradigms to achieve sustainability of our societies.

This deliverable describes the institute, its scope, and its development strategy. It is divided into two sections: (1) an analysis of the orientation of researchers towards societal issues, and (2) a description of pan-European research laboratories. The first section corresponds to deliverable D4.2.1b, while the second corresponds to deliverable D4.2.2b. The two sections have been combined into a single document for ease of reading.

The first section focusing on analysis aims to define the focal points within the EUt+ community of researchers interested in the scientific issues of sustainability. For a group of researchers to form a community, they must share a set of common readings, scientific literature, and common moments. This deliverable therefore focuses on certain writings by members of the community, in particular those produced at the first Sustainability Lab workshop and documents from the OpenAlex database on EUt+ partners (the 9th partner has been added at this stage of the document).

The second section describing the laboratories will therefore focus on the ESLab+: scope and perspective, the position of the ESLab+ within EUt+, the three main missions of the ESLab+ and the organisation of the laboratory. It will describe how the themes of energy and mobility – initially conceived as 2 independent structures – are integrated into the structure of the

[1] https://esleut.pubpub.org/

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ESLab+ (section Organisation of the ESLab+). As stated in the deliverable description, a section is dedicated to PhD students in sustainability science. It focuses on a workshop organised by and for sustainability science PhD students. The whole workshop will be described in more detail in deliverable 49.

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Table of Contents

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Introduction

The development of sustainability science in Europe is a major challenge to enable European society to participate in the sustainable transformation of societies. As EUt+ aspires to be a key player in the future, it is imperative to address the complex issue of sustainability. Thus, the ESLab+ lab is not about the design of new technologies to fix environmental issues, but about better understanding the paradigms behind current and new technologies, stepping back from regular production, and exploring new socio-technical paradigms.

Sustainability science is understood as an interdisciplinary endeavor oriented towards practical action. This interdisciplinarity of scientists obliges researchers to be epistemologically agile and methodologically grounded in order to ensure the rigour of the knowledge produced (Haider et al. 2018). This is a real challenge for researchers, as interdisciplinary requires more time to build a common vocabulary among researchers and poses a risk to the disciplinary structure of science. Sustainability science challenges the status quo and target multi-level issues. Being given these challenges, the interest of this deliverable is to examine the socialisation of EUt+ researchers, that helpfully informs the next steps of the co-construction process of this pan European Institute.

1 Analysis research/challenges

This analysis section of this D47 is divided into 2 parts: a short analysis of the academic contributions to the first ESLab+ workshop and a more global analysis of the state of the art in the socialisation of EUt+ researchers.

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1.1 Follow up on the first ESLab+ workshop

Table 1 maps the Sustainable Development Goals (SDGs) with the abstracts proposed at the first ESLab+ workshop. For example, there were two abstracts from researchers working at h_da that could can be related to the 2nd SDG (good health and well-being).

Table 1: number of abstracts per University per SDG in the 1st workshop of the European sustainability laboratory

SDG\Parnters	h_da	UTT	UPCT	RTU	UTCN	CUT	TUS	TUDublin
1. No poverty								
2. Zero Hunger			3	2		2		1
3. Good health and well-being	2	2		1		1		
4. Quality education			2			1		1
5. Gender equality								
6. Clean water and sanitation			3	1		2		1
7.Affordable and clean energy	2	1	3	2	6	2	2	
8.Decent work and economic growth								1
9. Industry, innovation and infrastructure	2	1	2	2	5	2		1
10. Reduced inequalities	1							
11. Sustainability cities and communities	2	2	7			1		
12. Responsible consumption and production	3	2	3		3			4
13. Climat action					1	1		1
14. Life below water								
15. Life on land			4					
16. Peace, justice and strong institutions		3				2		
17. Partnerships for the goals	1				1			
Can not be specified	3	1		2	4		1	1

We can see that some SDGs are addressed more than others. Only 1 SDG is addressed by all universities: “affordable and clean energy” (SDG7). We can see that SDG 9 “industry, innovation and infrastructure” is also addressed by all institutions except TUS.

On the other hand, SDG1 “No poverty”, SDG5 “Gender equality”, and SDG14 “Life below water” are not addressed at all. SDG8 “Decent work and economic growth” is only addressed by TU Dublin. Even if the SDGs are a good structure for mapping the work of researchers, the framework does not give any ideas about the common literature of these researchers.

As we can see, there is no clear evidence of common literature and common themes. It was therefore decided to conduct a more in-depth analysis of EUt+ socialisation and common literature on sustainability issues. This will be developed in the next section.

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1.2 Analysis of EUt+ researchers' socialization

This section consists of the motivations, the methods used to find out if EUt+ researchers already share references, and the results.

1.2.1 Motivation

Setting up a pan European laboratory raises several questions: how do the researchers organise themselves? How often do they meet? How do they collaborate? How do you build a community between researchers who do not know each other? The aim of this deliverable is to identify the barriers to the creation of a pan European laboratory on sustainability issues, and to propose possible actions to overcome these barriers. Ultimately, the main question posed by the laboratory is: how to socialize researchers and encourage them to build knowledge together?

This deliverable focuses on scientific references and citations. In fact, references are not only indicators of productivity, they are also shared readings between groups of researchers, a form of socialisation (Milard 2013). Ultimately, it is a set of shared references that allows researchers to exchange ideas, understand each other and form a community. We are far from saying that references are the only foundation of a community, but we are saying that they are an important component.

1.2.2 Analysis procedure of the shared references

An analysis of the scientific contributions in sustainability science makes it possible to identify common themes among EUt+ scientists. The fact that communities share the same references makes it possible to find out what literature is shared between EUt+ members. This analysis of common references can be carried out using a digital tool developed by Romain Thomas, a

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student at the Université de technologie de Troyes, during his internship at the Stockholm Resilience Centre (‘Institutions Comparison’ 2023).

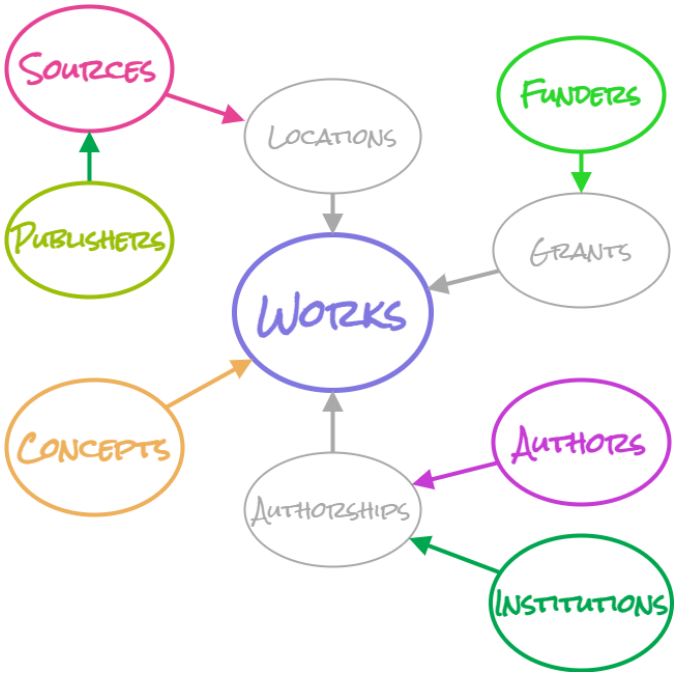

Figure 1: documents present in the openAlex library

This tool searches a database called openAlex library for references used in papers by authors from a given institution. This database consists of different documents: works (papers), metadata of works, institutions of researchers, etc., (see Figure 1). We made some queries on this database to understand if there are common references among EUt+ researchers on sustainability-related topics.

Thus, the results do not show the papers written by EUt+ members but the references used in papers written by EUt+ members. In order to start the analysis, we had to choose which key concepts to focus on. We identified those key concepts:

- General concepts on sustainability
  - Sustainability
  - Environmental ethics
  - Circular economy
  - Design for the Environment
- Concepts related to energy
  - Energy consumption
  - Impact energy
  - Clean energy
  - Solar energy
  - Efficient energy use
  - Sustainable energy
- Concepts related to mobility:
  - Sustainable transport
- Education
  - Environmental education
  - Education for sustainable development

The analysis was carried out on the 9 partners of EUt+ consortium, the 8 first ones and the newly integrated partner, the University of Cassino and Southern Lazio (UNICAS). This is not the case for the other analysis in deliverables 48 and 49.

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1.2.3 Results of the analysis by concept

The raw results are presented for the keyword “Sustainability” only. The rest is in appendix 1.

Tables

Most used by the main institution

Element names	I107257983 Darmstadt University of Applied Sciences	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I158333966 Technical University of Cluj-Napoca	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I163151358 Cyprus University of Technology	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	sum all entities
Sustainability seen from the perspective of consumers	2	0	0	0	0	0	0	0	0	2
Intentions to make sustainable tourism choices: do value orientations, time perspective, and efficacy beliefs explain individual differences?	2	0	0	0	0	0	0	0	0	2
The attitude–behaviour gap in sustainable tourism	2	0	0	1	0	0	0	0	1	4
Promoting sustainable consumption: Determinants of green purchases by Swiss consumers	2	0	0	1	1	0	0	0	0	4
Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour	2	0	0	0	0	0	0	0	0	2
The role of urban parks for the sustainable city	1	0	0	0	0	0	0	0	0	1
Classifying and valuing ecosystem services for urban planning	1	0	0	0	1	0	0	0	0	2
Valuation of environmental quality and eco-cultural attributes in Northwestern Idaho: Native Americans are more concerned than Caucasians	1	0	0	0	0	0	0	0	0	1
How can residents’ experiences inform planning of urban green infrastructure? Case Finland	1	0	0	0	0	0	0	0	0	1
Increased Dependence of Humans on Ecosystem Services and Biodiversity	1	0	0	0	0	0	0	0	0	1

Figure 2: Most used references linked to the key word “Sustainability” at Darmstadt University of Applied Science

Common references at h_da focus on the link between sustainability and consumers, tourism and urban planning. Very few references are shared within h_da researchers. In addition, very few references are shared with researchers from other partners.

Tables

Most used by the main institution

Element names	I201787326 Riga Technical University	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	I107257983 Darmstadt University of Applied Sciences	sum all entities
Technologies Sustainability Modeling	6	0	0	0	0	0	0	0	0	6
IMPACT 2002+: A new life cycle impact assessment methodology	5	0	0	0	0	0	0	1	0	6
The ecoinvent database version 3 (part I): overview and methodology	5	0	0	0	1	0	0	0	0	6
District Heating Systems Performance Analyses. Heat Energy Tariff	5	0	0	0	0	0	0	0	0	5
Ranking of Sustainability Indicators for Assessment of the New Housing Development Projects: Case of the Baltic States	5	0	0	0	0	0	0	0	0	5
User Acceptance of Information Technology: Toward a Unified View	4	0	0	0	0	0	0	0	0	4
Sustainability Assessment of the New Residential Projects in the Baltic States: A Multiple Criteria Approach	4	0	0	0	0	0	0	0	0	4
Multi-Criteria Decision Analysis Methods Comparison	4	0	0	0	0	0	0	0	0	4
Sensitivity analysis of TOPSIS method in water quality assessment: I. Sensitivity to the parameter weights	4	0	0	0	0	0	0	0	0	4
Introducing Integrated Acceptance and Sustainability Assessment of Technologies: A Model Based on System Dynamics Simulation	4	0	0	0	0	0	0	0	0	4

Figure 3: Most used references linked to the key word “Sustainability” at Riga Technical University

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Common references at RTU focus on environmental assessment, life cycle modeling and LCA databases. Very few references are shared with researchers from other partners. Six papers from RTU share the paper “Technologies Sustainability Modeling”, so this paper is a common lecture within RTU.

Tables

Most used by the main institution

Element names	I3123212020 Universidad Politécnica de Cartagena	I4210144925 Technological University Dublin	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	I201787326 Riga Technical University	I107257983 Darmstadt University of Applied Sciences	sum all entities
Evaluating Structural Equation Models with Unobservable Variables and Measurement Error	6	0	0	1	0	0	0	0	0	7
A new criterion for assessing discriminant validity in variance-based structural equation modeling	6	0	0	0	0	0	1	0	0	7
Life cycle assessment of fruit and vegetable production in the Region of Murcia (south-east Spain) and evaluation of impact mitigation practices	5	0	0	0	0	0	0	0	0	5
GIS Assessment of Mass Tourism Anthropization in Sensitive Coastal Environments: Application to a Case Study in the Mar Menor Area	4	0	0	0	0	0	0	0	0	4
Using PLS path modeling in new technology research: updated guidelines	4	0	0	0	0	0	0	0	0	4
Building dynamic capabilities through knowledge resources	4	0	0	0	0	0	0	0	0	4
Reusable Plastic Crates (RPCs) for Fresh Produce (Case Study on Cauliflowers): Sustainable Packaging but Potential Salmonella Survival and Risk of Cross-Contamination	4	0	0	0	0	0	0	0	0	4
Environmental strategies and organizational competitiveness in the hotel industry: The role of learning and innovation as determinants of environmental success	3	0	0	0	0	0	0	0	0	3
Sustainability motivations and practices in small tourism enterprises in European protected areas	3	0	0	0	0	0	0	0	0	3
Relaxation heuristics for a generalized assignment problem	3	0	0	0	0	0	0	0	0	3

Figure 4: Most used references linked to the key word “Sustainability” at Universidad Politécnica de Cartagena

The first of the UPCT’s most popular papers is on measurement in quantitative studies. Others are more oriented towards tourism. Some references are shared among UPCT researchers, especially the first two: “Evaluating structural equation models with unobservable variables and measurement error” and “A new criterion for assessing discriminant validity in variance-based structural equation modeling”. Very few references are shared with researchers from other partners.

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Tables

Most used by the main institution

Element names	I186995768 University of Cassino and Southern Lazio	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	I201787326 Riga Technical University	I107257 Darmsta Univers of Appl Science
The Analytic Hierarchy Process	4	0	0	0	0	0	0	1	0
Sustainability of a pay-as-you-go pension system by dynamic immigration control	3	0	0	0	0	0	0	0	0
The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders	3	0	0	0	0	0	0	0	0
An extension of Aaron's sustainable rate of return to partially funded pension systems	3	0	0	0	0	0	0	0	0
Does disclosure in sustainability reports indicate actual sustainability performance?	3	0	0	0	0	0	0	0	0
The growing influence of social and digital media	3	0	0	0	0	0	0	0	0
Dynamic capabilities and strategic management	3	0	2	0	0	0	0	0	0
Modeling unstructured decision problems – the theory of analytical hierarchies	3	0	0	0	0	0	0	0	0
The allocation of intangible resources: the analytic hierarchy process and linear programming	3	0	0	0	0	0	0	0	0
Pension Reform	3	0	0	0	0	0	0	0	0

Figure 5: Most used references linked to the key word "Sustainability" at University of Cassino and Southern Lazio

References to sustainability are related to the issue of management. Some references are directly linked to the pension system, which is outside the scope of our analysis. The reference "Dynamic capabilities and strategic management" is shared with researchers from UPCT. There is no strong common literature among UNICAS researchers related to sustainability concept.

Tables

Most used by the main institution

Element names	I31151848 Technical University of Sofia	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	I201787326 Riga Technical University	I
Evaluation Tools to Support Decision-Making Process Related to European Corridors	1	0	0	0	0	0	0	0	0
Electronic tools for support of strategic human resource management	1	0	0	0	0	0	0	0	0
CLUSTER APPROACH IN ORGANIZATION OF TRANSPORTATION IN THE BALTIC SEA REGION	1	0	0	0	0	0	0	0	0
Railway Hub Cities and TEN-T Network (RAILHUC Project) – How to Improve Connectivity Around Several Central European Railway Hub Cities?	1	0	0	0	0	0	0	0	0
Evaluating the European added value of TEN-T projects: a methodological proposal based on spatial spillovers, accessibility and GIS	1	0	0	0	0	0	0	0	0
Estimating potential reductions in externalities from rail-road substitution in Trans-European freight transport corridors	1	0	0	0	0	0	0	0	0
Has the efficiency of European railway companies been improved?	1	0	0	0	0	0	0	0	0
Governing inland ports: a multi-dimensional approach to addressing inland port-city challenges in European transport corridors	1	0	0	0	0	0	0	0	0
How to make modal shift from road to rail possible in the European transport market, as aspired to in the EU Transport White Paper 2011	1	0	0	0	0	0	0	0	0
Importance of TEN-T Corridors in the Development of Infrastructure Example of Visegrad Group Countries	1	0	0	0	0	0	0	0	0

Figure 6: Most used references linked to the key word "Sustainability" at Technical University of Sofia

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As we can see, no references are shared between TUS researchers. Nor are any shared with other partners.

Tables

Most used by the main institution

Element names	I158333966 Technical University of Cluj-Napoca	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I31151848 Technical University of Sofia	I163151358 Cyprus University of Technology	I201787326 Riga Technical University	I107257983 Darmstadt University of Applied Sciences	sum all entities
Studies and Investigation about the Attitude towards Sustainable Production, Consumption and Waste Generation in Line with Circular Economy in Romania	3	0	0	0	0	0	0	0	0	3
Will the real smart city please stand up?	2	0	1	0	0	0	0	0	0	3
Targeting consumers who are willing to pay more for environmentally friendly products	2	0	0	0	0	0	0	0	0	2
Factors influencing acceptance of technology for aging in place: A systematic review	2	0	0	0	0	0	0	0	0	2
The smart house for older persons and persons with physical disabilities: structure, technology arrangements, and perspectives	2	0	0	0	0	0	0	0	0	2
Life Cycle Environmental Assessment of Lithium-Ion and Nickel Metal Hydride Batteries for Plug-In Hybrid and Battery Electric Vehicles	2	0	0	0	0	0	0	0	0	2
Bibliometric Methods in Management and Organization	2	0	0	0	0	0	0	1	0	3
Beyond the business case for corporate sustainability	2	0	0	2	0	0	0	0	1	5
Exploring Consumers' Motivations for Sustainable Consumption: A Self-Deterministic Approach	2	0	0	0	0	0	0	0	0	2
A bibliometric perspective of learning analytics research landscape	2	0	0	0	0	0	0	0	0	2

Figure 7: Most used references linked to the key word "Sustainability" at Technical University of Cluj-Napoca

Of the most used references at TUCN, very few are also used by other partners, with the exception of "Beyond the business case for corporate sustainability", which is shared with researchers at UTT.

Tables

Most used by the main institution

Element names	I163151358 Cyprus University of Technology	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I201787326 Riga Technical University	I107257983 Darmstadt University of Applied Sciences	sum all entities
State-of-the-art technologies, measures, and potential for reducing GHG emissions from shipping – A review	2	0	0	0	0	0	0	0	0	2
GREENING THE SERVICE PROFIT CHAIN: THE IMPACT OF ENVIRONMENTAL MANAGEMENT PRACTICES	2	0	0	0	0	0	0	0	0	2
Editorial: Precision livestock farming: a 'per animal' approach using advanced monitoring technologies	2	0	0	0	0	0	0	0	0	2
Assessing Ecosystem Services Supplied by Agroecosystems in Mediterranean Europe: A Literature Review	2	0	0	0	0	0	0	0	0	2
Influence of sustainable hospitality supply chain management on customers' attitudes and behaviors	2	0	0	0	0	0	0	0	0	2
The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration	2	0	0	0	0	0	0	0	0	2
"Green" attributes and customer satisfaction	2	0	0	0	0	0	0	0	0	2
Design for social change and design education: Social challenges versus teacher-centred pedagogies	2	0	0	0	0	0	0	0	0	2
Impact of urban sprawl to cultural heritage monuments: The case study of Paphos area in Cyprus	2	0	0	0	0	0	0	0	0	2
Corporate social responsibility reporting by the global hotel industry: Commitment, initiatives and performance	2	0	1	0	0	0	0	0	0	3

Figure 8: Most used references linked to the key word "Sustainability" at Cyprus University of Technology

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Very few references are shared within CUT and almost none are shared with scientists from other partners. The references that are shared within CUT are from different areas: GHG emissions in shipping, management practices, assessment of agro-ecosystems, customer behaviour, etc.

Tables

Most used by the main institution

Element names	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I186995768 University of Cassino and Southern Lazio	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	I201787326 Riga Technical University	I107257983 Darmstadt University of Applied Sciences	sum all entities
Evolution of design for sustainability: From product design to design for system innovations and transitions	7	0	0	0	0	0	0	0	1	8
The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context	6	1	0	0	0	0	0	1	0	8
A literature and practice review to develop sustainable business model archetypes	6	0	1	1	0	0	0	2	0	10
Toward an systemic navigation framework to integrate sustainable development into the company	5	0	0	0	0	0	0	0	0	5
A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems	4	0	1	0	0	1	0	2	0	8
Clarifying the concept of product–service system	4	0	0	0	0	0	0	0	0	4
DRM, a Design Research Methodology	4	0	0	0	0	0	0	0	0	4
Recent developments in Life Cycle Assessment	4	0	1	0	0	0	0	2	0	7
Ecodesign maturity model: a management framework to support ecodesign implementation into manufacturing companies	4	0	0	0	0	0	0	0	0	4
The Circular Economy – A new sustainability paradigm?	4	0	0	1	0	1	0	1	0	7

Figure 9: Most used references linked to the key word "Sustainability" at University of Technology of Troyes

Some references are clearly shared among the researchers, especially on two main topics: design for sustainability and circular economy (sustainable business models). The references on design for sustainability are not shared with the other partners, whereas the circular economy papers are sometimes shared (with RTU, UPCT, UCSL).

Tables

Most used by the main institution

Element names	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	I186995768 University of Cassino and Southern Lazio	sum all entities
Key competencies in sustainability: a reference framework for academic program development	4	0	0	0	1	0	0	0	0	5
Using thematic analysis in psychology	4	0	1	0	0	0	0	1	0	6
Education for Sustainable Development: A Systemic Framework for Connecting the SDGs to Educational Outcomes	3	0	0	0	0	0	0	0	0	3
W(h)ither Ecology? The Triple Bottom Line, the Global Reporting Initiative, and Corporate Sustainability Reporting	3	0	0	0	0	0	1	0	0	4
Application of Novel Extraction Technologies for Bioactives from Marine Algae	2	0	0	0	0	0	0	0	0	2
Stakeholder outcomes in a wind turbine investment; is the Irish energy policy effective in reducing GHG emissions by promoting small-scale embedded turbines in SME's?	2	0	0	0	0	0	0	0	0	2
Big Data in Smart Farming – A review	2	0	0	0	0	0	0	0	0	2
Sharing fairly? Mobility, citizenship, and gender relations in two Swedish city-regions	2	0	0	0	0	0	0	0	0	2
The Delphi method as a research tool: an example, design considerations and applications	2	0	0	0	0	0	0	0	0	2
An AHP-DEA Approach of the Bike-Sharing Spots Selection Problem in the Free-Floating Bike-Sharing System	2	0	0	0	0	0	0	0	0	2

Figure 10: Most used references linked to the key word "Sustainability" at Technical University of Dublin

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The references are on different topics: education, energy, mobility, computing, psychology. They are not really shared by the other partners.

The digital tool used in our analysis is not fully complete, as the research databases are diverse and heterogeneous. For instance, the article entitled “Key competencies in sustainability: a reference framework for academic program development” was really used more than once at the RTU and once at the UTT, whereas the database finds only 1 citation at RTU and none at the UTT. Nevertheless, the orders of magnitude are still correct.

1.2.4 Conclusion on the concept “sustainability”

We can see that scientists from the EUt+ network do not share the same scientific literature. Even within each campus, very few groups of scientists share the same references. RTU, UPCT and UTT are the campuses where we can see common references. This situation can lead to difficulties, especially in the ability of researchers to understand each other during scientific exchanges. As a consequence, it will be crucial to explicitly state the definition of the words used during the first international ESLab+ activities.

1.2.5 Conclusion on the other chosen key concepts

This conclusion is drawn from the analysis of the following concepts: environmental ethics, circular economy, impact energy, clean energy, solar energy, efficient energy use, sustainable transport, education for sustainable development, environmental education, design for the environment. All the results are detailed in Appendix 1 (figures and analysis).

We can see that for the themes of environmental ethics, impact energy, clean energy, solar energy, sustainable transport, education for sustainable development, there are no clear common references shared by the EUt+ partners. Moreover, some partners do not address these themes at all.

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This is not the case for the theme “Circular economy” which is shared by RTU, UTT, UCSL, UPCT and UTCN researchers. Similarly, the theme of efficient use of energy is very common among UNICAS researchers. It is the only topic where we can see a real pool of common references in a group of researchers. Unfortunately, these references are not shared by the other partners.

1.2.6 References on “sustainability” used by each institution and by sustainability corpus

This section analyses the relationship between papers cited in the EUt+ community and those cited in the sustainability science community, worldwide.

Tables

Most used by the main institution

Element names	I107257983 Darmstadt University of Applied Sciences	C66204764 Sustainability	sum all entities
Sustainability seen from the perspective of consumers	2	2	4
Intentions to make sustainable tourism choices: do value orientations, time perspective, and efficacy beliefs explain individual differences?	2	0	2
The attitude–behaviour gap in sustainable tourism	2	5	7
Promoting sustainable consumption: Determinants of green purchases by Swiss consumers	2	21	23
Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour	2	34	36
The role of urban parks for the sustainable city	1	5	6
Classifying and valuing ecosystem services for urban planning	1	11	12
Valuation of environmental quality and eco-cultural attributes in Northwestern Idaho: Native Americans are more concerned than Caucasians	1	0	1
How can residents’ experiences inform planning of urban green infrastructure? Case Finland	1	2	3
Increased Dependence of Humans on Ecosystem Services and Biodiversity	1	1	2

Figure 11: Most used references linked to the concept “sustainability” at Darmstadt University of Applied Science

In Figure, 11, we can see that the reference called “Twenty years after Hines, Hungerford, and Tomera: a new meta-analysis of psycho-social determinants of pro-environmental behaviour” was cited 2 times by researchers from h_da and 34 times among the 10,000 first papers related to the concept of “sustainability”. The sum of the reference (3rd column) is the sum of the references from the 1st and 2nd columns. Thus, this paper is present in the references of papers on sustainability and is not used so much by researchers from h_da.

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Tables

Most used by the main institution

Element names	I201787326 Riga Technical University	C66204764 Sustainability	sum all entities
Technologies Sustainability Modeling	6	0	6
IMPACT 2002+: A new life cycle impact assessment methodology	5	20	25
The ecoinvent database version 3 (part I): overview and methodology	5	8	13
District Heating Systems Performance Analyses. Heat Energy Tariff	5	0	5
Ranking of Sustainability Indicators for Assessment of the New Housing Development Projects: Case of the Baltic States	5	0	5
User Acceptance of Information Technology: Toward a Unified View	4	6	10
Sustainability Assessment of the New Residential Projects in the Baltic States: A Multiple Criteria Approach	4	0	4
Multi-Criteria Decision Analysis Methods Comparison	4	0	4
Sensitivity analysis of TOPSIS method in water quality assessment: I. Sensitivity to the parameter weights	4	0	4
Introducing Integrated Acceptance and Sustainability Assessment of Technologies: A Model Based on System Dynamics Simulation	4	0	4

Figure 12: Most used references linked to the concept "sustainability" at Riga Technical University

One of the most cited sustainability paper is: "IMPACT 2022+: a new life cycle impact assessment methodology". It is related to LCA databases. The papers cited within the RTU are not very well known in the sustainability science literature.

Tables

Most used by the main institution

Element names	I3123212020 Universidad Politécnica de Cartagena	C66204764 Sustainability	sum all entities
Evaluating Structural Equation Models with Unobservable Variables and Measurement Error	6	37	43
A new criterion for assessing discriminant validity in variance-based structural equation modeling	6	15	21
Life cycle assessment of fruit and vegetable production in the Region of Murcia (south-east Spain) and evaluation of impact mitigation practices	5	0	5
GIS Assessment of Mass Tourism Anthropization in Sensitive Coastal Environments: Application to a Case Study in the Mar Menor Area	4	0	4
Using PLS path modeling in new technology research: updated guidelines	4	6	10
Building dynamic capabilities through knowledge resources	4	1	5
Reusable Plastic Crates (RPCs) for Fresh Produce (Case Study on Cauliflowers): Sustainable Packaging but Potential Salmonella Survival and Risk of Cross-Contamination	4	0	4
Environmental strategies and organizational competitiveness in the hotel industry: The role of learning and innovation as determinants of environmental success	3	6	9
Sustainability motivations and practices in small tourism enterprises in European protected areas	3	2	5
Relaxation heuristics for a generalized assignment problem	3	0	3

Figure 13: Most used references linked to the concept "sustainability" at Universidad Politécnica de Cartagena

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Two papers related to structural equations are cited by researchers in Cartagena and the first 10,000 papers related to the concept “sustainability”: “Evaluating structural equation models with unobservable variables and measurement error” (cited 37 times in the sustainability science literature) and “A new criterion for assessing discriminant validity in variance-based structural equation modeling” (cited 15 times in the sustainability science literature).

Most used by the main institution

Element names	I140494188 University of Technology of Troyes	C66204764 Sustainability
Evolution of design for sustainability: From product design to design for system innovations and transitions	7	2
The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context	6	43
A literature and practice review to develop sustainable business model archetypes	6	100
Toward an systemic navigation framework to integrate sustainable development into the company	5	4
A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems	4	82
Clarifying the concept of product–service system	4	39
DRM, a Design Research Methodology	4	1
Recent developments in Life Cycle Assessment	4	57
Ecodesign maturity model: a management framework to support ecodesign implementation into manufacturing companies	4	8
The Circular Economy – A new sustainability paradigm?	4	76

Figure 14: Most used references linked to the concept “sustainability” at University of Technology of Troyes

“A literature and practice review to develop sustainable business model archetypes” (cited 100 times), “a review on circular economy: the expected transition to a balanced interplay of environmental and economic systems” (cited 82 times), and “the circular economy – a new sustainability paradigm?” (cited 76 times) are three references shared by the first 10,000 papers on sustainability science. We can see that within the papers shared among UTT researchers, there are 6 which are also shared in sustainability science literature (more than 30 times).

Most of them are related to circular economy and business models.

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Tables

Most used by the main institution

Element names	I163151358 Cyprus University of Technology	C66204764 Sustainability	sum all entities
State-of-the-art technologies, measures, and potential for reducing GHG emissions from shipping – A review	2	2	4
GREENING THE SERVICE PROFIT CHAIN: THE IMPACT OF ENVIRONMENTAL MANAGEMENT PRACTICES	2	12	14
Editorial: Precision livestock farming: a 'per animal' approach using advanced monitoring technologies	2	1	3
Assessing Ecosystem Services Supplied by Agroecosystems in Mediterranean Europe: A Literature Review	2	0	2
Influence of sustainable hospitality supply chain management on customers' attitudes and behaviors	2	0	2
The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration	2	0	2
"Green" attributes and customer satisfaction	2	0	2
Design for social change and design education: Social challenges versus teacher-centred pedagogies	2	0	2
Impact of urban sprawl to cultural heritage monuments: The case study of Paphos area in Cyprus	2	0	2
Corporate social responsibility reporting by the global hotel industry: Commitment, initiatives and performance	2	5	7

Figure 15: Most used references linked to the concept "sustainability" at Cyprus University of Technology

Very few references are cited in the first 10,000 papers related to the concept of "sustainability".

Tables

Most used by the main institution

Element names	I158333966 Technical University of Cluj-Napoca	C66204764 Sustainability	sum all entities
Studies and Investigation about the Attitude towards Sustainable Production, Consumption and Waste Generation in Line with Circular Economy in Romania	3	2	5
Will the real smart city please stand up?	2	18	20
Targeting consumers who are willing to pay more for environmentally friendly products	2	34	36
Factors influencing acceptance of technology for aging in place: A systematic review	2	0	2
The smart house for older persons and persons with physical disabilities: structure, technology arrangements, and perspectives	2	0	2
Life Cycle Environmental Assessment of Lithium-Ion and Nickel Metal Hydride Batteries for Plug-In Hybrid and Battery Electric Vehicles	2	6	8
Bibliometric Methods in Management and Organization	2	6	8
Beyond the business case for corporate sustainability	2	203	205
Exploring Consumers' Motivations for Sustainable Consumption: A Self-Deterministic Approach	2	0	2
A bibliometric perspective of learning analytics research landscape	2	0	2

Figure 16: Most used references linked to the concept "sustainability" at Technical University of Cluj-Napoca

The paper "Beyond the business case for corporate sustainability" is highly referenced in the top 10,000 sustainability papers (203 times). It is also cited in 2 papers from CUT.

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Tables

Most used by the main institution

Element names	I31151848 Technical University of Sofia	C66204764 Sustainability	sum all entities
Evaluation Tools to Support Decision-Making Process Related to European Corridors	1	0	1
Electronic tools for support of strategic human resource management	1	0	1
CLUSTER APPROACH IN ORGANIZATION OF TRANSPORTATION IN THE BALTIC SEA REGION	1	0	1
Railway Hub Cities and TEN-T Network (RAILHUC Project) – How to Improve Connectivity Around Several Central European Railway Hub Cities?	1	0	1
Evaluating the European added value of TEN-T projects: a methodological proposal based on spatial spillovers, accessibility and GIS	1	0	1
Estimating potential reductions in externalities from rail-road substitution in Trans-European freight transport corridors	1	0	1
Has the efficiency of European railway companies been improved?	1	0	1
Governing inland ports: a multi-dimensional approach to addressing inland port-city challenges in European transport corridors	1	0	1
How to make modal shift from road to rail possible in the European transport market, as aspired to in the EU Transport White Paper 2011	1	0	1
Importance of TEN-T Corridors in the Development of Infrastructure Example of Visegrad Group Countries	1	0	1

Figure 17: Most used references linked to the concept "sustainability" at Technical University of Sofia

It appears that the references cited by TUS researchers are not related to the concept of sustainability.

Tables

Most used by the main institution

Element names	I186995768 University of Cassino and Southern Lazio	C66204764 Sustainability	sum all entities
The Analytic Hierarchy Process	4	0	4
Sustainability of a pay-as-you-go pension system by dynamic immigration control	3	0	3
The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders	3	58	61
An extension of Aaron's sustainable rate of return to partially funded pension systems	3	0	3
Does disclosure in sustainability reports indicate actual sustainability performance?	3	0	3
The growing influence of social and digital media	3	0	3
Dynamic capabilities and strategic management	3	88	91
Modeling unstructured decision problems – the theory of analytical hierarchies	3	0	3
The allocation of intangible resources: the analytic hierarchy process and linear programming	3	0	3
Pension Reform	3	1	4

Figure 18: Most used references linked to the concept "sustainability" in University of Cassino and Southern Lazio

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"The pyramid of corporate social responsibility: toward the moral management of organizational stakeholders" and "dynamic capabilities and strategic management" are used as references among the first 10,000 papers related to the concept of "sustainability". These papers focus on management.

Tables

Most used by the main institution

Element names	I4210144925 Technological University Dublin	C66204764 Sustainability	sum all entities
Key competencies in sustainability: a reference framework for academic program development	4	47	51
Using thematic analysis in psychology	4	14	18
Education for Sustainable Development: A Systemic Framework for Connecting the SDGs to Educational Outcomes	3	0	3
W(h)ither Ecology? The Triple Bottom Line, the Global Reporting Initiative, and Corporate Sustainability Reporting	3	39	42
Application of Novel Extraction Technologies for Bioactives from Marine Algae	2	0	2
Stakeholder outcomes in a wind turbine investment; is the Irish energy policy effective in reducing GHG emissions by promoting small-scale embedded turbines in SME's?	2	0	2
Big Data in Smart Farming – A review	2	8	10
Sharing fairly? Mobility, citizenship, and gender relations in two Swedish city-regions	2	0	2
The Delphi method as a research tool: an example, design considerations and applications	2	8	10
An AHP-DEA Approach of the Bike-Sharing Spots Selection Problem in the Free-Floating Bike-Sharing System	2	0	2

Figure 19: Most used references linked to the concept "sustainability" at Technical University Dublin

Two papers relate to the concept of sustainability: "key competencies in sustainability: a reference framework for academic program development" (cited 47 times) and "W(h)ither Ecology? The Triple Bottom Line, the Global Reporting Initiative, and Corporate Sustainability Reporting" (cited 39 times).

1.3 Discussion and next steps

Through this analysis, we have seen that there is a small number of references shared within the researchers of EUt+ on these different themes: sustainability, mobility, education. At UNICAS there is a group of researchers working on energy issues related to sustainability, but the references of this group are not shared with the other partners. In general, we can see that there is a lack of common references to build a strong community.

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Nevertheless, some common papers have been identified, especially on the circular economy. These papers (listed in the Appendix) will be used as a boundary object to discuss among researchers (as a literature already somewhat shared).

For this reason, it was decided to create a structure on sustainability consisting of different thematic groups: mobility, energy, education, and other topics that will be presented in the next sections. After a few months, we will see if it is relevant to have an energy or mobility laboratory in addition to the sustainability laboratory.

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2 Challenge-based laboratories

This section consists of the description of the sustainability laboratory and the description of a workshop organised by and for PhD students in sustainability science (winter seminar, edition 2021).

2.1 European sustainability Laboratory

2.1.1 Preambule

"*As a University of Technology, our mission is first and foremost to serve society*". This was one of the first statements of the European University of technology (EUt+). This desire to serve human societies is expressed in the context of exceeding planetary boundaries and can only be achieved by taking this phenomenon into account. The overstepping of planetary boundaries, mainly due to the pressure of societies on ecosystems, calls into question the habitability of planet Earth. In this context, the development of a research institute on sustainability issues within the EUt+ seems essential in order to participate in the sustainable transition of European societies. This will make it possible to study the "*pivotal role that technology plays in forging an inclusive and sustainable future*" (2020). This document describes the institute, its scope, and its development strategy.

2.1.2 Scope and perspective

Exceeding planetary boundaries has profoundly altered the balance of the Earth system (Steffen, Richardson, et al. 2015). As a result, the habitable conditions of the planet are under threat, to the point where certain areas of the world are becoming inhabitable. The global and local consequences of these imbalances are such that scientists have proposed a new geological period to characterise the changes underway: the Anthropocene (Crutzen 2006). This observation suggests that human societies must make efforts to move towards more

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sustainable lifestyles if we are to come back within planetary limits and learn to be resilient in the face of current and future changes.

This transition in socio-technical systems, although defined as necessary by scientists some forty years ago, is struggling to get off the ground. Indeed, the impact of societies on planetary limits continues to intensify, and the inequalities that structure societies have changed little, as evidenced by the increase in greenhouse gas concentrations in the atmosphere, from 325 ppm in 1970 to 420 ppm in 2023, the decline in biodiversity, and the increasing rate of land artificialisation (Steffen, Broadgate, et al. 2015) – to name but a few. Socio-technical systems need to be redesigned to adapt to this new situation while reducing the pressure on ecosystems. To enable these changes, sustainability scientists have identified several leverage points, the most important of which is the ability to transcend paradigms (Abson et al. 2017). Sustainability science is understood here as an interdisciplinary endeavour oriented towards practical action. This interdisciplinarity of scientists obliges researchers to be epistemologically agile and methodologically grounded in order to ensure the rigour of the knowledge produced (Haider et al. 2018). This is a real challenge for researchers, as interdisciplinary requires more time to build a common vocabulary among researchers and poses a risk to the disciplinary structure of science. Thus, it is clear that sustainability science challenges the status quo and targets multi-level issues.

The development of sustainability science in Europe is a major challenge to enable European society to participate in the sustainable transformation of societies. As EUt+ aspires to be a key player in the future, it is imperative to address the complex issue of sustainability. Thus, the ESLab+ lab is not about the design of new technologies to fix environmental issues, but about better understanding the paradigms behind current and new technologies, stepping back from regular production, and exploring new socio-technical paradigms. This document outlines the specificities of the European Sustainability Laboratory (ESLab+).

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2.1.3 ESLab+ within EUt+

EUt+'s academic contribution to sustainability efforts will be made through a new European Research Institute called the European Sustainability Laboratory (ESLab+). ESLab+ will be a multinational, multi-campus, trans- and interdisciplinary research institute.

Firmly rooted within the mission and vision of EUt+, ESLab+ is particularly aware that the answers to these challenges necessarily involve technology, but that they must be multi-faceted and address the complexity of socio-technical issues. Furthermore, ESL aims to develop a critical perspective on technology to enable paradigm shifts.

"This can only be achieved by empowering technologically responsible citizens, and researchers who fully comprehend the potential of technology as well as the risks of neglecting its purpose". (Statement from the European University of Technology proposal, submitted to the 2020 ERASMUS+ Call for proposals)

Name of the proposed ERI	European Sustainability Laboratory (ESLab+)
Constituent Universities:	+ University of Technology of Troyes, + Darmstadt University of Applied Sciences, + Riga Technical University, + Technological University Dublin, + Technical University of Sofia, + Cyprus University of Technology, + Technical University of Cartagena, + Technical University of Cluj-Napoca.
Leader Member	Professor Dr. Nicole Saenger, University of Applied Sciences Darmstadt (h_da)

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2.1.4 Missions of the European Sustainability Laboratory (ESLab+)

ESLab+ is about better understanding the paradigms behind current and new technologies, stepping back from regular production and exploring new socio-technical paradigms to achieve sustainability of our societies. Thus, projects within the framework of ESLab+ are concerned with the production of knowledge about the interactions between human societies and ecosystems.

The European Sustainability Laboratory has three missions:

1. RESEARCH. To generate knowledge on sustainability
2. TRANSFER. To reduce the time needed to transfer knowledge from researchers to non-researchers
3. REFLEXIVITY. To explore ways of doing research in a more sustainable way

RESEARCH. To generate knowledge on sustainability

ESLab+ aims to promote research that contributes to understanding the evolution of our world, especially in the context of technological change. “It is our essential human ability to express, think and understand the world through artefacts." (Mission statement, 2020). The first mission therefore focuses on generating scientific knowledge to better understand the role of technology in the sustainable transformation of our societies. As technology and people co-evolve, it is crucial to study technology in the context of sustainable lifestyles (assumption 1). Technology shapes people’s understanding of problems, while at the same time people design technical systems. Sustainability transitions assume that technological production needs a paradigm shift to reduce pressure on the Earth System while ensuring the well-being of the majority of human societies, not only a minority. Sustainability issues are thus wicked problems, that need to be tackled with multi-level perspectives (assumption 2).

ESLab+ aims to go beyond the application of the SDGs to bring an ambitious research plan embedded in a strong sustainability perspective, and to try to move away from an

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anthropocentric view (towards a more ecocentric view). This will allow ESLab+ to have a critical perspective on the first moto of EUt+ "think human first", and to explore the (PhD) students' moto "*think human and all living beings first*" (Student MoU, 2019).

Sustainability science is not easy to practice, as it requires deep interdisciplinary competencies and is practice-oriented. Therefore, the research produced within ESLab+ will come from different epistemological backgrounds that need to be explained (positivism, feminism, constructivism, interpretativism, …), while having a deep methodological groundness (Haider et al. 2018) (assumption 3). As stated by (Nagatsu et al. 2020), "*sustainability scientists have recently started discussing a range of methodological issues, including the transferability of case-based transdisciplinary knowledge (Adler et al. 2018), the taxonomy of experimentation (Caniglia et al. 2017), evidence synthesis (Livoreil et al. 2017), and the synthesis of scientific and non-scientific knowledge such as indigeneous knowledge* (Tengö et al. 2017)*. These all revolve around the question of how to produce knowledge that is both epistemically reliable and practically usable.*" This addresses several questions: How is knowledge produced? Who produces knowledge? For what purpose? Should we have a purpose? It is related to the notion of dissemination and knowledge transfer which are the second main mission of ESLab+.

TRANSFER. To reduce the time needed to transfer knowledge from researchers to non-researchers

As EUt+'s main objective is to serve society, it is fully in line with the transdisciplinary approaches that are crucial to the practice of sustainability science. Indeed, "*transdisciplinarity for producing groundbreaking sociotechnical solutions has to serve (a) the public good and (b) calls for independence, academic freedom, institutionalization, and proper funding schemes.*" (Scholz 2020)

Given the urgency of the sustainable transformation, the knowledge generated by scientific projects needs to be disseminated more rapidly to society at large. Therefore, other

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knowledge transfer systems beyond the traditional science-industry interaction need to be put into practice to accelerate the sustainable transformation. In line with this statement, closer collaboration between stakeholders within the production process should be developed. This type of knowledge production is called transdisciplinary research. Furthermore, as EUt+ campuses are located in different areas (rural, urban, landlocked territories or capital cities), the transfer process will need to be adapted to the different local situations.

Some academic platforms will need to be developed to support the knowledge produced on sustainability.

REFELEXIVITY. To explore the ways to practice research in a more sustainable way

Sustainability science is about challenging research goals, research methods, and ultimately research practices (Clark and Dickson 2003; Jerneck et al. 2011; Kates 2011). Researchers are questioning the extent to which the way in which they produce their knowledge affects their credibility and the way in which the knowledge produced is disseminated to society.

These questions may seem trivial, but they have been the subject of a great deal of research, so much so that several researchers have come together at national and international level to address them. The first questions focused on the environmental impact of research, mainly in terms of carbon emissions, especially from transport. (Bossdorf, Parepa, and Fischer 2010; Cluzel et al. 2020). Others question the ability of researchers to conduct research in a doubly anxiety-provoking environment. First, the research environment has become anxiety-provoking (competition, publish or perish), leading to a higher representation of mental pathologies among PhD students than other highly qualified individuals in all countries (Berry et al. 2020; Levecque et al. 2017; Martínez-Nicolás and García-Girón 2021). Second, as the planet's living conditions are not assured, there is a development of eco-anxiety among the younger generations and thus among students (Eriksson et al. 2022).

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More broadly, we can ask: how to practice research in sustainable (environmental but also social) contexts? What does it mean to produce knowledge in the Anthropocene? What kind of knowledge does society need? Does the Anthropocene force us to rethink the role of the researcher in society?

2.1.5 Organisation of ESLab+

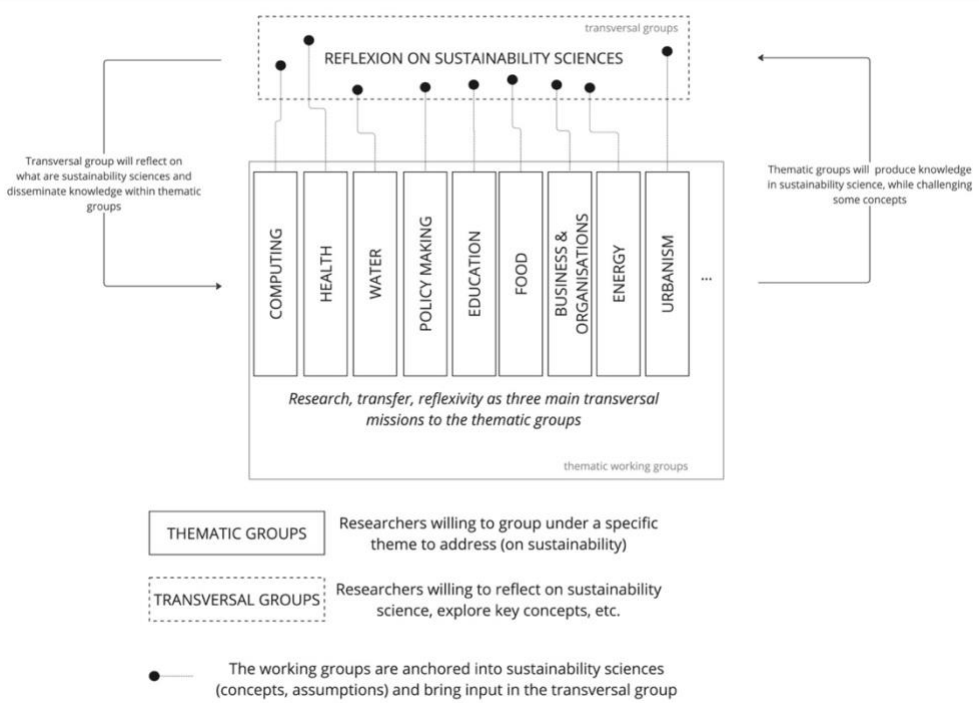

Figure 20: diagram representing the organisation of ESLab+

The laboratory will be organised into a transversal group and thematic groups. The transversal group will tackle questions such as “What is sustainability science?”, “How to practice

To give an example of thematic group, “computing” thematic group could tackle the issue of the design of computing systems outside of a cornucopian paradigm, which means having

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researchers from philosophy, HCI, ergonomics but also telecommunications disciplines. Wherever possible, practical actors (industry, grassroots communities) will be involved in order to ensure that the research is applied and action-oriented. This openness to stakeholders is in line with ESLab+'s status as test bed of the EUt EXTRAS project's focus of 'Science With And For Society'. Reducing the pressure on the planetary boundaries while maintaining a certain level of well-being for human and non-human societies should be the framework for the thematic groups.

2.2 Extension on PhD in sustainability science

This section will be focused on the Winter Seminar, edition 2021. This is a seminar dedicated to PhD students. The concept, and the agenda of the seminar will be explained. The details of this seminar will be presented in deliverable D49.

2.2.1 The concept

The Winter Seminar is a yearly seminar organized by and dedicated to PhD students of the Interdisciplinary Research Team on Transitions Towards Sustainable Socio-technical Systems (CREIDD). This Seminar is thus an annual moment to gather and share scientific practices and knowledge between early-stage researchers. As the team embraces an interdisciplinary framework, they believe it is important for all members to meet and trust each other to better build research projects together. This Seminar helps the young researchers to build a shared vision of our impact as researchers on sustainability in a challenging world.

This edition of 2021 is done in the context of the European University of Technology (EUt+). This is the reason why for the first time, this seminar will be open to PhD students interested in sustainable and who are coming from other team research which are part of the EUt+ initiative.

2.2.2 Agenda

2.2.2.1 First day meeting

Hours	Activity	What to prepare before the workshop
8 a.m. to 8.45 a.m.	**Ice breaker** As we don't know each other, we suggest a quick ice-breaker to feel more at ease during the following activities.	Having a good internet connection Having a croissant (and coffee for some) ☺
8.45 a.m. to 9 a.m.	**Break**	
9 a.m. to 10.30 a.m.	**Let's discover your research** The idea is to make a dynamic and quick presentation of your PhD to make people discover your PhD subject and to have a clear overview on what people are working on.	Between 3 and 5 minutes presentation on your PhD (subject, positioning, method, expected results). *Approximately 2 hours work preparation.*
10.30 a.m. to 11.30 a.m	**Discussions** It is time to exchange on the presentation you have seen: questions, comments and proposal are welcome!	
11.30 a.m. to 2 p.m.	**Break**	Have a big break to deal with potential work and your delicious lunch!

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2 p.m. to 3pm	**What is sustainability?** We all work on sustainability, but we do not understand it the same way. Let's share this non common understanding of this concept.	Chose (and read) at least 1 article on sustainability (you don't have any constraints on the length). We will share our understanding and use of this term, but we need references to justify our assertions. *Approximately 1 hour work preparation maximum.*
3pm to 3.15pm	**Formalization** Let's structure the global discussion to classify and explicit the different point of views.	
3.15 p.m. to 3.30 p.m	**Break**	
3.30 p.m. to 4.30 p.m	**What is interdisciplinarity?** Sustainability is usually done in interdisciplinary context. Do you work in such a context? Which practices do you have in your daily work?	Chose (and read) at least 1 article on interdisciplinarity (you don't have any constraints on the length). We will share our understanding and use of this term, but we need references to justify our assertions. *Approximately 1 hour work preparation maximum.*
4.30 p.m. to 4.45 p.m.	**Formalization**	

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	Let's structure the global discussion to classify and explicit the different point of views.	
4.45 p.m. to 5 p.m.	**Break**	Time to go to the toilets!
5 p.m. to 5.15 p.m.	**Conclusion of the day**	Have a beer or an apple juice ☺

2.2.2.2 Second day meeting

Hours	**Activity**	**What to prepare before the workshop**
9 a.m. to 10.30 a.m.	**Research-pong** We prepared you a game to share together differences in practices between the French, German, Irish, Spanish, and other research organization and institution (transnational sharing).	Sufficient knowledge on your own national research context.
10 a.m. to 10.30 a.m.	**Break and coffee discussion on what you have just learned!**	
10.30 a.m. to 12 a.m.	**Explain your methodology/methods** You are preparing the method of your PhD but you need a critical point of view on your methodology/methods proposal?	For those who want to present their methodology/methods: you need to prepare either a discussion, either a classic presentation to share your method with everyone (15 minutes approx.)

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	Let's share with us and get feedback from your colleagues. We will do parallel sessions for this part. Participants will choose their own session.	
12 a.m. to 1 p.m	**Lunch**	Have a big break to deal with potential work and your delicious lunch!
1 p.m. to 2.30 p.m.	**First session of peer-reviewing** You are writing an article and you would like to get a feedback on it? This session is for you! We will do parallel sessions for this part, regarding the number of papers we receive.	For those who present a paper: you need to send us a paper you are writing (or a conference paper you want to transform into a journal paper). For those who don't present a paper but still want to participate: We will send you an article you will have to review.
2.30 p.m. to 3 pm	**Break**	
3pm to 4.30 pm	**Second session of peer-reviewing** You are writing an article and you would like to get a feedback on it? This session is for you!	For those who present a paper: you need to send us a paper you are writing (or a conference paper you want to transform into a journal paper).

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	We will do parallel sessions for this part, regarding the number of papers we receive.	For those who don't present a paper but still want to participate: We will send you an article you will have to review.
4.30 p.m. to 4.45 p.m	**Break**	
4.45 p.m. to 5.30 p.m	**Conclusion of the day and perspectives** Writing of a final document to check the scientific outputs of the seminar.	

Conclusion

The main insights from the comprehensive and co-design methods described in this Deliverable 47 is the identification of the missions of the ESLab+ and its purpose.

The European Sustainability Laboratory has three missions:

1. RESEARCH. To generate knowledge on sustainability
2. TRANSFER. To reduce the time needed to transfer knowledge from researchers to non-researchers
3. REFLEXIVITY. To explore ways of doing research in a more sustainable way

ESLab+ is about better understanding the paradigms behind current and new technologies, stepping back from regular production and exploring new socio-technical paradigms to achieve sustainability of our societies. Thus, projects within the framework of ESLab+ are concerned with the production of knowledge about the interactions between human societies and ecosystems.

This identification of the missions has been co-constructed during the participatory workshop that is further described in detail in D49. In an incremental way, these insights have informed the next steps of the collaborative process of structuring this pan European institute based on common understanding and common values (see D48).

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Annex 1

Results for 6 key concepts shared by EUt+ researchers

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Appendix 1

This appendix is composed of the results for 6 key concepts: environmental ethics, circular economy, impact energy, clean energy, solar energy, efficient energy use, sustainable transport, education for sustainable development, environmental education, design for the environment. Each section is composed of 2 sub-sections: the results and the conclusions.

3.1 Key concept "environmental ethics"

3.1.1 Results

Tables

Most used by the main institution

Element names	I107257983 Darmstadt University of Applied Sciences	I4210144925 Technological University Dublin	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I201787320 Riga Technical University	I163151358 Cyprus University of Technology	sum all entities
Health and climate change: policy responses to protect public health	1	0	0	0	0	0	0	0	0	1
Das Prinzip Verantwortung. Versuch einer Ethik für die technische Zivilisation	1	0	0	0	0	0	0	0	0	1
Principles to guide investment towards a stable climate	1	0	0	0	0	0	0	0	0	1
The 2018 report of the Lancet Countdown on health and climate change: shaping the health of nations for centuries to come	1	0	0	0	0	0	0	0	0	1
Medical organisations must divest from fossil fuels	1	0	0	0	0	0	0	0	0	1
Sport und Ethik	1	0	0	0	0	0	0	0	0	1
Ökologie und Freiheit	1	0	0	0	0	0	0	0	0	1
Risikogesellschaft auf dem Weg in eine andere Moderne	1	0	0	0	0	0	0	0	0	1
Das Prinzip Verantwortung : Versuch einer Ethik für die technologische Zivilisation	1	0	0	0	0	0	0	0	0	1
Wertfreie Wissenschaft und Freiheit der Forschung	1	0	0	0	0	0	0	0	0	1

Figure 21: Most used references linked to the key word "Environmental ethics" at Darmstadt University of Applied Science

Some references are in German. No reference is shared among the scientists of Darmstadt University of Applied Science and none is also shared among the partners.

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Tables

Most used by the main institution

Element names	I201787326 Riga Technical University	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I107257983 Darmstadt University of Applied Sciences	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	I186995768 University of Cassino and Southern Lazio	sum all entities
Evolutionary Ontology	2	0	0	0	0	0	0	0	0	2
Does the JTES help us Create Deeper Personal Meanings for Sustainable Education?	1	0	0	0	0	0	0	0	0	1
Economic valuation of the cultural heritage: application to four case studies in Spain	1	0	0	0	0	0	0	0	0	1
Experience-Centered Design	1	0	0	0	0	0	0	0	0	1
Consciousness	1	0	0	0	0	0	0	0	0	1
A Place for Consciousness	1	0	0	0	0	0	0	0	0	1
Making Sense of Evolution	1	0	0	0	0	0	0	0	0	1
Greening Anthropology	1	0	0	0	0	0	0	0	0	1
Sustainable International Relations. Pope Francis' Encyclical Laudato Si' and the Planetary Implications of "Integral Ecology"	1	0	0	0	0	0	0	0	0	1
Educational Action Research for Sustainability: Seeking Wisdom of Insight in Teacher Education	1	0	0	0	0	0	0	0	0	1

Figure 22: Most used references linked to the key word "Environmental ethics" at Riga Technical University

Only 1 reference is shared among the scientists of Riga Technical University and none is shared among the partners.

Tables

Most used by the main institution

Element names	I3123212020 Universidad Politécnica de Cartagena	I4210144925 Technological University Dublin	I140494188 University of Technology of Troyes	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	I186995768 University of Cassino and Southern Lazio	sum all entities
Anthroscapes : A Landscape Unit For Assessment Of Human Impact On Land Systems	1	0	0	0	0	0	0	0	0	1
Assessing the recreational value of small-scale nature-based solutions when planning urban flood adaptation	1	0	0	0	0	0	0	0	0	1
Reinvestment in the housing stock: the role of construction costs and the supply side	1	0	0	0	0	0	0	0	0	1
The landscape and evolution of urban planning science	1	0	0	0	0	0	0	0	0	1
Spatial Correlation between Urban Planning Patterns and Vulnerability to Flooding Risk: A Case Study in Murcia (Spain)	1	0	0	0	0	0	0	0	0	1
World Drug Report 2022	1	0	0	0	0	0	0	0	0	1
3D visualisations for communicative urban and landscape planning: What systematic mapping of academic literature can tell us of their potential?	1	0	0	0	0	0	0	0	0	1
Ecological risk assessment models for simulating impacts of land use and landscape pattern on ecosystem services	1	0	0	0	0	0	0	0	0	1
The out-migration of young people from a region of the "Empty Spain": Between a constant slump cycle and a pending innovation spiral	1	0	0	0	0	0	0	0	0	1
Housing supply and housing bubbles	1	0	0	0	0	0	0	0	0	1

Figure 23: Most used references linked to the key word "Environmental ethics" at Universidad Politécnica de Cartagena

No reference is shared among the scientists of UPCT and none is also shared among the partners.

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Tables

Most used by the main institution

Element names	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	I186995768 University of Cassino and Southern Lazio	sum all entities
Louis Pasteur's discovery of molecular chirality and spontaneous resolution in 1848, together with a complete review of his crystallographic and chemical work	1	0	0	0	0	0	0	0	0	1
Sustainable development: A critical review	1	0	0	0	0	0	0	0	0	1
The New World of the Anthropocene	1	0	0	0	0	0	0	0	0	1
Anthropocene: Human interactions with earth systems	1	0	0	0	0	0	0	0	0	1
Atmospheric homeostasis by and for the biosphere: the gaia hypothesis	1	0	0	0	0	0	0	0	0	1
Vernadsky and Biospheral Ecology	1	0	0	0	0	0	0	0	0	1
'Earth system' analysis and the second Copernican revolution	1	0	0	0	0	0	0	0	0	1
Croonian lecture. – The cosmical function of the green plant	1	0	0	0	0	0	0	0	0	1
V.I. Vernadskii and the development of biogeochemical understandings of the biosphere, c.1888s–1968	1	0	0	0	0	0	0	0	0	1
The Anthropocene: conceptual and historical perspectives	1	0	0	0	0	0	0	0	0	1

Figure 24: Most used references linked to the key word "Environmental ethics" at University of Technology of Troyes

Linked to the fact that humans have entered into the Anthropocene. Related to Earth System sciences. No reference is shared among the scientists of UTT and none is also shared among the partners.

Tables

Most used by the main institution

Element names	I163151358 Cyprus University of Technology	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I186995768 University of Cassino and Southern Lazio	sum all entities
Philoxenia offered to tourists? A rural tourism perspective	2	0	0	0	0	0	0	0	0	2
Motives for a secular pilgrimage to the Gallipoli battlefields	2	0	0	0	0	0	0	0	0	2
Positive emotions and spirituality in older travelers	2	0	0	0	0	0	0	0	0	2
Rural tourism	2	0	0	0	0	0	0	0	0	2
Exploring agape: Tourists on the island of love	2	0	0	0	0	0	0	0	0	2
Present Pasts	1	0	0	0	0	0	0	0	0	1
Culture, economics and sustainability	1	0	0	0	0	0	0	0	0	1
Energy saving strategies in air-conditioning for museums	1	0	0	0	0	0	0	0	0	1
Sustainability and culture some theoretical issues	1	0	0	0	0	0	0	0	0	1
Museum collections and sustainability	1	0	0	0	0	0	0	0	0	1

Figure 25: Most used references linked to the key word "Environmental ethics" at Cyprus University of Technology

Some references are related to travels, tourism and culture. None is shared with other partners.

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Tables

Most used by the main institution

Element names	I158333966 Technical University of Cluj-Napoca	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I163151358 Cyprus University of Technology	I186995768 University of Cassino and Southern Lazio	sum all entities
Environmental Ethics	1	0	0	0	0	0	0	0	0	1
Assessing Landscape Ecological Risk in a Mining City: A Case Study in Liaoyuan City, China	1	0	0	0	0	0	0	0	0	1
Nature by Design	1	0	0	0	0	0	0	0	0	1
Potential ecological risk of heavy metals in sediments from the Mediterranean coast, Egypt	1	0	0	0	0	0	0	0	0	1
An ecological risk index for aquatic pollution control.a sedimentological approach	1	0	0	0	0	0	0	0	0	1
Ethics and Sustainability: Guest or Guide? On Sustainability as a Moral Ideal	1	0	0	0	0	0	0	0	0	1
Analysis of Soil Heavy Metal Pollution and Pattern in Central Transylvania	1	0	0	0	0	0	0	0	0	1
Ecological risk assessment of heavy metals in sediments of Xiawan Port based on modified potential ecological risk index	1	0	0	0	0	0	0	0	0	1
The Effect on Ecological Systems of Remediation to Protect Human Health	1	0	0	0	0	0	0	0	0	1
Potential ecological risk assessment and prediction of soil heavy-metal pollution around coal gangue dump	1	0	0	0	0	0	0	0	0	1

Figure 26: Most used references linked to the key word "Environmental ethics" at Technical University of Cluj-Napoca

No reference is shared among the scientists of TUCN and none is also shared among the partners.

No graph available.

Most used references linked to the key word "Environmental ethics" at Technical University of Sofia

No conclusion can be expressed.

Tables

Most used by the main institution

Element names	I186995768 University of Cassino and Southern Lazio	I4210144925 Technological University Dublin	I140494188 University of Technology of Troyes	I3123212020 Universidad Politécnica de Cartagena	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I201787326 Riga Technical University	I163151358 Cyprus University of Technology	I107257983 Darmstadt University of Applied Sciences	sum all entities
Species of Mind	2	0	0	0	0	0	0	0	0	2
Chimpanzees: Self-Recognition	2	0	0	0	0	0	0	0	0	2
Primates and Philosophers	2	0	0	0	0	0	0	0	0	2
A new conceptualization of mega sports event legacy delivery: Wicked problems and critical realist solution	1	0	0	0	0	0	0	0	0	1
In Other Words	1	0	0	0	0	0	0	0	0	1
The Commercialization of Voluntary Sport Organizations in Norway	1	0	0	0	0	0	0	0	0	1
Using critical realism: a new perspective on control of volunteers in sport clubs	1	0	0	0	0	0	0	0	0	1
Assessing the sociology of sport: On critical sport sociology and sport management	1	0	0	0	0	0	0	0	0	1
The Good, the Bad, and the Ugly: Critical Sport Management Research	1	0	0	0	0	0	0	0	0	1
Do non-profit sport organisations innovate? Types and preferences of service innovation within regional sport federations	1	0	0	0	0	0	0	0	0	1

Figure 27: Most used references linked to the key word "Environmental ethics" in University of Cassino and Southern Lazio

Some references are shared, especially on the link between primates and humans, and on the ability to think. No reference is shared among the partners.

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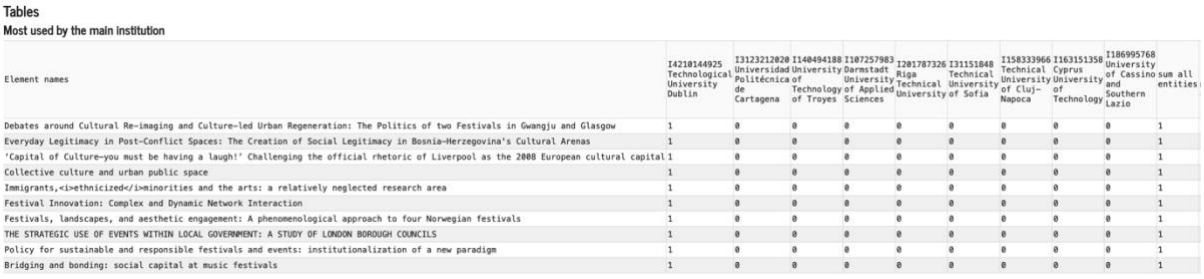


Tables

Most used by the main institution

Element names	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	I186995768 University of Cassino and Southern Lazio	sum all entities
Debates around Cultural Re-imaging and Culture-led Urban Regeneration: The Politics of two Festivals in Gwangju and Glasgow	1	0	0	0	0	0	0	0	0	1
Everyday Legitimacy in Post-Conflict Spaces: The Creation of Social Legitimacy in Bosnia-Herzegovina's Cultural Arenas	1	0	0	0	0	0	0	0	0	1
'Capital of Culture-you must be having a laugh!' Challenging the official rhetoric of Liverpool as the 2008 European cultural capital	1	0	0	0	0	0	0	0	0	1
Collective culture and urban public space	1	0	0	0	0	0	0	0	0	1
Immigrants,ethnicizedminorities and the arts: a relatively neglected research area	1	0	0	0	0	0	0	0	0	1
Festival Innovation: Complex and Dynamic Network Interaction	1	0	0	0	0	0	0	0	0	1
Festivals, landscapes, and aesthetic engagement: A phenomenological approach to four Norwegian festivals	1	0	0	0	0	0	0	0	0	1
THE STRATEGIC USE OF EVENTS WITHIN LOCAL GOVERNMENT: A STUDY OF LONDON BOROUGH COUNCILS	1	0	0	0	0	0	0	0	0	1
Policy for sustainable and responsible festivals and events: institutionalization of a new paradigm	1	0	0	0	0	0	0	0	0	1
Bridging and bonding: social capital at music festivals	1	0	0	0	0	0	0	0	0	1

Figure 28: Most used references linked to the key word "Environmental ethics" at Technical University of Dublin

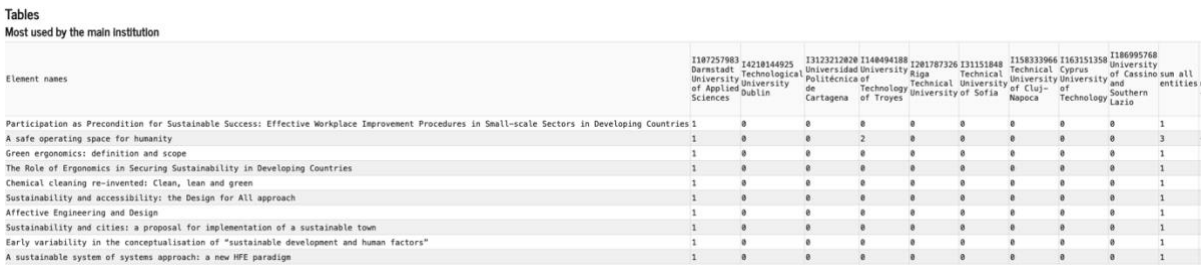
No reference is shared among the scientists of TUDublin and none is also shared among the partners.

3.1.2 Conclusion

There are no common references in between researchers of EUt+ on environmental ethics.

3.2 Key concept "circular economy"

3.2.1 Results



Tables

Most used by the main institution

Element names	I107257983 Darmstadt University of Applied Sciences	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	I186995768 University of Cassino and Southern Lazio	sum all entities
Participation as Precondition for Sustainable Success: Effective Workplace Improvement Procedures in Small-scale Sectors in Developing Countries	1	0	0	0	0	0	0	0	0	1
A safe operating space for humanity	1	0	0	2	0	0	0	0	0	3
Green ergonomics: definition and scope	1	0	0	0	0	0	0	0	0	1
The Role of Ergonomics in Securing Sustainability in Developing Countries	1	0	0	0	0	0	0	0	0	1
Chemical cleaning re-invented: Clean, lean and green	1	0	0	0	0	0	0	0	0	1
Sustainability and accessibility: the Design for All approach	1	0	0	0	0	0	0	0	0	1
Affective Engineering and Design	1	0	0	0	0	0	0	0	0	1
Sustainability and cities: a proposal for implementation of a sustainable town	1	0	0	0	0	0	0	0	0	1
Early variability in the conceptualisation of "sustainable development and human factors"	1	0	0	0	0	0	0	0	0	1
A sustainable system of systems approach: a new HFE paradigm	1	0	0	0	0	0	0	0	0	1

Figure 29: Most used references linked to the key word "Circular economy" at Darmstadt University of Applied Science

"A safe operating space for humanity" is used by HAD and UTT. As this paper is the basis of the planetary boundaries model, it is surprising it is not more shared among the institution. It gives insight to the first elements we need to develop within ESL.

Tables

Most used by the main institution

Element names	I201787326 Riga Technical University	I4210144925 Technological University Dublin	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	I107257983 Darmstadt University of Applied Sciences	sum all entities
The Synergy in Circular Economy	3	0	0	0	0	0	0	0	0	3
Time Series Prediction Using Restricted Boltzmann Machines and Backpropagation	2	0	0	0	0	0	0	0	0	2
Synthesis and characterization of biodegradable poly(butylene succinate-co-butylene adipate)s	2	0	0	0	0	0	0	0	0	2
Circular economy – From review of theories and practices to development of implementation tools	2	0	3	0	0	0	3	0	0	8
Importance of waste composition for Life Cycle Assessment of waste management solutions	2	0	0	0	0	0	0	0	0	2
Bioproducts from Potatoes. A Review	2	0	0	0	0	0	0	0	0	2
Multi-Criteria Decision Analysis Methods Comparison	2	0	0	0	0	0	0	0	0	2
Technoeconomic and environmental assessment of a process for biodiesel production from spent coffee grounds (SCGs)	2	0	0	0	0	0	0	0	0	2
Conceptualizing the circular economy: An analysis of 114 definitions	2	0	5	1	1	0	5	0	0	14
Plastic pollution and potential solutions.	2	0	0	0	0	0	0	0	0	2

Figure 30: Most used references linked to the key word “Circular economy” at Riga Technical University

“Circular economy – From review of theories and practices to development to implementation tools” are shared by RTU, UTT and UTCN. Also, “conceptualizing the circular economy: an analysis of 114 definitions” are shared by RTU, UTT, UPCSL, UPCT and UTCN. It confirms the fact that circular economy is a theme shared by different institutions.

Tables

Most used by the main institution

Element names	I3123212020 Universidad Politécnica de Cartagena	I4210144925 technological University Dublin	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I201787326 Riga Technical University	I163151358 Cyprus University of Technology	I107257983 Darmstadt University of Applied Sciences	sum all entities
	1	0	0	1	0	0	0	0	0	2
A review of modelling tools for energy and electricity systems with large shares of variable renewables	1	0	0	0	0	0	0	0	0	1
On Materials Experience	1	0	0	0	0	0	0	0	0	1
Modelling the impacts of variable renewable sources on the power sector: Reconsidering the typology of energy modelling tools	1	0	0	0	0	0	0	0	0	1
Enhanced bioproduction of poly-3-hydroxybutyrate from wheat straw lignocellulosic hydrolysates	1	0	0	0	0	0	0	0	0	1
Understanding carbon lock-in	1	0	0	0	0	0	0	0	0	1
Escaping carbon lock-in	1	0	0	0	0	0	0	0	0	1
Biocomposites reinforced with natural fibers: 2000–2010	1	0	0	0	0	0	0	0	0	1
Critical aspects in the life cycle assessment (LCA) of bio-based materials – Reviewing methodologies and deriving recommendations	1	0	0	0	0	0	0	0	0	1
Feeding strategies for tuning poly (3-hydroxybutyrate-co-4-hydroxybutyrate) monomeric composition and productivity using Burkholderia sacchari	1	0	0	0	0	0	0	0	0	1

Figure 31: Most used references linked to the key word “Circular economy” at Universidad Politécnica de Cartagena

No shared reference.

Co-funded by the European Union

Tables

Most used by the main institution

Element names	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I201787326 Riga Technical University	I163151358 Cyprus University of Technology	I107257983 Darmstadt University of Applied Sciences	sum all entities
The circular economy: New or Refurbished as CE 3.0? – Exploring Controversies in the Conceptualization of the Circular Economy through a Focus on History and Resource Value Retention Options	6	0	0	0	0	1	2	0	0	9
The Circular Economy – A new sustainability paradigm?	5	0	4	0	0	6	2	0	0	17
Conceptualizing the circular economy: An analysis of 114 definitions	5	0	1	1	0	5	2	0	0	14
A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems	4	0	1	0	0	5	1	0	0	11
The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context	4	1	1	0	0	5	0	0	0	11
Critical appraisal of the circular economy standard BS 8001:2017 and a dashboard of quantitative system indicators for its implementation in organizations	3	0	0	0	0	2	0	0	0	5
Environmental sciences, sustainable development and circular economy: Alternative concepts for trans-disciplinary research	3	0	1	0	0	2	1	0	0	7
Diversifying and de-growing the circular economy: Radical social transformation in a resource-scarce world	3	0	0	0	0	0	0	0	0	3
Circular economy – From review of theories and practices to development of implementation tools	3	0	0	0	0	3	2	0	0	8
Towards circular economy implementation: a comprehensive review in context of manufacturing industry	3	0	2	0	1	1	2	0	0	9

Figure 32: Most used references linked to the key word “Circular economy” at University of Technology of Troyes

Some references are shared within UTT teams and with other insituttions:

- The circular economy – a new sustainable paradigm?
- Conceptualizing the circular economy: an analysis of 114 definitions
- A review on circular economy: the expected transition to a balanced interplay of environmental and economic system
- The Circular Economy: an interdisciplinary exploration of the concept and application in a global context
- Towards circular economy implementation: a comprehensive review in context of manufacturing industry
- The Circular Economy: new or refurbished as CE 3.0

Those references are also shared with UTCN, RTU and UCSL (mainly).

Tables

Most used by the main institution

Element names	I163151358 Cyprus University of Technology	I4210144925 Technological University Dublin	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I201787326 Riga Technical University	I107257983 Darmstadt University of Applied Sciences
Fused deposition modeling with polypropylene	1	0	0	0	0	0	0	0	0
Innovations in separations technology for the recycling and re-use of liquid waste streams	1	0	0	0	0	0	0	0	0
Investigating the effect of accelerated weathering on the mechanical and physical properties of high content plastic solid waste (PSW) blends with virgin linear low density polyethylene (LLDPE)	1	0	0	0	0	0	0	0	0
Handling WEEE waste flows: on the effectiveness of producer responsibility in a globalizing world	1	0	0	0	0	0	0	0	0
Management and recycling of electronic waste	1	0	0	0	0	0	0	0	0
Quantification of heavy metals for the recycling of waste plastics from electrotechnical applications	1	0	0	0	0	0	0	0	0
Decrease of Cl contents in waste plastics using a gas–solid fluidized bed separator	1	0	0	0	0	0	0	0	0
Handling e-waste in developed and developing countries: Initiatives, practices, and consequences	1	0	1	0	0	0	0	0	0
Tribo-charging properties of waste plastic granules in process of tribo-electrostatic separation	1	0	0	0	0	0	0	0	0
Study on the recovery of gallium from phosphorus flue dust by leaching with spent sulfuric acid solution and precipitation	1	0	0	0	0	0	0	0	0

Figure 33: Most used references linked to the key word “Circular economy” at Cyprus University of Technology

No shared reference.

Co-funded by the European Union

Tables

Most used by the main institution

Element names	I158333966 Technical University of Cluj-Napoca	I4210144925 Technological University Dublin	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I31151848 Technical University of Sofia	I201787326 Riga Technical University	I163151358 Cyprus University of Technology	I107257983 Darmstadt University of Applied Sciences	sum all entities
The Circular Economy – A new sustainability paradigm?	6	0	5	4	0	0	2	0	0	17
A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems	5	0	4	1	0	0	1	0	0	11
The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context	5	1	4	1	0	0	0	0	0	11
Conceptualizing Core Aspects on Circular Economy in Cities	5	0	0	0	0	0	0	0	0	5
Circular economy indicators: What do they measure?	5	1	2	0	0	0	0	0	0	8
Conceptualizing the circular economy: An analysis of 114 definitions	5	0	5	1	1	0	2	0	0	14
The circular economy umbrella: Trends and gaps on integrating pathways	4	0	1	1	0	0	0	0	0	6
A Critical Review of EU Key Indicators for the Transition to the Circular Economy	4	0	0	0	0	0	0	0	0	4
Circular Economy: Theoretical Benchmark or Perpetual Motion Machine?	4	0	1	0	0	0	0	0	0	5
Lost in Transition? Drivers and Barriers in the Eco-innovation Road to the Circular Economy	4	0	2	1	0	0	0	0	0	7

Figure 34: Most used references linked to the key word “Circular economy” at Technical University of Cluj-Napoca

The references are the same as the UTT. One new reference is present “circular economy indicators: what do they measure?”.

Tables

Most used by the main institution

Element names	I31151848 Technical University of Sofia	I4210144925 Technological University Dublin	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I158333966 Technical University of Cluj-Napoca	I201787326 Riga Technical University	I163151358 Cyprus University of Technology	I107257983 Darmstadt University of Applied Sciences	sum all entities
Chapter 1 The zeolite scene–An overview	1	0	0	0	0	0	0	0	0	1
Thermodynamic Study of the Synthesis of Zeolites from Coal Ash and Its Use as Sorbents for Heavy Metals	1	0	0	0	0	0	0	0	0	1
Physico-chemical characteristics of European pulverized coal combustion fly ashes	1	0	0	0	0	1	0	0	0	2
Zeolite synthesis from coal fly ash for the removal of lead ions from aqueous solution	1	0	0	0	0	0	0	0	0	1
Reporting physisorption data for gas/solid systems with special reference to the determination of surface area and porosity (Recommendations 1984)	1	0	0	0	0	0	0	0	0	1
Fly ashes from coal and petroleum coke combustion: current and innovative potential applications	1	0	0	0	0	0	0	0	0	1
New perspectives for coal ash utilization: synthesis of zeolitic materials	1	0	0	0	0	0	0	0	0	1
Methods for Characterization of Composition of Fly Ashes from Coal-Fired Power Stations: A Critical Overview	1	0	0	0	0	0	0	0	0	1
Synthesis of zeolites by alkaline activation of ferro-aluminous fly ash	1	0	0	0	0	0	0	0	0	1
Magnetic zeolites: a new adsorbent for removal of metallic contaminants from water	1	0	0	0	0	0	0	0	0	1

Figure 35: Most used references linked to the key word “Circular economy” at Technical University of Sofia

No reference shared.

Co-funded by the European Union

Tables

Most used by the main institution

Element names	I186995768 University of Cassino and Southern Lazio	I4210144925 Technological University Dublin	I140494188 University of Technology of Troyes	I3123212020 Universidad Politécnica de Cartagena	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I201787326 Riga Technical University	I163151358 Cyprus University of Technology	I107257983 Darmstadt University of Applied Sciences	sum all entities
Circular Economy: The Concept and its Limitations	4	0	3	0	0	2	1	0	0	10
The Circular Economy – A new sustainability paradigm?	4	0	5	0	0	6	2	0	0	17
Circular economy as an essentially contested concept	2	0	0	0	0	3	0	0	0	5
Circular economy in Italian SMEs: A multi-method study	2	0	0	0	0	0	0	0	0	2
An integrated conceptual model to promote green policies	2	0	0	0	0	0	0	0	0	2
The circular economy	2	0	1	0	0	0	0	0	0	3
Circular economy design considerations for research and process development in the chemical sciences	2	0	0	0	0	0	0	0	0	2
Implementation of Circular Economy Business Models by Small and Medium-Sized Enterprises (SMEs): Barriers and Enablers	2	0	1	0	0	1	0	0	0	4
The Emergence of Circular Economy: A New Framing Around Prolonging Resource Productivity	2	0	3	0	0	2	0	0	0	7
Modeling unstructured decision problems – the theory of analytical hierarchies	2	0	0	0	0	0	0	0	0	2

Figure 36: Most used references linked to the key word “Circular economy” in University of Cassino and Southern Lazio

The paper “Circular economy: the concept and its limitations” is shared with UTT, TUCN and RTU.

Tables

Most used by the main institution

Element names	I4210144925 Technological University Dublin	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I201787326 Riga Technical University	I163151358 Cyprus University of Technology	I107257983 Darmstadt University of Applied Sciences	sum all entities
The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context	1	4	1	0	0	5	0	0	0	11
Reuse of refillable PET packaging: Approaches to safety and quality in soft drink processing	1	0	0	0	0	0	0	0	0	1
Evaluating effects of sewage sludge and household compost on soil physical, chemical and microbiological properties	1	0	0	0	0	0	0	0	0	1
Advancements in meat packaging	1	0	0	0	0	0	0	0	0	1
Mechanical and chemical recycling of solid plastic waste	1	0	0	0	0	0	0	0	0	1
Recycling of Polymer-Based Multilayer Packaging: A Review	1	0	0	0	0	0	0	0	0	1
Environmental impact of biodegradable food packaging when considering food waste	1	0	0	0	0	0	0	0	0	1
Closing the loop on plastic packaging materials: What is quality and how does it affect their circularity?	1	0	0	0	0	0	0	0	0	1
Food packaging in the circular economy: Overview of chemical safety aspects for commonly used materials	1	0	0	0	0	0	0	0	0	1
Environmental impacts of food waste in Europe	1	0	0	0	0	0	0	0	0	1

Figure 37: Most used references linked to the key word “Circular economy” at Technical University of Dublin

The references have already been identified in previous tables.

3.2.2 Conclusion

It seems that some references are shared in between EUt+ partners. The share of common references can be used as an entry point for discussion in between researchers from EUt+ network (see **Error! Reference source not found.**).

3.3 Key word “impact energy”

3.3.1 Results

No graph available.

Most used references linked to the key word "impact energy" at Darmstadt University of Applied Science

Tables

Most used by the main institution

Element names	I201787326 Riga Technical University	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
The Resistance of Transparencies to Bird Impact at High Speeds	1	0	0	0	0	0	0	0	0	1
Impact of an Indenter on a Large Plate	1	0	0	0	0	0	0	0	0	1
Hail Damage to Typical Aircraft Surfaces	1	0	0	0	0	0	0	0	0	1
The Impact Between a Rigid Sphere and a Thin Layer	1	0	0	0	0	0	0	0	0	1
Tissue-Level Thresholds for Axonal Damage in an Experimental Model of Central Nervous System White Matter Injury	0	0	0	1	0	0	0	0	0	1
Six Degree-of-Freedom Measurements of Human Mild Traumatic Brain Injury	0	0	0	1	0	0	0	0	0	1
The dynamics of concussive head impacts in rugby and Australian rules football	0	0	0	1	0	0	0	0	0	1
A proposed tolerance criterion for diffuse axonal injury in man	0	0	0	1	0	0	0	0	0	1
The Epidemiology and Impact of Traumatic Brain Injury	0	0	0	1	0	0	0	0	0	1
Brain Injury Prediction: Assessing the Combined Probability of Concussion Using Linear and Rotational Head Acceleration	0	0	0	1	0	0	0	0	0	1

Figure 38: Most used references linked to the key word "impact energy" at Riga Technical University

No reference is shared.

No graph available.

Most used references linked to the key word "impact energy" at Universidad Politécnica de Cartagena

No graph available.

Most used references linked to the key word "impact energy" at University of Technology of Troyes

No graph available.

Most used references linked to the key word "impact energy" at Cyprus University of Technology

No graph available.

Most used references linked to the key word "impact energy" at Technical University of Cluj-Napoca

No graph available.

Most used references linked to the key word "impact energy" at Technical University of Sofia

No graph available.

Most used references linked to the key word "impact energy" in University of Cassino and Southern Lazio

Tables

Most used by the main institution

Element names	I4210144925 Technological University Dublin	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I3123212020 Universidad Politécnica de Cartagena	I187257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
Intracranial Pressure Dynamics During Head Impact	1	0	0	0	0	0	0	0	0	1
Recent Advances in Brain Injury Research: A New Human Head Model Development and Validation	1	0	0	0	0	0	0	0	0	1
Brain tissue strains vary with head impact location: A possible explanation for increased concussion risk in struck versus striking football players	1	0	0	0	0	0	0	0	0	1
Six Degree-of-Freedom Measurements of Human Mild Traumatic Brain Injury	1	0	0	0	0	0	0	0	0	1
The dynamics of concussive head impacts in rugby and Australian rules football	1	0	0	0	0	0	0	0	0	1
A proposed tolerance criterion for diffuse axonal injury in man	1	0	0	0	0	0	0	0	0	1
The Epidemiology and Impact of Traumatic Brain Injury	1	0	0	0	0	0	0	0	0	1
Brain Injury Prediction: Assessing the Combined Probability of Concussion Using Linear and Rotational Head Acceleration	1	0	0	0	0	0	0	0	0	1
Development of a Finite Element Human Head Model Partially Validated With Thirty Five Experimental Cases	1	0	0	0	0	0	0	0	0	1
The biomechanics of concussion in unhelmeted football players in Australia: a case–control study	1	0	0	0	0	0	0	0	0	1

Figure 39: Most used references linked to the key word "impact energy" at Technical University of Dublin

No reference shared.

3.3.2 Conclusion

No reference is shared among the institutions on this theme and most of the institutions don't tackle this theme (when there is no graph available).

Co-funded by the European Union

3.4 Key word “clean energy”

3.4.1 Results

No graph available.

Most used references linked to the key word “clean energy” at Darmstadt University of Applied Science

Tables

Most used by the main institution

Element names	I201787326 Riga Technical University	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
Empiric design evaluation in urban planning	1	0	0	0	0	0	0	0	0	1
Towards Solar Urban Planning: A New Step for Better Energy Performance	1	0	0	0	0	0	0	0	0	1
Energy efficient city: A model for urban planning	1	0	0	0	0	0	0	0	0	1
SMART RURAL: a model for planning net-zero energy balance at municipal level	1	0	0	0	0	0	0	0	0	1
Evaluation in Urban Planning: Advances and Prospects	1	0	0	0	0	0	0	0	0	1
Factors impacting investments in energy efficiency and clean technologies: empirical evidence from Slovenian manufacturing firms	0	0	0	0	0	0	0	1	0	1
An energy management framework tailor-made for SMEs: Case study of a German car company	0	0	0	0	0	0	0	1	0	1
Assessing the driving factors for energy management program adoption	0	0	0	0	0	0	0	1	0	1
Energy efficiency in small and medium enterprises: Lessons learned from 280 energy audits across Europe	0	0	0	0	0	0	0	1	0	1
Drivers for energy efficiency and their effect on barriers: empirical evidence from Italian manufacturing enterprises	0	0	0	0	0	0	0	1	0	1

Figure 40: Most used references linked to the key word “clean energy” at Riga Technical University

No reference is shared.

No graph available.

Most used references linked to the key word “clean energy” at Universidad Politécnica de Cartagena

No graph available.

Most used references linked to the key word “clean energy” at University of Technology of Troyes

No graph available.

Most used references linked to the key word “clean energy” at Cyprus University of Technology

Tables

Most used by the main institution

Element names	I158333966 Technical University of Cluj-Napoca	I186995768 University of Cassino and Southern Lazio	I148494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212820 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I163151358 Cyprus University of Technology	sum all entities
Perceived barriers and policy solutions in clean energy infrastructure investment	1	0	0	0	0	0	0	0	0	1
Drivers for energy efficiency and their effect on barriers: empirical evidence from Italian manufacturing enterprises	1	0	0	0	0	0	0	0	0	1
An overview of hydrogen production technologies	1	0	0	0	0	0	0	0	0	1
Barriers and motivators to the adoption of energy savings measures for small- and medium-sized enterprises (SMEs): the case of the ClimateSmart Business Cluster program	1	0	0	0	0	0	0	0	0	1
Quantifying the extended energy efficiency gap-evidence from Swedish electricity-intensive industries	1	0	0	0	0	0	0	0	0	1
Adoption of energy-efficiency measures in SMEs-An empirical analysis based on energy audit data from Germany	1	0	0	0	0	0	0	0	0	1
Industrial energy efficiency: the need for investment decision support from a manager perspective	1	0	0	0	0	0	0	0	0	1
Dealing with barriers to energy efficiency and SMEs: Some empirical evidences	1	0	0	0	0	0	0	0	0	1
Barriers to increasing energy efficiency: evidence from small-and medium-sized enterprises in China	1	0	0	0	0	0	0	0	0	1
Make it strategic! Financial investment logic is not enough	1	0	0	0	0	0	0	0	0	1

Figure 41: Most used references linked to the key word “clean energy” at Technical University of Cluj-Napoca

No reference is shared.

Tables

Most used by the main institution

Element names	I31151848 Technical University of Sofia	I186995768 University of Cassino and Southern Lazio	I148494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212820 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
The Flexibility Workout: Managing Variable Resources and Assessing the Need for Power System Modification	1	0	0	0	0	0	0	0	0	1
Tehachapi Wind Energy Storage Project: Description of operational uses, system components, and testing plans	1	0	0	0	0	0	0	0	0	1
Energy storage for the electricity grid : benefits and market potential assessment guide : a study for the DOE Energy Storage Systems Program.	1	0	0	0	0	0	0	0	0	1
Stochastic Security-Constrained Unit Commitment	1	0	0	0	0	0	0	0	0	1
Transmission, Variable Generation, and Power System Flexibility	1	0	0	0	0	0	0	0	0	1
PJM Integrates Energy Storage: Their Technologies and Wholesale Products	1	0	0	0	0	0	0	0	0	1
Analyzing operational flexibility of electric power systems	1	0	0	0	0	0	0	0	0	1
Unit Commitment for Systems With Significant Wind Penetration	1	0	0	0	0	0	0	0	0	1
A novel approach for barriers to industrial energy efficiency	0	0	0	0	0	0	0	1	0	1
Assessing the driving factors for energy management program adoption	0	0	0	0	0	0	0	1	0	1

Figure 42: Most used references linked to the key word “clean energy” at Technical University of Sofia

No reference is shared.

No graph available.

Most used references linked to the key word “clean energy” in University of Cassino and Southern Lazio

No graph available.

Most used references linked to the key word “clean energy” at Technical University of Dublin

3.4.2 Conclusion

No reference is shared among the institutions on this theme and most of the institutions don’t tackle this theme.

Co-funded by the European Union

3.5 Key word “solar energy”

3.5.1 Results

No graph available.

Most used references linked to the key word “solar energy” at Darmstadt University of Applied Science

Tables

Most used by the main institution

Element names	I201787326 Riga Technical University	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
German central solar heating plants with seasonal heat storage	5	0	0	0	0	0	0	1	0	6
4th Generation District Heating (4GDH)	5	0	0	0	0	0	0	1	0	6
Trends of European research and development in district heating technologies	4	0	0	0	0	0	0	0	0	4
Solar energy use in district heating systems. A case study in Latvia	4	0	0	0	0	0	0	0	0	4
Optimal integration of solar energy in a district heating network	4	0	0	0	0	0	0	0	0	4
Review on thermal energy storage with phase change materials and applications	3	0	0	0	0	0	1	1	2	7
Solar facade module for nearly zero energy building	3	0	0	0	0	0	0	0	0	3
System dynamics model analysis of pathway to 4th generation district heating in Latvia	3	0	0	0	0	0	0	0	0	3
Comparison of distributed and centralised integration of solar heat in a district heating system	3	0	0	0	0	0	0	0	0	3
Active building envelope systems toward renewable and sustainable energy	3	0	0	0	0	0	0	1	0	4

Figure 43: Most used references linked to the key word “solar energy” at Riga Technical University

The paper “review on thermal energy storage with phase change materials and applications” is shared by different universities (even if it is not used widely). The references are focused on solar heating in buildings (and 4th generation heating systems).

Tables

Most used by the main institution

Element names	I3123212020 Universidad Politécnica de Cartagena	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
A numerical study of solar chimney for natural ventilation of buildings with heat recovery	5	0	0	0	0	0	0	0	0	5
Experimental approach to the thermal response of passive systems	5	0	0	0	0	0	0	0	0	5
Air flow and thermal efficiency characteristics in solar chimneys and Trombe Walls	5	0	0	0	0	0	0	0	0	5
A study of solar chimney assisted wind tower system for natural ventilation in buildings	5	0	0	0	0	0	0	0	0	5
An experimental investigation of a solar chimney model with uniform wall heat flux	5	0	0	0	0	0	0	0	0	5
Design considerations for naturally ventilated buildings	4	0	0	0	0	0	0	0	0	4
Optimal geometry of L and C-shaped channels for maximum heat transfer rate in natural convection	4	0	0	0	0	0	0	0	0	4
Enhancement of natural ventilation in buildings using a thermal chimney	4	0	0	0	0	0	0	0	0	4
Numerical study on mixed buoyancy-wind driving induced flow in a solar chimney for building ventilation	4	0	0	0	0	0	0	0	0	4
Effect of wind and buoyancy interaction on single-sided ventilation in a building	3	0	0	0	0	0	0	0	0	3

Figure 44: Most used references linked to the key word “solar energy” at Universidad Politécnica de Cartagena

Co-funded by the European Union

A lot of references are shared among UPCT, especially on passive systems and natural ventilation in solar chimney. Those references seem specific to UPCT as they are not shared with the other universities.

No graph available.

Most used references linked to the key word "solar energy" at University of Technology of Troyes

Tables

Most used by the main institution

Element names	I163151358 Cyprus University of Technology	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	sum all entities
Solar thermal collectors and applications	6	0	0	0	0	0	1	0	0	7
Applications of artificial neural-networks for energy systems	4	0	0	0	0	0	0	1	0	5
Artificial neural networks in renewable energy systems applications: a review	4	0	0	0	0	0	0	0	1	5
The architectural integration of active solar systems. Building applications in the Eastern Mediterranean region	3	0	0	0	0	0	0	0	0	3
Thermal characteristics of a building-integrated dual-function solar collector in water heating mode with natural circulation	3	0	0	0	0	0	0	0	0	3
Experimental study of a building-integrated solar air heating system in cold climate of China	3	0	0	0	0	0	0	0	0	3
Retrieving Cloud Characteristics from Ground-Based Daytime Color All-Sky Images	3	0	0	0	0	0	0	0	0	3
Hybrid PV and solar-thermal systems for domestic heat and power provision in the UK: Techno-economic considerations	3	0	0	0	0	0	1	0	0	4
Automatic cloud classification of whole sky images	3	0	0	0	0	0	0	0	0	3
The thermal and electrical yield of a PV-thermal collector	3	0	0	0	0	0	0	0	0	3

Figure 45: Most used references linked to the key word "solar energy" at Cyprus University of Technology

Tables

Most used by the main institution

Element names	I158333966 Technical University of Cluj-Napoca	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I163151358 Cyprus University of Technology	sum all entities
Potential of Solar ORC and PV Systems to Provide Electricity under Romanian Climatic Conditions	6	0	0	0	0	0	0	0	0	6
Baseline Evaluation of Potential to Use Solar Radiation in Air Conditioning Applications	5	0	0	0	0	0	0	0	0	5
Preliminary Results on Design and Implementation of a Solar Radiation Monitoring System	5	0	0	0	0	0	0	0	0	5
Effect of wind on flow distribution in unglazed transpired-plate collectors	4	0	0	0	0	0	0	0	0	4
Heat-exchange relations for unglazed transpired solar collectors with circular holes on a square or triangular pitch	4	0	0	0	0	0	0	0	0	4
Mathematical modeling and thermal performance analysis of unglazed transpired solar collectors	4	0	0	0	0	0	0	0	0	4
On the temperature dependence of photovoltaic module electrical performance: A review of efficiency/power correlations	4	0	0	0	0	0	0	0	1	5
Simulation and optimization of stand-alone hybrid renewable energy systems	3	0	0	0	0	0	0	0	0	3
Modeling, validation and time-dependent simulation of the first large passive building in Romania	3	0	0	0	0	0	0	0	0	3
Orientation of Facades for Active Solar Energy Applications in Different Climatic Conditions	3	0	0	0	0	0	0	0	0	3

Figure 46: Most used references linked to the key word "solar energy" at Technical University of Cluj-Napoca

Only 1 reference shared.

Some references are focused on air conditioning. Others are on solar energy, with a technical perspective.

Co-funded by the European Union

Tables

Most used by the main institution

Element names	I31151848 Technical University of Sofia	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
Technology readiness assessment of Small Modular Reactor (SMR) designs	3	0	0	0	0	0	0	0	0	3
The future of the nuclear industry reconsidered: Risks, uncertainties, and continued promise	3	0	0	0	0	0	0	0	0	3
Concentrating solar power hybrid plants – Enabling cost effective synergies	3	0	0	0	0	0	0	0	0	3
Nuclear–renewable hybrid energy systems: Opportunities, interconnections, and needs	3	0	0	0	0	0	0	0	0	3
Exergy analysis of an integrated solar combined cycle system	3	0	0	0	0	0	0	0	1	4
Instantaneous performance of the first Integrated Solar Combined Cycle System in Algeria	3	0	0	0	0	0	0	0	0	3
Combining the nuclear power plant steam cycle with gas turbines	3	0	0	0	0	0	0	0	0	3
Benefits and cost implications from integrating small flexible nuclear reactors with off-shore wind farms in a virtual power plant	3	0	0	0	0	0	0	0	0	3
Economic analysis of integrated solar combined cycle power plants	3	0	0	0	0	0	0	0	0	3
Hybrid systems to address seasonal mismatches between electricity production and demand in nuclear renewable electrical grids	3	0	0	0	0	0	0	0	0	3

Figure 47: Most used references linked to the key word “solar energy” at Technical University of Sofia

Only 1 reference shared.

Tables

Most used by the main institution

Element names	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
A novel polygeneration system integrating photovoltaic/thermal collectors, solar assisted heat pump, adsorption chiller and electrical energy storage: Dynamic and energy–economic analysis	3	0	0	0	0	0	0	0	1	4
Additives in transparent glassy polymers: Concentration profiles obtained by solvent diffusion technique	3	0	0	0	0	0	0	0	0	3
A review on global solar energy policy	2	0	0	0	0	0	0	0	0	2
Progress and latest developments of evacuated tube solar collectors	2	0	0	0	0	0	0	0	0	2
Bi-fluid photovoltaic/thermal (PV/T) solar collector: Experimental validation of a 2-D theoretical model	2	0	0	0	0	0	0	0	0	2
A novel solar-assisted heat pump driven by photovoltaic/thermal collectors: Dynamic simulation and thermoeconomic optimization	2	0	0	0	0	0	0	0	1	3
Solar-powered single-and double-effect directly air-cooled LiBr-H2O absorption prototype built as a single unit	2	0	0	0	0	0	0	0	0	2
Coupling efficiency of non-uniform optical fibers for solar energy applications	2	0	0	0	0	0	0	0	0	2
A review of solar collectors and thermal energy storage in solar thermal applications	2	0	0	0	0	1	0	0	1	4
Thermoeconomic optimization of a solar-assisted heat pump based on transient simulations and computer Design of Experiments	2	0	0	0	0	0	0	0	0	2

Figure 48: Most used references linked to the key word “solar energy” in University of Cassino and Southern Lazio

UCSL and CUT share 3 references in common.

Tables

Most used by the main institution

Element names	I4210144925 Technological University Dublin	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
Technological assessment of different solar–biomass systems for hybrid power generation in Europe	3	0	0	0	0	0	0	0	0	3
A Review on Nanofluids: Fabrication, Stability, and Thermophysical Properties	2	0	0	0	0	0	0	0	0	2
A quasi-dynamic simulation model for direct steam generation in parabolic troughs using TRNSYS	2	0	0	0	0	0	0	0	1	3
Corrosive effects of salt hydrate phase change materials used with aluminium and copper	2	0	0	0	0	0	0	0	0	2
Investigation of CoSO4-based Ag nanofluids as spectral beam splitters for hybrid PV/T applications	2	0	0	0	0	0	0	0	1	3
Life Cycle Assessment Applied to Electricity Generation from Renewable Biomass	2	0	0	0	0	0	0	0	0	2
Spectral characterization of spectrally selective liquid absorption filters and exploring their effects on concentrator solar cells	2	0	0	0	0	0	0	0	0	2
Economic implications of thermal energy storage for concentrated solar thermal power	2	0	0	0	0	0	0	0	0	2
Use of Nanofluids in Solar PV/Thermal Systems	2	0	0	0	0	0	0	0	0	2
Development of poly-vinyl alcohol stabilized silver nanofluids for solar thermal applications	2	0	0	0	0	0	0	0	0	2

Figure 49: Most used references linked to the key word “solar energy” at Technical University of Dublin

Co-funded by the European Union

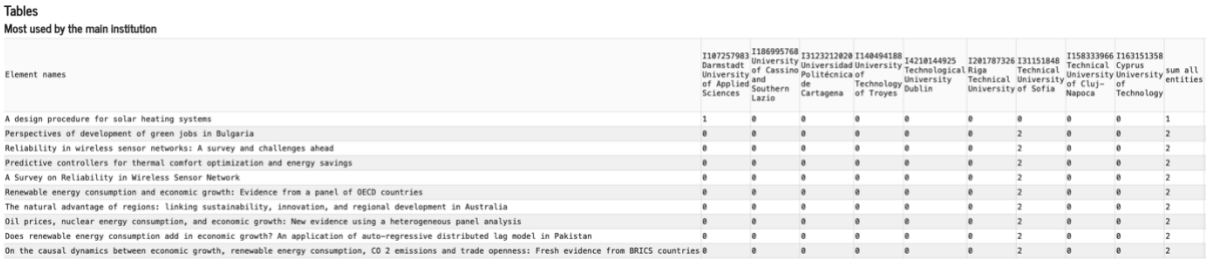
The references are focused on technical aspects of solar systems (materials, nanomaterials). Also, some references are linked to the assessment of solar and biomass technologies.

3.5.2 Conclusion

It seems that universities have a focus on *solar energy*. Nonetheless, universities don't share any references. UPCT is focused on passive systems, TUDublin is focued on solar energy and biomass, and on nano-fluids in energetical systems.

3.6 Key word "efficient energy use"

3.6.1 Results



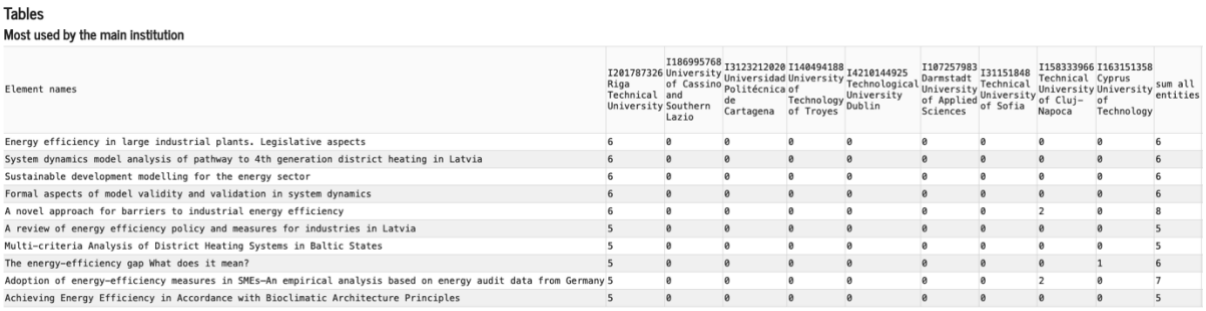
Tables

Most used by the main institution

Element names	I107257983 Darmstadt University of Applied Sciences	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
A design procedure for solar heating systems	1	0	0	0	0	0	0	0	0	1
Perspectives of development of green jobs in Bulgaria	0	0	0	0	0	0	2	0	0	2
Reliability in wireless sensor networks: A survey and challenges ahead	0	0	0	0	0	0	2	0	0	2
Predictive controllers for thermal comfort optimization and energy savings	0	0	0	0	0	0	2	0	0	2
A Survey on Reliability in Wireless Sensor Network	0	0	0	0	0	0	2	0	0	2
Renewable energy consumption and economic growth: Evidence from a panel of OECD countries	0	0	0	0	0	0	2	0	0	2
The natural advantage of regions: linking sustainability, innovation, and regional development in Australia	0	0	0	0	0	0	2	0	0	2
Oil prices, nuclear energy consumption, and economic growth: New evidence using a heterogeneous panel analysis	0	0	0	0	0	0	2	0	0	2
Does renewable energy consumption add in economic growth? An application of auto-regressive distributed lag model in Pakistan	0	0	0	0	0	0	2	0	0	2
On the causal dynamics between economic growth, renewable energy consumption, CO 2 emissions and trade openness: Fresh evidence from BRICS countries	0	0	0	0	0	0	2	0	0	2

Figure 50: Most used references linked to the key word "efficient energy use" at Darmstadt University of Applied Science

There are no references shared in h_da on this theme.



Tables

Most used by the main institution

Element names	I201787326 Riga Technical University	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I107257983 Darmstadt University of Applied Sciences	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
Energy efficiency in large industrial plants. Legislative aspects	6	0	0	0	0	0	0	0	0	6
System dynamics model analysis of pathway to 4th generation district heating in Latvia	6	0	0	0	0	0	0	0	0	6
Sustainable development modelling for the energy sector	6	0	0	0	0	0	0	0	0	6
Formal aspects of model validity and validation in system dynamics	6	0	0	0	0	0	0	0	0	6
A novel approach for barriers to industrial energy efficiency	6	0	0	0	0	0	0	2	0	8
A review of energy efficiency policy and measures for industries in Latvia	5	0	0	0	0	0	0	0	0	5
Multi-criteria Analysis of District Heating Systems in Baltic States	5	0	0	0	0	0	0	0	0	5
The energy-efficiency gap What does it mean?	5	0	0	0	0	0	0	0	1	6
Adoption of energy-efficiency measures in SMEs—An empirical analysis based on energy audit data from Germany	5	0	0	0	0	0	0	2	0	7
Achieving Energy Efficiency in Accordance with Bioclimatic Architecture Principles	5	0	0	0	0	0	0	0	0	5

Figure 51: Most used references linked to the key word "efficient energy use" at Riga Technical University

The ten first references on this table are shared among 5 / 6 papers from RTU researchers. So researchers do share some references on this topic at RTU. But those references are not shared among other partners.

Tables

Most used by the main institution

Element names	I3123212020 Universidad Politécnica de Cartagena	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
Analysis of a solar assisted heat pump system for indoor swimming pool water and space heating	2	1	0	0	0	0	0	0	0	3
IEEE 802.15.5 WPAN mesh standard-low rate part: Meshing the wireless sensor networks	2	0	0	0	0	0	0	0	0	2
Energy analysis of swimming pools for sports activities: cost effective solutions for efficiency improvement	2	0	0	0	0	0	0	0	0	2
Emerging standards for wireless mesh technology	2	0	0	0	0	0	0	0	0	2
Performance analysis of IEEE 802.15.4 non-beacon mode with the unslotted CSMA/CA	2	0	0	0	0	0	0	0	0	2
Passive Houses for different climate zones	2	0	0	0	0	0	0	0	1	3
Wireless mesh networks: a survey	2	0	0	0	0	0	0	0	0	2
Energy demand and environmental impact of various construction scenarios of an office building in Morocco	2	0	0	0	0	0	0	0	0	2
Comparison of three climatic zoning methodologies for building energy efficiency applications	2	0	0	0	0	0	0	0	0	2
Analysis of an open-air swimming pool solar heating system by using an experimentally validated TRNSYS model	2	0	0	0	0	0	0	0	0	2

Figure 52: Most used references linked to the key word “efficient energy use” at Universidad Politécnica de Cartagena

No real references shared on this topic in UPCT.

Tables

Most used by the main institution

Element names	I140494188 University of Technology of Troyes	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I4210144925 Technological University Dublin	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
Equivalent machine method for approximate evaluation of buffered unreliable production lines	3	0	0	0	0	0	0	0	0	3
The state of the art on buffer allocation problem: a comprehensive survey	3	0	0	0	0	0	0	0	0	3
Cell Zooming for Power Efficient Base Station Operation	3	0	0	0	0	0	0	0	0	3
Modeling, analysis, and improvement of integrated productivity and energy consumption in a serial manufacturing system	3	0	0	0	0	0	0	0	0	3
Energy efficiency improvement through pico base stations for a green field operator	3	0	0	0	0	0	0	0	0	3
The buffer allocation problem in production lines: Formulations, solution methods, and instances	3	0	0	0	0	0	0	0	0	3
Reducing energy consumption in serial production lines with Bernoulli reliability machines	3	0	0	0	0	0	0	0	0	3
Improving energy efficiency in Bernoulli serial lines: an integrated model	3	0	0	0	0	0	0	0	0	3
Optimal Control of Wake Up Mechanisms of Femtocells in Heterogeneous Networks	3	0	1	0	0	0	0	0	0	4
Energy Management-as-a-Service Over Fog Computing Platform	2	0	0	0	0	0	0	0	0	2

Figure 53: Most used references linked to the key word “efficient energy use” at University of Technology of Troyes

Some references are a bit shared but not at a high level (>3) at the UTT. And none of those references are shared among the other partners.

Co-funded by the European Union

Tables

Most used by the main institution

Element names	I163151358 Cyprus University of Technology	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	sum all entities
Energy retrofitting of a typical old Danish multi-family building to a "nearly-zero" energy building based on experiences from a test apartment	3	0	0	0	0	0	0	0	0	3
Refurbishment of Residential Buildings: A Design Approach to Energy-Efficiency Upgrades	3	0	0	0	0	0	0	0	0	3
Zero Energy Building – A review of definitions and calculation methodologies	3	0	0	1	0	0	0	0	0	4
Exploring drivers of energy demand in Cyprus – Scenarios and policy options	2	0	0	0	0	0	0	0	0	2
A review on buildings energy consumption information	2	0	0	0	1	0	2	0	1	6
The characteristics and the energy behaviour of the residential building stock of Cyprus in view of Directive 2002/91/EC	2	0	0	0	0	0	0	0	0	2
Estimating the global waste heat potential	2	0	0	0	0	0	0	0	0	2
Comparison between measured and calculated energy performance for dwellings in a summer dominant environment	2	0	0	0	0	0	0	0	0	2
From net energy to zero energy buildings: Defining life cycle zero energy buildings (LC-ZEB)	2	0	0	0	0	0	0	0	1	3
The building envelope of Mediterranean houses: Optimization of mass and insulation	2	0	0	0	0	0	0	0	0	2

Figure 54: Most used references linked to the key word "efficient energy use" at Cyprus University of Technology

Some references are a bit shared but not at a high level (>3) at the CUT. And 2 references are shared with 1 or 2 other partners. The paper "A review on buildings energy consumption information" is shared among 4 partners (CUT, TUDublin, RTU, TUCN).

Tables

Most used by the main institution

Element names	I158333966 Technical University of Cluj-Napoca	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I163151358 Cyprus University of Technology	sum all entities
Design and Operation of Constructions: A Healthy Living Environment-Parametric Studies and New Solutions	3	0	0	0	0	0	0	0	0	3
Integrated heat, air and moisture modeling toolkit in Matlab	3	0	0	0	0	0	0	0	0	3
Blockchain Based Decentralized Management of Demand Response Programs in Smart Energy Grids	3	0	0	0	0	0	0	0	0	3
Sick Building Syndrome	2	0	0	0	0	0	0	0	0	2
Sick building syndrome: An overview to raise awareness	2	0	0	0	0	0	0	0	0	2
Picking up the Pieces: Self-Healing in reconfigurable networks	2	0	0	0	0	0	0	0	0	2
Green Retrofitting Skyscrapers: A Review	2	0	0	0	0	0	0	0	0	2
Airborne molds and bacteria, microbial volatile organic compounds (MVOC), plasticizers and formaldehyde in dwellings in three North European cities in relation to sick building syndrome (SBS)	2	0	0	0	0	0	0	0	0	2
Demand Side Management: Demand Response, Intelligent Energy Systems, and Smart Loads	2	0	0	0	0	0	0	0	0	2
Economics of residential energy arbitrage in california using a PV system with directly connected energy storage	2	0	0	0	0	0	0	0	0	2

Figure 55: Most used references linked to the key word "efficient energy use" at Technical University of Cluj-Napoca

No references used by UTCN researchers are shared with other partners.

Tables

Most used by the main institution

Element names	I31151848 Technical University of Sofia	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
Study of Mediated Consumption Effect of Renewable Energy on Economic Growth of OECD Countries	2	0	0	0	0	0	0	0	0	2
Oil prices, nuclear energy consumption, and economic growth: New evidence using a heterogeneous panel analysis	2	0	0	0	0	0	0	0	0	2
Nuclear energy, renewable energy, CO 2 emissions, and economic growth for nine developed countries: Evidence from panel Granger causality tests	2	0	0	0	0	0	0	0	0	2
Investigating Causal Relations by Econometric Models and Cross-spectral Methods	2	0	0	0	0	0	0	0	0	2
Perspectives of development of green jobs in Bulgaria	2	0	0	0	0	0	0	0	0	2
Bounds test approach to cointegration and causality between nuclear energy consumption and economic growth in India	2	0	0	0	0	0	0	0	0	2
Causal relationship between nuclear energy consumption and economic growth: A multi-country analysis	2	0	0	0	0	0	0	0	0	2
On the causal dynamics between economic growth, renewable energy consumption, CO 2 emissions and trade openness: Fresh evidence from BRICS countries	2	0	0	0	0	0	0	0	0	2
Does renewable energy consumption add in economic growth? An application of auto-regressive distributed lag model in Pakistan	2	0	0	0	0	0	0	0	0	2
The natural advantage of regions: linking sustainability, innovation, and regional development in Australia	2	0	0	0	0	0	0	0	0	2

Figure 56: Most used references linked to the key word "efficient energy use" at Technical University of Sofia

Co-funded by the European Union

No real shared references at TUS. None of the references are shared with other partners.

Tables

Most used by the main institution

Element names	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
Energy Efficiency in Wireless Networks via Fractional Programming Theory	19	0	0	0	0	0	0	0	0	19
On Nonlinear Fractional Programming	15	0	0	0	0	0	0	0	0	15
Energy-Efficient Power Control: A Look at 5G Wireless Technologies	14	0	0	0	0	0	0	0	0	14
Framework for Link-Level Energy Efficiency Optimization with Informed Transmitter	14	0	0	0	0	0	0	0	0	14
Distributed Interference-Aware Energy-Efficient Power Optimization	14	0	0	0	0	0	0	0	0	14
Energy-Aware Competitive Power Control in Relay-Assisted Interference Wireless Networks	14	0	0	0	0	0	0	0	0	14
A Survey of Energy-Efficient Techniques for 5G Networks and Challenges Ahead	13	0	0	0	0	0	0	0	0	13
Power control for wireless data	13	0	0	0	0	0	0	0	0	13
A framework for uplink power control in cellular radio systems	13	0	0	0	0	0	0	0	0	13
Pricing and power control in a multicell wireless data network	12	0	0	0	0	0	0	0	0	12

Figure 57: Most used references linked to the key word “efficient energy use” in University of Cassino and Southern Lazio

There is a strong share of references within UCSL on the theme of efficient energy use. None of these references are shared among other partners.

Tables

Most used by the main institution

Element names	I4210144925 Technological University Dublin	I186995768 University of Cassino and Southern Lazio	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
A review of benchmarking, rating and labelling concepts within the framework of building energy certification schemes	2	0	0	0	0	0	0	1	0	3
State of the stock-What do we know about existing buildings and their future prospects?	2	0	0	0	0	0	0	0	0	2
Quantifying the severity of fuel poverty, its relationship with poor housing and reasons for non-investment in energy-saving measures in Ireland	2	0	0	0	0	0	0	0	0	2
State of the Irish housing stock-Modelling the heat losses of Ireland's existing detached rural housing stock & estimating the benefit of thermal retrofit measures on this stock	2	0	0	0	0	0	0	0	0	2
Improving policy instruments to better tap into homeowner refurbishment potential: Lessons learned from a case study in Germany	2	0	0	0	0	0	0	0	0	2
Altering existing buildings in the UK	2	0	0	0	0	0	0	0	0	2
Towards an energy efficient European housing stock: Monitoring, mapping and modelling retrofitting processes	2	0	0	0	0	0	0	0	0	2
The statistical relevance and effect of assuming pessimistic default overall thermal transmittance coefficients on dwelling energy performance certification quality in Ireland	2	0	0	0	0	0	0	0	0	2
Energy-led domestic retrofit: impact of the intervention sequence	2	0	0	0	0	0	0	0	0	2
Carbon reduction in existing buildings: a transdisciplinary approach	2	0	0	0	0	0	0	0	0	2

Figure 58: Most used references linked to the key word “efficient energy use” at Technical University of Dublin

No shared references.

3.6.2 Conclusion

There is only 1 partner (UCSL) which has a strong community on efficient energy use. The other partners share little references among their own community and nearly no reference is shared among partners.

Co-funded by the European Union

3.7 Key word “sustainable transport”

3.7.1 Results

Tables

Most used by the main institution

Element names	I107257983 Darmstadt University of Applied Sciences	I140494188 University of Technology of Troyes	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I186995768 University of Cassino and Southern Lazio	I4210144925 Technological University Dublin	I163151358 Cyprus University of Technology	I3123212020 Universidad Politécnica de Cartagena	sum all entities
Carbon footprint mitigation on vacation: A norm activation model	1	0	0	0	0	0	0	0	0	1
Reflections on Past Behavior: A Self-Report Index of Habit Strength¹	1	0	0	0	0	0	0	0	0	1
The Relative Importance of Social and Personal Norms in Explaining Intentions to Choose Eco-Friendly Travel Options	1	0	0	0	0	0	0	0	0	1
Volume and GHG emissions of long-distance travelling by Western Europeans	1	0	0	0	0	0	0	0	0	1
Mode use in long-distance travel	1	0	0	0	0	0	0	0	0	1
Psychological, sociodemographic, and infrastructural factors as determinants of ecological impact caused by mobility behavior	1	0	0	0	0	0	0	0	0	1
Troublesome Leisure Travel	1	0	0	0	0	0	0	0	0	1
Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour	1	0	0	0	0	0	0	0	0	1
Structural Modeling of Car Use on the Way to the University in Different Settings: Interplay of Norms, Habits, Situational Restraints, and Perceived Behavioral Control	1	0	0	0	0	0	0	0	0	1
Exploring people's viewpoints on air travel and climate change: understanding inconsistencies	1	0	0	0	0	0	0	0	0	1

Figure 59: Most used references linked to the key word “sustainable transport” at Darmstadt University of Applied Science

No shared references.

Tables

Most used by the main institution

Element names	I201787326 Riga Technical University	I140494188 University of Technology of Troyes	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I186995768 University of Cassino and Southern Lazio	I4210144925 Technological University Dublin	I163151358 Cyprus University of Technology	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	sum all entities
The "Ins and Outs" of APCs: An Overview of Automatic Passenger Counters	2	0	0	0	0	0	0	0	0	2
The new approach for passenger counting in public transport system	1	0	0	0	0	0	0	0	0	1
The technology life cycle: Conceptualization and managerial implications	1	0	0	0	0	0	0	0	0	1
Insight Maker: A general-purpose tool for web-based modeling & simulation	1	0	0	0	0	0	0	0	0	1
User Acceptance of Information Technology: Toward a Unified View	1	0	0	0	0	0	0	0	0	1
Technology Acceptance Model 3 and a Research Agenda on Interventions	1	0	0	0	0	0	0	0	0	1
Service-oriented middleware for the Future Internet: state of the art and research directions	1	0	0	0	0	0	0	0	0	1
The FUPOL Policy Lifecycle	1	0	0	0	0	0	0	0	0	1
Intelligence Enhancing of Dual Use Bicycle Routes Designing and Planning System Simulator	1	0	0	0	0	0	0	0	0	1
Technologies Sustainability Modeling	1	0	0	0	0	0	0	0	0	1

Figure 60: Most used references linked to the key word “sustainable transport” at Riga Technical University

No shared references.

Co-funded by the European Union

Tables

Most used by the main institution

Element names	I3123212020 Universidad Politécnica de Cartagena	I140494188 University of Technology of Troyes	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I186995768 University of Cassino and Southern Lazio	I4210144925 Technological University Dublin	I163151358 Cyprus University of Technology	I107257983 Darmstadt University of Applied Sciences	sum all entities
The sustainable mobility paradigm	2	0	0	0	0	0	0	0	0	2
Designing, planning, and managing resilient cities: A conceptual framework	1	0	0	0	0	0	0	0	0	1
How brownfield sites kill places and people: an examination of neighborhood housing values, foreclosures, and lifespan	1	0	0	0	0	0	0	0	0	1
Combined vehicle routing and scheduling with temporal precedence and synchronization constraints	1	0	0	0	0	0	0	0	0	1
A Branch and Price Algorithm for the Combined Vehicle Routing and Scheduling Problem With Synchronization Constraints	1	0	0	0	0	0	0	0	0	1
Daily scheduling of home health care services using time-dependent public transport	1	0	0	0	0	0	0	0	0	1
Designing the Walkable City	1	0	0	0	0	0	0	0	0	1
A methodology for cellular manufacturing design	1	0	0	0	0	0	0	0	0	1
The Home Care Crew Scheduling Problem: Preference-based visit clustering and temporal dependencies	1	0	0	0	0	0	0	0	0	1
Laps Care-an operational system for staff planning of home care	1	0	0	0	0	0	0	0	0	1

Figure 61: Most used references linked to the key word “sustainable transport” at Universidad Politécnica de Cartagena

No shared references.

No graph available.

Most used references linked to the key word “sustainable transport” at University of Technology of Troyes

Tables

Most used by the main institution

Element names	I163151358 Cyprus University of Technology	I140494188 University of Technology of Troyes	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I186995768 University of Cassino and Southern Lazio	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	sum all entities
The costs and benefits of sulphur reduction measures: Sulphur scrubbers versus marine gas oil	1	0	0	0	0	0	0	0	0	1
The Impact of Autonomous Vehicles on Cities: A Review	1	0	0	0	0	0	0	0	0	1
Development of a decision support tool for the assessment of biofuels	1	0	0	0	0	0	0	0	0	1
Evaluation of cold ironing and speed reduction policies to reduce ship emissions near and at ports	1	0	0	0	0	0	0	0	0	1
Slow steaming impacts on ocean carriers and shippers	1	0	0	0	0	0	0	0	0	1
Modelling modal choice effects of regulation on low-sulphur marine fuels in Northern Europe	1	0	0	0	0	0	0	0	0	1
Performance measurement models in facility management: a comparative study	1	0	0	0	0	0	0	0	0	1
Management's Perception of Key Performance Indicators for Construction	1	0	0	0	0	0	0	0	0	1
The Time Factor in Liner Shipping Services	1	0	0	0	0	0	0	0	0	1
Mortality from Ship Emissions: A Global Assessment	1	0	0	0	0	0	0	0	0	1

Figure 62: Most used references linked to the key word “sustainable transport” at Cyprus University of Technology

No shared references.

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Tables

Most used by the main institution

Element names	I158333966 Technical University of Cluj-Napoca	I140494188 University of Technology of Troyes	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I186995768 University of Cassino and Southern Lazio	I4210144925 Technological University Dublin	I163151358 Cyprus University of Technology	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	sum all entities
Success and failures in urban transport planning in Europe–understanding the transport system	1	0	0	0	0	0	0	0	0	1
Commuting behavior in emerging urban areas: Findings of a revealed-preferences and stated-intentions survey in Cluj-Napoca, Romania	1	0	0	0	0	0	0	0	0	1
An investigation on the performances of mode shift models in transit ridership forecasting	1	0	0	0	0	0	0	0	0	1
Ballasted Track versus Ballastless Track	1	0	0	0	0	0	0	0	0	1
A methodology for evaluating environmental impacts of railway freight transportation policies	1	0	0	0	0	0	0	0	0	1
Governance of competition and performance in European railways: An analysis of five cases	1	0	0	0	0	0	0	0	0	1
Emissions of particulate matters from railways – Emission factors and condition monitoring	1	0	0	0	0	0	0	0	0	1
Analysis on Public's Response Toward Bus Reform Policy in Indonesia Considering Latent Variables	1	0	0	0	0	0	0	0	0	1
Nexus of the Load Bearing Capacity of Rails and the Stiffness of the Optimized Sleepers	1	0	0	0	0	0	0	0	0	1
Recursive bivariate response models of the ex-ante intentions to link perceived acceptability among charge and refund options for alternative road pricing schemes	1	0	0	0	0	0	0	0	0	1

Figure 63: Most used references linked to the key word “sustainable transport” at Technical University of Cluj-Napoca

No shared references.

Tables

Most used by the main institution

Element names	I31151848 Technical University of Sofia	I140494188 University of Technology of Troyes	I201787326 Riga Technical University	I158333966 Technical University of Cluj-Napoca	I186995768 University of Cassino and Southern Lazio	I4210144925 Technological University Dublin	I163151358 Cyprus University of Technology	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	sum all entities
Evaluation Tools to Support Decision-Making Process Related to European Corridors	1	0	0	0	0	0	0	0	0	1
How to make modal shift from road to rail possible in the European transport market, as aspired to in the EU Transport White Paper 2011	1	0	0	0	0	0	0	0	0	1
Intermodal connectivity in Europe, an empirical exploration	1	0	0	0	0	0	0	0	0	1
Study on the Implementation of the TEN-T Regulation – The Netherlands Case	1	0	0	0	0	0	0	0	0	1
Formal And Informal Macro-Regional Transport Clusters As A Primary Step In The Design And Implementation Of Cluster-Based Strategies	1	0	0	0	0	0	0	0	0	1
Organisation of railway freight transport: case study CIM/SMGS between Slovakia and Ukraine	1	0	0	0	0	0	0	0	0	1
A Strategy for Using Multicriteria Analysis in Decision-Making	1	0	0	0	0	0	0	0	0	1
Importance of TEN-T Corridors in the Development of Infrastructure Example of Visegrad Group Countries	1	0	0	0	0	0	0	0	0	1
Governing inland ports: a multi-dimensional approach to addressing inland port-city challenges in European transport corridors	1	0	0	0	0	0	0	0	0	1
Analytic Network Process, Interactive Maps and Strategic Assessment: The Evaluation of Corridor24 Alternative Development Strategies	1	0	0	0	0	0	0	0	0	1

Figure 64: Most used references linked to the key word “sustainable transport” at Technical University of Sofia

No shared references.

Tables

Most used by the main institution

Element names	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I4210144925 Technological University Dublin	I163151358 Cyprus University of Technology	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	sum all entities
	1	0	0	0	0	0	0	0	0	1
A continuum theory for the flow of pedestrians	1	0	0	0	0	0	0	0	0	1
Natural movement: or, configuration and attraction in urban pedestrian movement	1	0	0	0	0	0	0	0	0	1
Modeling and simulation of pedestrian traffic flow	1	0	0	0	0	0	0	0	0	1
The 3Ds+R: Quantifying land use and urban form correlates of walking	1	0	0	0	0	0	0	0	0	1
Scaling and universality in city space syntax: Between Zipf and Matthew	1	0	0	0	0	0	0	0	0	1
Space syntax: standardised integration measures and some simulations	1	0	0	0	0	0	0	0	0	1
Traffic flow: a statistical physics point of view	1	0	0	0	0	0	0	0	0	1
Integration of Space Syntax into GIS: New Perspectives for Urban Morphology	1	0	0	0	0	0	0	0	0	1
Simulation of pedestrian dynamics using a two-dimensional cellular automaton	1	0	0	0	0	0	0	0	0	1

Figure 65: Most used references linked to the key word “sustainable transport” in University of Cassino and Southern Lazio

No shared references.

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Tables

Most used by the main institution

Element names	I4210144925 Technological University Dublin	I140494188 University of Technology of Troyes	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I186995768 University of Cassino and Southern Lazio	I163151358 Cyprus University of Technology	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	sum all entities
Sharing fairly? Mobility, citizenship, and gender relations in two Swedish city-regions	2	0	0	0	0	0	0	0	0	2
Evaluating equal employment opportunity and its impact on the increased participation of men and women in the transport industry	2	0	0	0	0	0	0	0	0	2
Gender and mobility: new approaches for informing sustainability	2	0	0	0	0	0	0	0	0	2
Intention to use a fully automated car: Attitudes and a priori acceptability	2	0	0	0	0	0	0	0	0	2
Analysis of Network Structure of Urban Bike-Sharing System: A Case Study Based on Real-Time Data of a Public Bicycle System	2	0	0	0	0	0	0	0	0	2
An AHP-DEA Approach of the Bike-Sharing Spots Selection Problem in the Free-Floating Bike-Sharing System	2	0	0	0	0	0	0	0	0	2
The Delphi method as a research tool: an example, design considerations and applications	2	0	0	0	0	0	0	0	0	2
Public attitudes to and perceptions of high speed rail in the UK	2	0	0	0	0	0	0	0	0	2
User preferences regarding autonomous vehicles	2	0	0	0	0	0	0	0	0	2
Methodology for Gender Analysis in Transport: Factors with Influence in Women's Inclusion as Professionals and Users of Transport Infrastructures	2	0	0	0	0	0	0	0	0	2

Figure 66: Most used references linked to the key word "sustainable transport" at Technical University of Dublin

No shared references among TUDublin references and other partners' references.

3.7.2 Conclusion

There are no shared references on the topic of sustainable transport within EUt+ partners.

3.8 Key word "education for sustainable development"

3.8.1 Results

Tables

Most used by the main institution

Element names	I107257983 Darmstadt University of Applied Sciences	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I158333966 Technical University of Cluj-Napoca	I31151848 Technical University of Sofia	I201787326 Riga Technical University	I186995768 University of Cassino and Southern Lazio	I163151358 Cyprus University of Technology	I3123212020 Universidad Politécnica de Cartagena	sum all entities
The role of Rasch analysis when conducting science education research utilizing multiple-choice tests	2	0	0	0	0	0	0	0	0	2
What Do Students Gain by Engaging in Socioscientific Inquiry?	2	0	0	0	0	0	0	0	0	2
Education for Sustainable Development in German Science Education: Past – Present – Future	2	0	0	0	0	0	0	0	0	2
Weighted likelihood estimation of ability in item response theory	2	0	0	0	0	0	0	0	0	2
A rasch model for partial credit scoring	2	0	0	0	0	0	0	0	0	2
An NCME Instructional Module on Booklet Designs in Large-Scale Assessments of Student Achievement: Theory and Practice	2	0	0	0	0	0	0	0	0	2
Patterns in Students' Argumentation Confronted with a Risk-focused Socio-scientific Issue	2	0	0	0	0	0	0	0	0	2
Modelling in Mathematics Classroom Instruction: An Innovative Approach for Transforming Mathematics Education	1	0	0	0	0	0	0	0	0	1
Wirtschafts-, Mathematik- und Deutschkenntnisse Deutschschweizer Lernender am Ende der Berufsmaturität und des Gymnasiums	1	0	0	0	0	0	0	0	0	1
A Curriculum Framework for Active Democratic Citizenship Education	1	0	0	0	0	0	0	0	0	1

Figure 67: Most used references linked to the key word "education for sustainable development" at Darmstadt University of Applied Science

Some references are shared within Darmstadt University of Applied Science, mostly on rasch model and analysis. One of the references is in German.

No graph available.

Co-funded by the European Union

Most used references linked to the key word "education for sustainable development" at Riga Technical University

No graph available.

Most used references linked to the key word "education for sustainable development" at Universidad Politécnica de Cartagena

No graph available.

Most used references linked to the key word "education for sustainable development" at University of Technology of Troyes

No graph available.

Most used references linked to the key word "education for sustainable development" at Cyprus University of Technology

Tables

Most used by the main institution

Element names	I158333966 Technical University of Cluj-Napoca	I140494188 University of Technology of Troyes	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I186995768 University of Cassino and Southern Lazio	I4210144925 Technological University Dublin	I163151358 Cyprus University of Technology	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	sum all entities
A research framework of smart education	1	0	0	0	0	0	0	0	0	1
CASBEE-Wellness Office: An objective measure of the building potential for a healthily built environment	1	0	0	0	0	0	0	0	0	1
The Empirical and Institutional Dimensions of Smart Specialisation	1	0	0	0	0	0	0	0	0	1
Hydrodynamic interactions within fish schools	1	0	0	0	0	0	0	0	0	1
Green Buildings as a Necessity for Sustainable Environment Development: Dilemmas and Challenges	1	0	0	0	0	0	0	0	0	1
Technology Transfer in the Context of Sustainable Development–A Bibliometric Analysis of Publications in the Field	1	0	0	0	0	0	0	0	0	1
Technology Transfer, Sustainability, and Development, Worldwide and in Romania	1	0	0	0	0	0	0	0	0	1
Design and Operation of Constructions: A Healthy Living Environment–Parametric Studies and New Solutions	1	0	0	0	0	0	0	0	0	1
Smart Universities	1	0	0	0	0	0	0	0	0	1
The Concept of Smart-Education for Sustainable Development	1	0	0	0	0	0	0	0	0	1

Figure 68: Most used references linked to the key word "education for sustainable development" at Technical University of Cluj-Napoca

No shared references.

No graph available.

Most used references linked to the key word "education for sustainable development" at Technical University of Sofia

No graph available.

Most used references linked to the key word "education for sustainable development" in University of Cassino and Southern Lazio

Tables

Most used by the main institution

Element names	I4210144925 Technological University Dublin	I140494188 University of Technology of Troyes	I107257983 Darmstadt University of Applied Sciences	I3123212020 Universidad Politécnica de Cartagena	I163151358 Cyprus University of Technology	I158333966 Technical University of Cluj-Napoca	I31151848 Technical University of Sofia	I186995768 University of Cassino and Southern Lazio	I201787326 Riga Technical University	sum all entities
Key competencies in sustainability: a reference framework for academic program development	2	0	0	0	0	0	0	0	0	2
Seeking sustainability competence and capability in the ESD and HESD literature: an international philosophical hermeneutic analysis	1	0	0	0	0	0	0	0	0	1
Complex evaluation of sustainability in engineering education: case & analysis	1	0	0	0	0	0	0	0	0	1
Response strategies for curriculum change in engineering	1	0	0	0	0	0	0	0	0	1
Sustainability as a Route to Broadening Participation in Engineering	1	0	0	0	0	0	0	0	0	1
Engineering students' sustainability approaches	1	0	0	0	0	0	0	0	0	1
The development of ESD-related competencies in supportive institutional frameworks	1	0	1	0	0	0	0	0	0	2
Learning apart and together: towards an integrated competence framework for sustainable entrepreneurship in higher education	1	0	0	0	0	0	0	0	0	1
Which ABET Competencies Do Engineering Graduates Find Most Important in their Work?	1	0	0	0	0	0	0	0	0	1
Educating engineers to embrace complexity and context	1	0	0	0	0	0	0	0	0	1

Figure 69: Most used references linked to the key word "education for sustainable development" at Technical University of Dublin

No shared references.

3.8.2 Conclusion

Only h_da, TUCN and TUDublin have references on education for sustainable development (ESD). It doesn't mean that no scientists in other universities are focused on ESD, but not extensively or in isolation (no research group on the topic). This could be interesting for ESL because it might mean that there is a need for a group at ESL level, composed of individuals from the different universities.

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3.9 Key word “environmental education”

3.9.1 Results

Tables

Most used by the main institution

Element names	I107257983 Darmstadt University of Applied Sciences	I140494188 University of Technology of Troyes	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I186995768 University of Cassino and Southern Lazio	I4210144925 Technological University Dublin	I163151358 Cyprus University of Technology	I3123212020 Universidad Politécnica de Cartagena	sum all entities
Environmental engineering education – summary report of the 1st European Seminar	1	0	0	0	0	0	0	0	0	1
From Small Scale, Short Term to Large Scale, Long Term: Integrating ‘Sustainability’ into Engineering Education	1	0	0	0	0	0	0	0	0	1
Introduction of Process Life Cycle Inventory in Environmental Engineering Education	1	0	0	0	0	0	0	0	0	1
Issues of sustainability and pollution prevention in environmental engineering education	1	0	0	0	0	0	0	0	0	1
Design principles for engaging and retaining virtual citizen scientists	0	0	0	0	0	0	0	1	0	1
Effects of Educational Background on Students' Attitudes, Activity Levels, and Knowledge Concerning the Environment	0	0	0	0	0	0	0	1	0	1
Science for the post-normal age	0	0	0	0	0	0	0	1	0	1
Perceived biodiversity, sound, naturalness and safety enhance the restorative quality and wellbeing benefits of green and blue space in a neotropical city	0	0	0	0	0	0	0	1	0	1
Analysis of smart city indicators based on prisma : systematic review	0	0	0	0	0	0	0	1	0	1
Towards a circular economy in cities: Exploring local modes of governance in the transition towards a circular economy in construction and textile recycling	0	0	0	0	0	0	0	1	0	1

Figure 70: Most used references linked to the key word “environmental education” at Darmstadt University of Applied Science

No shared references.

Tables

Most used by the main institution

Element names	I201787326 Riga Technical University	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
Building a Conceptual Framework: Philosophy, Definitions, and Procedure	1	0	0	0	0	0	0	0	0	1
Introducing sustainability into university curricula: an indicator and baseline survey of the views of university teachers at the University of Valencia	1	0	0	0	0	0	0	0	0	1
Sustainability in Higher Education: A Didactic Strategy for Environmental Mainstreaming	1	0	0	0	0	0	0	0	0	1
The role of an academic institute in setting national environmental policy: The case of Israel	1	0	0	0	0	0	0	0	0	1
An exploratory study of sustainable development at Italian universities	1	0	0	0	0	0	0	0	0	1
The role of education in protected area sustainable governance	1	0	0	0	0	0	0	0	0	1
Integrating environmental sustainability into universities	1	0	0	0	0	0	0	0	0	1
Moving towards an ecologically sound society? Starting from green universities and environmental higher education	1	0	0	0	0	0	0	0	0	1
Learning for change: an educational contribution to sustainability science	1	0	0	0	0	0	0	0	0	1
Higher education as a change agent for sustainability in different cultures and contexts	1	0	0	0	0	0	0	0	0	1

Figure 71: Most used references linked to the key word “environmental education” at Riga Technical University

No shared references.

No graph available.

Most used references linked to the key word “environmental education” at Universidad Politécnica de Cartagena

No graph available.

Co-funded by the European Union

Most used references linked to the key word "environmental education" at University of Technology of Troyes

Tables

Most used by the main institution

Element names	I163151358 Cyprus University of Technology	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	sum all entities
New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behavior	3	0	0	0	0	0	0	0	0	3
Youth-focused citizen science: Examining the role of environmental science learning and agency for conservation	3	0	0	0	0	0	0	0	0	3
'Globalisation, Cosmopolitanism and Ecological Citizenship'	3	0	0	0	0	0	0	0	0	3
Teachers' Perceptions on Environmental Citizenship: A Systematic Review of the Literature	3	0	0	0	0	0	0	0	0	3
Environmental Citizen Science Initiatives as a Springboard towards the Education for Environmental Citizenship: A Systematic Literature Review of Empirical Research	3	0	0	0	0	0	0	0	0	3
We Be Burnin'!Agency, Identity, and Science Learning	2	0	0	0	0	0	0	0	0	2
Citizen science for environmental citizenship	2	0	0	0	0	0	0	0	0	2
Examining student environmental science agency across school science contexts	2	0	0	0	0	0	0	0	0	2
Education for Environmental Citizenship: The Pedagogical Approach	2	0	0	0	0	0	0	0	0	2
The journal coverage of Web of Science and Scopus: a comparative analysis	2	0	0	0	0	0	0	0	0	2

Figure 72: Most used references linked to the key word "environmental education" at Cyprus University of Technology

There references are shared among 2-3 papers but not more. None of the references are shared among EUt+ partners.

Tables

Most used by the main institution

Element names	I158333966 Technical University of Cluj-Napoca	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212020 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I163151358 Cyprus University of Technology	sum al entiti
Enhancing and Conservation of Ecosystem through Philatelic Education in Europe: Think Green Concept (II) – Stamp Research Study	2	0	0	0	0	0	0	0	0	2
Enhancing and Conservation of Ecosystem through Philatelic Education in Europe: Think Green Concept (I) – Stamp Research Study	2	0	0	0	0	0	0	0	0	2
Environmental Attitudes and Behaviors Across Cultures	1	0	0	0	0	0	0	0	0	1
The Effects of Mothers' Educational Levels on University Students' Environmental Protection Commitments and Environmental Behaviors	1	0	0	0	0	0	0	0	0	1
Sustainability in higher education in Atlantic Canada	1	0	0	0	0	0	0	0	0	1
Using digital photography and journaling in evaluation of field-based environmental education programs	1	0	0	0	0	0	0	0	0	1
Greening due to environmental education? Environmental knowledge, attitudes, consumer behavior and everyday pro-environmental activities of Hungarian high school and university students	1	0	0	0	0	0	0	0	0	1
Green School Grounds as Sites for Outdoor Learning: Barriers and Opportunities	1	0	0	0	0	0	0	0	0	1
Environmental education evaluation: Time to reflect, time for change	1	0	0	0	0	0	0	0	0	1
Valuing access to protected areas in Nepal: The case of Chitwan National Park	1	0	0	0	0	0	0	0	0	1

Figure 73: Most used references linked to the key word "environmental education" at Technical University of Cluj-Napoca

No real share of references among UTCN researchers. No shared references with other partners.

Tables

Most used by the main institution

Element names	I3115184 Technical University of Sofia	I1869957 University of Cassino and Southern Lazio	I1404941 University of Technology of Troyes	I4210144 Technological University Dublin	I3123212 Universidad Politécnica de Cartagena	I1072579 Darmstadt University of Applied Sciences	I2017873 Riga Technical University	I1583339 Technical University of Cluj-Napoca	I1631513 Cyprus University of Technology	sum all entities
Linking Environmental Studies and IT – a East-West Project in Bulgaria, Germany and the United Kingdom	1	0	0	0	0	0	0	0	0	1
Geographic information systems: A management perspective	1	0	0	0	0	0	0	0	0	1
Object-oriented databases: technology, applications, and products	1	0	0	0	0	0	0	0	0	1
Legitimacy for climate policies: politics and participation in the Green City of Freiburg	0	0	0	0	0	0	0	0	1	1
Situated Learning	0	0	0	0	0	0	0	0	1	1
Science for the post-normal age	0	0	0	0	0	0	0	0	1	1
Perceived biodiversity, sound, naturalness and safety enhance the restorative quality and wellbeing benefits of green and blue space in a neotropical city	0	0	0	0	0	0	0	0	1	1
Analysis of smart city indicators based on prisma : systematic review	0	0	0	0	0	0	0	0	1	1
Towards a circular economy in cities: Exploring local modes of governance in the transition towards a circular economy in construction and textile recycling	0	0	0	0	0	0	0	0	1	1
Global action networks: Agents for collective action	0	0	0	0	0	0	0	0	1	1

Figure 74: Most used references linked to the key word "environmental education" at Technical University of Sofia

No shared references.

No graph available.

Most used references linked to the key word "environmental education" in University of Cassino and Southern Lazio

Most used by the main institution

Element names	I4210144 Technological University Dublin	I1404941 University of Technology of Troyes	I1869957 University of Cassino and Southern Lazio	I3123212 Universidad Politécnica de Cartagena	I3115184 Technical University of Sofia	I1583339 Technical University of Cluj-Napoca	I2017873 Riga Technical University	I1631513 Cyprus University of Technology	I1072579 Darmstadt University of Applied Sciences	sum all entities
From Language to Literacy: The Evolving Concepts of Foreign Language Teaching at American Colleges and Universities Since 1945	1	0	0	0	0	0	0	0	0	1
La enseñanza del español en la era del antropoceno: Hacia la integración de la sostenibilidad en las clases de español como lengua extranjera	1	0	0	0	0	0	0	0	0	1
Sustainable Teaching in an Uncertain World: Pedagogical Continuities, Un-Precedented Challenges	1	0	0	0	0	0	0	0	0	1
TESOL and Sustainability	1	0	0	0	0	0	0	0	0	1
Greening the German Classroom: Starting Points for a Cultural Lesson	1	0	0	0	0	0	0	0	0	1
Climate Change: A "Green" Approach to Teaching Contemporary Germany	1	0	0	0	0	0	0	0	0	1
Routledge Handbook of Higher Education for Sustainable Development	1	0	0	0	0	0	0	0	0	1
The Routledge Handbook of Ecolinguistics	1	0	0	0	0	0	0	0	0	1
Teaching the Environmental Humanities	1	0	0	0	0	0	0	0	0	1
Promoting language education for sustainable development: a program effects case study in Japanese higher education	1	0	0	0	0	0	0	0	0	1

Figure 75: Most used references linked to the key word "environmental education" at Technical University of Dublin

No reference is shared at TUDublin and none is shared within the partners.

3.9.2 Conclusion

There are no common references among EUt+ partners on the concept "Environmental education".

3.10 Design for the Environment

3.10.1 Results

No graph available.

Most used references linked to the key word "Design for the Environment" at Darmstadt University of Applied Science

No graph available.

Most used references linked to the key word "Design for the Environment" at Riga Technical University

No graph available.

Most used references linked to the key word "Design for the Environment" at Universidad Politécnica de Cartagena

Tables

Most used by the main institution

Element names	I140494188 University of Technology of Troyes	I107257983 Darmstadt University of Applied Sciences	I3123212020 Universidad Politécnica de Cartagena	I163151358 Cyprus University of Technology	I158333966 Technical University of Cluj-Napoca	I31151848 Technical University of Sofia	I186995768 University of Cassino and Southern Lazio	I201787326 Riga Technical University	I4210144925 Technological University Dublin	sum all entities
DRM, a Design Research Methodology	2	0	0	0	0	0	0	0	0	2
Ecodesign maturity model: a management framework to support ecodesign implementation into manufacturing companies	2	0	0	0	0	0	0	0	0	2
Integrating ecodesign by conducting changes in SMEs	2	0	0	0	0	0	0	0	0	2
A taxonomy of ecodesign tools for integrating environmental requirements into the product design process	2	0	0	0	0	0	0	0	0	2
Measuring Collaboration Among Grant Partners	1	0	0	0	0	0	0	0	0	1
A tool to implement sustainable end-of-life strategies in the product development phase	1	0	0	0	0	0	0	0	0	1
Assessment of eco-labelling criteria development from a strategic sustainability perspective	1	0	0	0	0	0	0	0	0	1
Economic benefits tied to ecodesign	1	0	0	0	0	0	0	0	0	1
UML based specifications of PDM product structure and workflow	1	0	0	0	0	0	0	0	0	1
Mapping the green product development field: engineering, policy and business perspectives	1	0	0	0	0	0	0	0	0	1

Figure 76: Most used references linked to the key word "Design for the Environment" at University of Technology of Troyes

The DRM seems to be used as a design methodology at the UTT, but not at the other partners.

Ecodesign and eco-labels in SME seems to be a interesting theme for UTT researchers.

No graph available.

Most used references linked to the key word "Design for the Environment" at Cyprus University of Technology

Tables

Most used by the main institution

Element names	I158333966 Technical University of Cluj-Napoca	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212820 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I163151358 Cyprus University of Technology	sum all entities
The Eco-Design Handbook2002360Alistair Fuad-Luke. The Eco-Design Handbook. London: Thames and Hudson 2002. 352pp., ISBN: ISBN 0 500 28343 5 £16.95	1	0	0	0	0	0	0	0	0	1
Management of radical innovation and environmental challenges	1	0	0	0	0	0	0	0	0	1
Proposal for new quantitative eco-design indicators: a first case study	1	0	0	0	0	0	0	0	0	1
Key aspects of product attraction: a focus on eco-friendliness	1	0	0	0	0	0	0	0	0	1
Eco-efficiency and ecodesign in electrical and electronic products	1	0	0	0	0	0	0	0	0	1
Implications of choices and interpretation in LCA for multi-criteria process design: de-inked pulp capacity and cogeneration at a paper mill case study	1	0	0	0	0	0	0	0	0	1
A novel concurrent design process planning method and application	1	0	0	0	0	0	0	0	0	1
A systematic approach to eco-innovative product design based on life cycle planning	1	0	0	0	0	0	0	0	0	1
Design Achievement Model for Planning Creative and Concurrent Design Process	1	0	0	0	0	0	0	0	0	1
A comparative study of the prioritization matrix method and the analytic hierarchy process technique in quality function deployment	1	0	0	0	0	0	0	0	0	1

Figure 77: Most used references linked to the key word "Design for the Environment" at Technical University of Cluj-Napoca

The design perspective at the TUCN seems to be focused on eco-design, eco-efficiency and on LCA. Even if those subjects could be discussed in other universities, the references are not shared.

No graph available.

Most used references linked to the key word "Design for the Environment" at Technical University of Sofia

Tables

Most used by the main institution

Element names	I186995768 University of Cassino and Southern Lazio	I140494188 University of Technology of Troyes	I4210144925 Technological University Dublin	I3123212820 Universidad Politécnica de Cartagena	I107257983 Darmstadt University of Applied Sciences	I201787326 Riga Technical University	I31151848 Technical University of Sofia	I158333966 Technical University of Cluj-Napoca	I163151358 Cyprus University of Technology	sum all entities
Optimization by the Analytic Hierarchy Process	1	0	0	0	0	0	0	0	0	1
SPIonExcel-Fast and easy calculation of the Sustainable Process Index via computer	1	0	0	0	0	0	0	0	0	1
When to buy new electrical/electronic products?	1	0	0	0	0	0	0	0	0	1
Assessment of the effects of the Japanese shift to lead-free solders and its impact on material substitution and environmental emissions by a dynamic material flow analysis	1	0	0	0	0	0	0	0	0	1
An environmental pressure index proposal for urban development planning based on the analytic network process	1	0	0	0	0	0	0	0	0	1
Product category rules and environmental product declarations as tools to promote sustainable products: experiences from a case study of furniture production	1	0	0	0	0	0	0	0	0	1
Treatment and recycling system optimisation with activity-based costing in WEEE reverse logistics management: an environmental supply chain perspective	1	0	0	0	0	0	0	0	0	1
Synergico: a method for systematic integration of energy efficiency into the design process of electr(on)ic equipment	1	0	0	0	0	0	0	0	0	1
An environmental sustainability analysis in the printing sector	1	0	0	0	0	0	0	0	0	1
LCA of Scrap CRT Display at Various Scenarios of Treatment	1	0	0	0	0	0	0	0	0	1

Figure 78: Most used references linked to the key word "Design for the Environment" in University of Cassino and Southern Lazio

Co-funded by the European Union

No references shared.

No graph available.

Most used references linked to the key word "Design for the Environment" at Technical University of Dublin

3.10.2 Conclusion

There are no common references on the concept "Design for the Environment".