BRINGING SOCIAL SCIENCES & HUMANITIES INTO H2020 ENERGY PROJECTS

Early-Stage Researcher **internship diaries**

SHAPEENERGY

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731264.

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March 2018

Suggested citation: Ortar, N., Burguet, D., and Robison, R., 2018. *Bringing Social Sciences & Humanities into H2020 energy projects: Early-Stage Researcher internship diaries*. Cambridge: SHAPE ENERGY.

Executive summary

SHAPE ENERGY[1] - Social sciences and Humanities for Advancing Policy in European Energy - is a two-year platform funded under the EU's Horizon 2020 energy work programme. It represents a €2m investment to strengthen and promote Europe's energy-related Social Science and Humanities (energy-SSH) capabilities.

Within SHAPE ENERGY, an Early-Stage Researcher (ESR[2]) internship programme was designed to both offer H2020 projects new energy-SSH research expertise, and enable participating ESRs to:

- meet a new work team and adapt to a new work environment;
- learn about a H2020 energy/transport project;
- carry out specific tasks in a short period of time to meet concrete needs;
- acquire new skills in a multidisciplinary work environment;
- acquire new (sometimes technical) knowledge in the field of energy.

In this report, the process of selection of the ESRs and the host H2020 energy-related projects is presented, key findings that came out of the ESRs 'internship diaries', as well as ways the Platform worked with the ESRs to communicate their experiences.

Several lessons can be taken from the ESR internships. The first is regarding the types of meaningful objectives that may be given to interdisciplinary energy collaborations, in particular those aiming to capitalise on energy-SSH expertise. The second is about the setting of frameworks in order to make interdisciplinary working a success, and some guidance for future project coordinators wishing to welcome ESRs or other visiting researchers with a different disciplinary background than that of their team. The third is about the recognition of the necessity of interdisciplinary working in the field of energy.

1 Further information available via: shapeenergy.eu. All SHAPE ENERGY publications referenced in the report are, or will be, freely available via this website.

2 Early-Stage Researchers (PhD students) are those who are, at the time of selection by the host institution, in the first four years (full-time equivalent) of their research careers and have not yet been awarded a doctoral degree. This is measured from the date when they obtained their MSc degree which formally entitles them to embark on a doctorate (as a PhD student). http://www.oncornet.eu/index.php/recruitment/2-uncategorised/79-esr

Contents

Executive summary 2
Contents 3
1. Introduction 4
2. The ESR internship programme 5
2.1. Selecting the projects 5
2.2. Research objectives of the host projects 5
2.3. Selecting the ESRs 11
2.4. Backgrounds of the Early Stage Researchers 11
2.5. Internship objectives 14
3. Key findings 16
3.1. Going beyond your comfort zone: working in an multi-, inter-, transdisciplinarity context 16
3.2. Interdisciplinary work is challenging 18
3.3. Guidance for a successful internship step-by-step 19
3.4. Why energy needs interdisciplinarity 22
4. Communicating the internships 25
5. Conclusions 27
6. Acknowledgements 28
Appendix 1. The ESRs and their tasks 29
Appendix 2. SHAPE ENERGY internship diary form 31

1. Introduction

The SHAPE ENERGY H2020 platform encompasses a dedicated Early-Stage Researcher (ESR) programme. This programme has been designed as an opportunity for participants to reflect on how to frame questions that help SSH become embedded into existing energy initiatives, encouraging interdisciplinary depth around problem-centered issues[3]. The ESR programme comprised a Summer School (June 2017; Lyon, France) – entitled 'Advancing Energy Policy Summer School'[4] – focused on how energy-SSH research can contribute to tackling the many energy-related challenges in Europe. Key energy topics were discussed with an emphasis on interdisciplinarity and on the translation of academic research into policy and practice. Themes included: Global energy dilemmas; Energy transition; Public engagement and energy citizenship; Consumption and social practices; Energy poverty.

The second stage of the ESR programme involved SSH internships within existing Horizon 2020 energy projects over October 2017-January 2018. These internships had several objectives:

- to enable students to develop their skills and knowledge in the field of SSH;
- to make methodological tools from SSH available to professionals, stakeholders and researchers in other energy-related technical and scientific fields;
- to provide solutions to H2020 energy/transport project teams on SSH-related issues;
- to propose case studies, analyses, models and tools to better understand society's energy-related problems.

This report gathers information on the organisation of the internships, the participants (ESRs and H2020 project hosts), the practice of interdisciplinarity, and the place of SSH in an energy project. In order to enable an analytical reading of these experiences, each ESR completed a report, or 'diary', at the end of their internship to share their practice and reflect on interdisciplinary issues.

The report is divided into three main sections. The first section presents the organisational side, including the H2020 projects that hosted ESRs - characteristics of the projects, their objectives, their needs - as well as the characteristics of the ESR interns selected, their profiles and their specific internship objectives. The second section covers key findings from the diaries, including a summary of the ESRs' written feedback on their understanding of what interdisciplinarity is and how to make it work. It provides some guidance on how to set up an internship or secondment aimed at advancing cross-disciplinary issues as well as the ESRs reasons for why interdisciplinary work is needed in the field of energy. The third section presents the communications and outreach activities undertaken with and by the ESRs during their internships and after their experiences.

3 See B.K. Sovacool (et al.). 2015. Integrating social science in energy research, *Energy Research & Social Science*, Volume 6, Pages 95-99, https://doi.org/10.1016/j.erss.2014.12.005.

4 See Ortar, N., Burguet, D., Claudot, P. and Foulds, C. 2017. The SHAPE ENERGY Summer School - interdisciplinary debates with PhD researchers. Cambridge: SHAPE ENERGY. https://shapeenergy.eu/wp-content/uploads/2017/11/SHAPE_ENERGY_Summer_School.pdf

2. The ESR internship programme

The SHAPE ENERGY ESR internship programme involved connecting ESRs working within SSH with energy project partners, with a particular emphasis on representation of host projects in the technical fields of energy (STEM[5]). This section includes: a description of the H2020 project host and ESR intern selection process; the outcomes of that process (who participated), and; the ESRs' 'missions' during their internships, i.e. the objectives agreed between host and intern.

This programme, led by SHAPE ENERGY partner ENTPE for more than 6 months, was organised in several phases:

- an identification phase for H2020 energy/transport project hosts;
- advertisement to ESRs working in energy-related Social Science and Humanities;
- linking up hosts and ESRs to enable them to collaborate;
- tracking the good progress of the internships;
- administrative and financial follow-up with the ESRs;
- an analysis of the ESRs' feedback for the writing of this report.

2.1. Selecting the projects

Two phases were used to attract sufficient internship opportunities for the ESRs:

- The first involved tailored targeting of interesting H2020 projects identified via the CORDIS portal using a number of keywords in relation to energy. The coordinators of some 30 projects were contacted individually.
- In addition, using the SHAPE ENERGY project resources established by partner POLITO through searching for *all* the projects identified on CORDIS under the simple keyword "energy", the second call was mailed to more than 300 projects.

In total, 18 H2020 projects expressed their interest in integrating one or two ESRs into their project. Prospective hosts were asked to send details on what they would ideally like the student to work on, and to bring in terms of disciplinary expertise and/or methodological experience, as well as where they would be based and who the supervisor would be. These opportunities were then advertised to interested ESRs, and ultimately 10 of these projects attracted ESR interns (SHAPE ENERGY's target number for the programme).

2.2. Research objectives of the host projects

The following is a brief description of the 10 projects that hosted the ESRs. Their presentation in Table 1 introduces the sub-themes, topics, objectives and challenges of each project.

Most of the project hosts are part of the "Societal Challenge 3 - Secure, clean and efficient energy programme" within H2020. Within this programme, there are five energy sub-themes (H2020-EU.3.3.2-3.3.6), and the alignment of the host projects with these is presented in Table 1. Additionally, two projects are part of the H2020 programme on industrial leadership. The funding scheme of the project hosts are principally "Research and Innovation Action" (RIA) and "Coordination and Support Action" (CSA).

5 Science, Technology, Engineering and Mathematics

Table 1. The host H2020 energy and transport projects

H2020 Project	H2020 sub-themes, topic(s), funding scheme and brief description
AMBITION: Advanced biofuel production with energy system integration	
PROJECT ID: 731263 COORDINATED IN: Norway	H2020-EU.3.3.2. - Low-cost, low-carbon energy supply H2020-EU.3.3.3. - Alternative fuels and mobile energy sources H2020-EU.3.3.4. - A single, smart European electricity grid H2020-EU.3.3.5. - New knowledge and technologies TOPIC(S): LCE-33-2016 - European Common Research and Innovation Agendas (ECRIAs) in support of the implementation of the SET Action Plan FUNDING SCHEME: RIA AMBITION aims to develop a long-term joint European Community Research and Innovation Agenda (ECRIA) on the integration of biofuels production and surplus grid electricity valorisation. AMBITION brings together eight partners from eight different countries into a European wide lasting research partnership, which is closely linked to EERA Bioenergy.
BioEnergyTrain	
PROJECT ID: 656760 COORDINATED IN: Austria	H2020-EU.3.3.6. - Robust decision making and public engagement TOPIC(S): LCE-20-2014 - The human factor in the energy system FUNDING SCHEME: CSA The development and adoption of renewable and sustainable energy has become a top priority in Europe, and is Horizon 2020's most prominent theme. As aligned with the SET-Plan's needs analysis for European development, BioEnergyTrain has the following objectives: to address identified knowledge gaps through common training collaboration and best practices by clearly identifying the technology and knowledge chain for the development and leverage of European expertise; to bridge the gap between industrial innovation and education in order to improve the practical orientation of higher and professional education to enable the market up-take of innovative solutions for SET-Plan measures; to create a network of integrated research and industrial infrastructures and develop programmes on the integration of practical training modules at these installations in curricula; to create a forum for stakeholders within the bioenergy value chain from research, universities, industry and the public sector to exchange information on educational needs and share knowledge and experience; to create a 'network of networks', linking HEIs with stakeholders in their regional context, providing information, awareness raising and training opportunities as well as hands-on assistance for implementing bioenergy systems.

ECOLED: Efficient and Low CO2 footprint B2B turnkey LED module with an innovative thermal solution	
PROJECT ID: 763313 COORDINATED IN: Belgium	H2020-EU.2.1.1. - Industrial Leadership H2020-EU.2.3.1. - Mainstreaming SME support, especially through a dedicated instrument H2020-EU.3.3. - SOCIETAL CHALLENGES - Secure, clean and efficient energy TOPIC(S): SMEInst-09-2016-2017 - Stimulating the innovation potential of SMEs for a low carbon and efficient energy system FUNDING SCHEME: SME instrument phase 1 LED lighting is increasingly a part of our daily life, thanks to its proven advantage in energy saving and longer lifespan. Nevertheless, thermal management of LED lighting fixtures remain an issue like other electronic devices (e.g. laptops, smart phones). ECOLED is solving this problem thanks to its patented IF-T LED technology. The aluminium content of ECOLED is up to 75% lower compared to current LED modules. This leads to a smaller, embeddable, longer lasting and even more energy saving light source. A first generation of ECOLED will appeal to clients to take advantage of size and the ease of a pre-assembled device. This is the market segment of indoor design lighting fixtures. The second generation ECOLED will play out the temperature management functionality creating a device that has a considerably longer lifespan. This advantage will have a disruptive effect for clients in the segment of residential, office, industrial and outdoor lighting, a €2,5 billion market in Europe alone.

EMPOWER: Local Electricity Retail Markets for Prosumer smart grid POWER services	
PROJECT ID: 646476 COORDINATED IN: Norway	H2020-EU.3.3.4. - A single, smart European electricity grid TOPIC(S): LCE-07-2014 - Distribution grid and retail market FUNDING SCHEME: IA - Innovation Action The aim is to explore and develop an integrated ICT solution to support the development of an electricity local market place and innovative business models, including operational methods to encourage micro-generation with renewable resources and participation of consumers and prosumers. The creation of incentives for all players would allow for exploiting the latent flexibility of the user-side of the electricity distribution net. This would greatly enhance the benefits of distributed renewable resources and enhance the impact and sustainability of demand-response programs. A local electricity market approach supported by innovative ICT platforms can operate effectively in a synchronized way with the overall energy system and market. The solution will create a shared engagement of local supply alleviating the traditional DSO's need to invest in centralized sourcing.

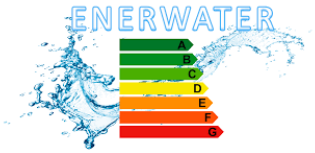
EMPOWERING: Empowering local public authorities to build integrated sustainable energy strategies

PROJECT ID: 695944 COORDINATED IN: Italy	H2020-EU.3.3.7. - Market uptake of energy innovation - building on Intelligent Energy Europe TOPIC(S): EE-07-2015 - Enhancing the capacity of public authorities to plan and implement sustainable energy policies and measures FUNDING SCHEME: CSA The project contributes to the shift of six EU regions toward low-carbon society by enhancing the capacities of municipalities and regional representatives to shape integrated energy strategies and plans. The project contributes to bridge the gap of skills needed to plan energy measures in the new 2030 framework for Climate and Energy Policy in terms of GHG emission reduction, renewable energy and energy efficiency. EMPOWERING addresses energy saving challenges involving local municipalities and regional authorities in a sound transnational exchange and learning activities. Local target audience is then effectively reached thanks to ad hoc capacity local building measures addressing different target groups to maximize the learning experience. The improved knowledge and competences of local authorities are put into practice during the development of the mitigation part of SECAPs and in the upgrading of the existing SEAPs, while regional authorities are supported in shaping regional energy vision to 2050 highlighting the main energy challenges and identifying possible financial strategic actions to be implemented.

ENERGISE: European Network for Research, Good Practice and Innovation for Sustainable Energy

PROJECT ID: 727642 COORDINATED IN: Ireland	H2020-EU.3.3.6. - Robust decision making and public engagement TOPIC(S): LCE-31-2016-2017 - Social Sciences and Humanities Support for the Energy Union FUNDING SCHEME: RIA One of the major challenges Europe will face in the coming decades is to make its energy system clean, secure and efficient, while ensuring EU industrial leadership in low-carbon energy technologies. Achieving such ambitious objectives requires affordable, cost-effective and resource-efficient technology solutions to decarbonise the energy system in a sustainable way, to secure energy supply and to develop the energy internal market in line with the objectives of the Strategic Energy Technology Plan (SET-Plan) and the related energy legislation (notably the Renewable Energy and CCS Directives) – the energy policies designed to deliver the 2020 targets and to shape energy market frameworks for 2030 and 2050.

ENERWATER: Standard method and online tool for assessing and improving the energy efficiency of wastewater treatment plants



PROJECT ID: 649819
COORDINATED IN:
Spain

H2020-EU.3.3.7. - Market uptake of energy innovation - building on Intelligent Energy Europe

TOPIC(S): EE-16-2014 - Organisational innovation to increase energy efficiency in industry

FUNDING SCHEME: CSA

The main objective of ENERWATER is to develop, validate and disseminate an innovative standard methodology for continuously assessing, labelling and improving the overall energy performance of WWTPs. For that purpose, a collaboration framework in the waste water treatment sector including research groups, SMEs, utilities, city councils, authorities and industry be set up. ENERWATER devote important efforts to ensure that the method is widely adopted. Subsequent objectives are to impulse dialogue towards the creation of a specific European legislation following the example of recently approved EU directives, to achieve EU energy reductions objectives for 2020, ensuring effluent water quality, environmental protection and compliance with the WFD.

EURECA: Datacenter EURECA Project

PROJECT ID: 649972
COORDINATED IN:
United Kingdom

H2020-EU.3.3.7. - Market uptake of energy innovation - building on Intelligent Energy Europe

TOPIC(S): EE-08-2014 - Public procurement of innovative sustainable energy solutions

FUNDING SCHEME: CSA

The EURECA project tackles the lack of knowledge and awareness of how to identify and procure environmentally sound and greener data centres. The work will encompass solutions for pre-commercial procurement and procurement of innovative solutions. This will be achieved by consolidating recognised and emerging benchmark criteria into an easy-to-use tool that can be deployed by non-experts. EURECA will recommend an improvement roadmap indicating the procurement options(s) to reduce energy consumption, make efficiencies and minimise the environmental footprint.

ISAAC: Increasing Social Awareness and Acceptance of biogas and biomethane

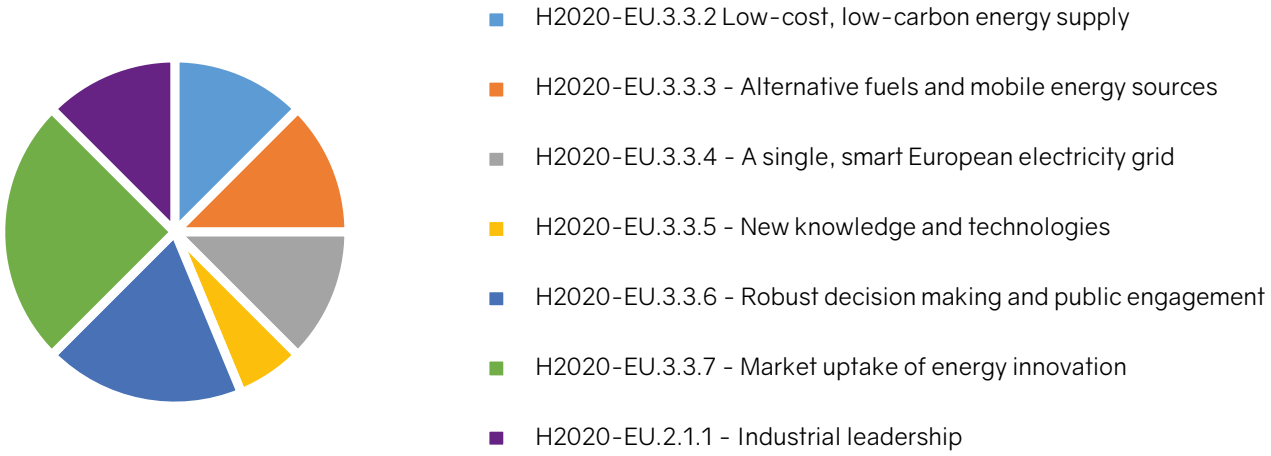
Project ID: 691875 Coordinated in: Italy	H2020-EU.3.3.2. - Low-cost, low-carbon energy supply H2020-EU.3.3.3.1. – Make bio-energy more competitive and sustainable H2020-EU.3.3.7. - Market uptake of energy innovation - building on Intelligent Energy Europe Topic(s): LCE-14-2015 - Market uptake of existing and emerging sustainable bioenergy Funding scheme: CSA ISAAC's main aim is to remove non-technical barriers, such as lack of public acceptance and coordination for the biogas facilities diffusion, normative and legislative inadequacies, in order to support biogas/biomethane market penetration in Italy and make plants implementation easier within the national context. Although Italy is the second European biogas producer after Germany, it still has a great potential for biogas production and market expansion, especially in central and southern regions. According to elaborations of CIB – Consorzio Italiano Biogas e Gassificazione (based on the 2015 annual report of GSE – Gestore dei Servizi Energetici), more than 1550 plants with a total capacity of around 1160 MWel have been installed, but the non-technical barriers, that impede a more widespread diffusion, are still critical.

MEDEAS: Modelling Energy system Development under Environmental And Socioeconomic constraints. Guiding European Policy toward a low-carbon economy.

Project ID: 691287 Coordinated in: Spain	H2020-EU.3.3.6. - Robust decision making and public engagement Topic(s): LCE-21-2015 - Modelling and analysing the energy system, its transformation and impacts Funding scheme: RIA The transition to a low carbon economy needs to achieve multiple aims: competitiveness, protection of the environment, creation of quality jobs, and social welfare. Thus policy-makers and other key stakeholders require tools that need to focus beyond the energy sector by including these other domains of economy, society and the environment. Currently, most available tools lack integration of these important areas despite being tightly connected to the energy sector. Moreover, current energy modelling tools often lack documentation, transparency and have been developed for a specialized insider audience, which makes validation and comparison of results as well as independent review impossible. The project aims to solve the current needs of integration and transparency by developing a leading-edge policy modelling tool based on WoLiM, TIMES and LEAP models and incorporating Input-Output Analysis, that allows for accounting of environmental, social and economic impacts.

Many of the selected projects cover several energy sub-themes within H2020 (see Figure 1) and all sub-themes were represented across the internship programme as a whole.

Figure 1. Sub-themes of the H2020 project hosts (noting that some hosts covered several sub-themes)



2.3. Selecting the ESRs

To attract ESRs to the internships, several calls for applications were issued. The first was to the ESRs who had participated in the "Advancing Energy Policy Summer School", mentioned earlier[4]. Eight ESRs participated in both the summer school and the internship scheme.

Another call was issued through SSH and energy networks. We also used SHAPE ENERGY's professional networks at a European level. More than 40 students pre-registered their interest in the scheme by sending a CV and cover letter, as well as a form detailing their doctoral topics, key-words, discipline(s), methodology/ies, and preferred internship periods. These documents made it possible to identify possible host projects for each ESR, whom they could then contact directly. Once a match was made, the ESRs and coordinators scheduled the internship between themselves: period and duration, confirmed location, tasks, and any specific requirements. Where possible, projects were linked with two ESRs who ideally could undertake their internships at the same time (thus able to share experiences with each other) although this was not mandatory.

Not all the ESR applicants got a positive answer from potential hosts, either due to a mis-match of dates or where the project coordinators did not consider the ESRs profile adapted to their needs. A few projects did also not receive any applications from ESRs, perhaps due to their very technical nature, and/or the remoteness of the location – we note that no projects located in small cities identified as far away from major urban metropolis received applications.

A pedagogical and logistical follow-up was set up with the ESRs by scheduling webinars with them. These meetings were offered during the first week of the internship, in order to gather initial impressions of the internship and their reception into the project hosts.

2.4. Backgrounds of the Early Stage Researchers

Seventeen ESRs completed a SHAPE ENERGY internship between September 2017 and February 2018. Internships ranged in length from two weeks to one month.

While the gender ratio was relatively equal for the preceding summer school - 59% women and 41% men - the ratio of internships was less balanced with 12 women and 5 men. Although this could be seen as

an anomaly within the energy research field which is mostly dominated by men[6], two elements need to be noted. The first explanation is to be found within the set-up of the programme itself: more men than women dropped out of the programme after receiving a first refusal, they were perhaps less flexible than women in their choice of projects and dates. The second is linked to an increase in recent years in women's participation in energy related research, especially in 'new' fields such as renewables[4], and in disciplines other than economics[7] (only 3 ESRs who participated were economists). Another hypothesis could be that women might anticipate a more difficult professional future[8] and therefore try to improve their curriculum by any relevant experience.

The dominant disciplines of the ESRs were first Political Science, followed by Sociology (see Figure 2) but many applicants had a multidisciplinary background.

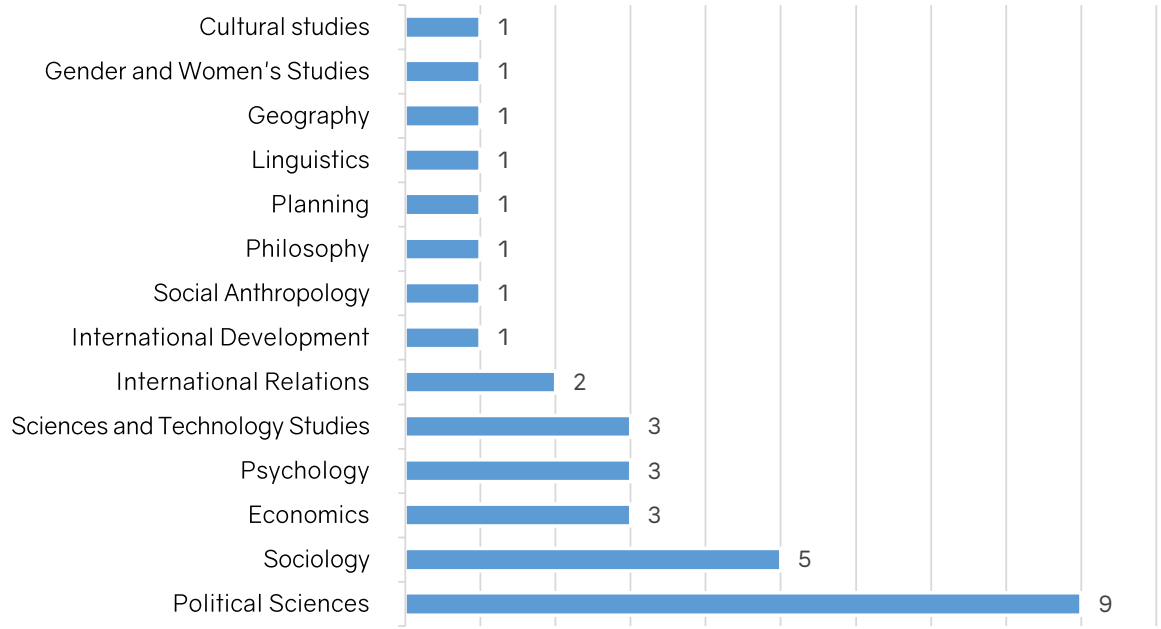


Figure 2. Distribution of the Early-Stage Researchers' disciplines (note ESRs could select more than one discipline)

A variety of methodological experience across SSH was sought in the recruitment of ESRs and the data collection and analysis tools they had experience of were very diverse. Several qualitative methods were proposed to the project coordinators as being appropriate in order to meet a scientific need related to societal issues of energy and SSH concepts. Similarly, quantitative methodological tools (including modelling) were identified in some cases in order to provide expertise in the field of SSH - see Table 2.

6 See Sarah E. Ryan. 2014. Rethinking gender and identity in energy studies, *Energy Research & Social Science, Volume 1*, Pages 96-105, https://doi.org/10.1016/j.erss.2014.02.008; and Anfinsen, M. and Heidenreich, S., 2017. *Energy & gender - a social sciences and humanities cross-cutting theme report*. Cambridge: SHAPE ENERGY.

7 National Science Foundation. Survey of earned doctorates. 2013. Available from http://www.nsf.gov/statistics/srvydoctorates

8 See Lotte Baylin. 2003. Academic Careers and Gender Equity: Lessons Learned from MIT, *Gender, Work and Organization*. Vol. 10 No. 2 and Pierrette Bouchard and Jean-Claude Saint-Amand (eds). 2005. Les succès scolaires des filles : deux lectures contradictoires, Éducations et francophonie, VOLUME XXXIII:1.

Table 2. Methods and analysis tools within the ESRs' collective experience

Qualitative	Quantitative
• Interviews • Focus groups • Content and discourse analysis • Observation • Comparative case studies analysis • Historical criticism • Ethnography • Netnography (ethnography online) • Archival research • Literature and document analysis • Q-methodology (a research method used in psychology/social sciences to study people's 'subjectivity')	• Triangulation method (assessing 'attributed influence' combined with process tracing) • EAR instrument (ego-perception, alter-perception and researcher's analysis) • Mapping • Questionnaires • Game Theoretic Models • Optimization and Modelling • Cluster analysis • Methods of Statistical Analysis and Econometrics • Mathematical Modelling • Analysis of processes • Backcasting • Discrete choice experimentation • SNQ profit function (calculation of netput quantities and profit with the Symmetric Normalized Quadratic)

Table 3 presents a summary of the internship hosts and ESRs. We would like to point out that a number of students have a country of residence which does not correspond to the country where they are registered for their studies or their nationality, nor to the country of residence of their parents. Some of them lived in a country outside their country of birth, studied in another European country and had a passport of another nationality - this shows a high degree of mobility among these ESRs.

Table 3. Host and ESR intern summary, in chronological order

H2020 Project	ESRs	Country of residence	Country of University	Country of internship	Period
EURECA	Miriam Aczel	France	UK	UK	October 2017
	Tina Schivatcheva	Bulgaria	Germany	UK	December 2017
AMBITION	Valeria Guerrieri	Denmark	Denmark	Norway	November 2017
ISAAC	Javanshir Fouladvand	Netherlands	Netherlands	Italy	November 2017
	Qiu Chen	Germany	Germany	Italy	November 2017
ENERGISE	Pasi Toivanen	Finland	Finland	Ireland	November 2017
	Giulia Mininni	France	UK	Ireland	November 2017
ENERWATER	Katerina Zharan	Germany	Germany	Spain	November 2017
EMPOWER	Soroush Golnoush	Italy	Italy	Switzerland	November 2017
	Penelope Buckley	France	France	Switzerland	January 2018
EMPOWERING	Fulvio Biddau	Italy	Italy	Italy	November – December 2017
	Jessica Balest	Italy	Italy	Italy	November – December 2017
MEDEAS	Pauline Claudot	France	France	Italy	December 2017
	Mariya Trifonova	Bulgaria	Bulgaria	Bulgaria	December 2017
BioEnergyTrain	Andrzej Ceglarz	Germany	Germany	Slovenia	January 2018
	Sybille Reitz	Germany	Germany	Slovenia	January 2018
ECOLED	Adven Masih	Russia	Russia	Belgium	February 2018

The map below (Figure 4) shows the distribution of declared ESRs' places of residence and the distribution of the location of the internships in Europe. Half of the applicants lived in France and Germany (four in France, four in Germany) and were enrolled in universities in both countries. Italy (three), Bulgaria (two), Denmark, the Netherlands, Finland, and Russia were the other countries significantly represented.

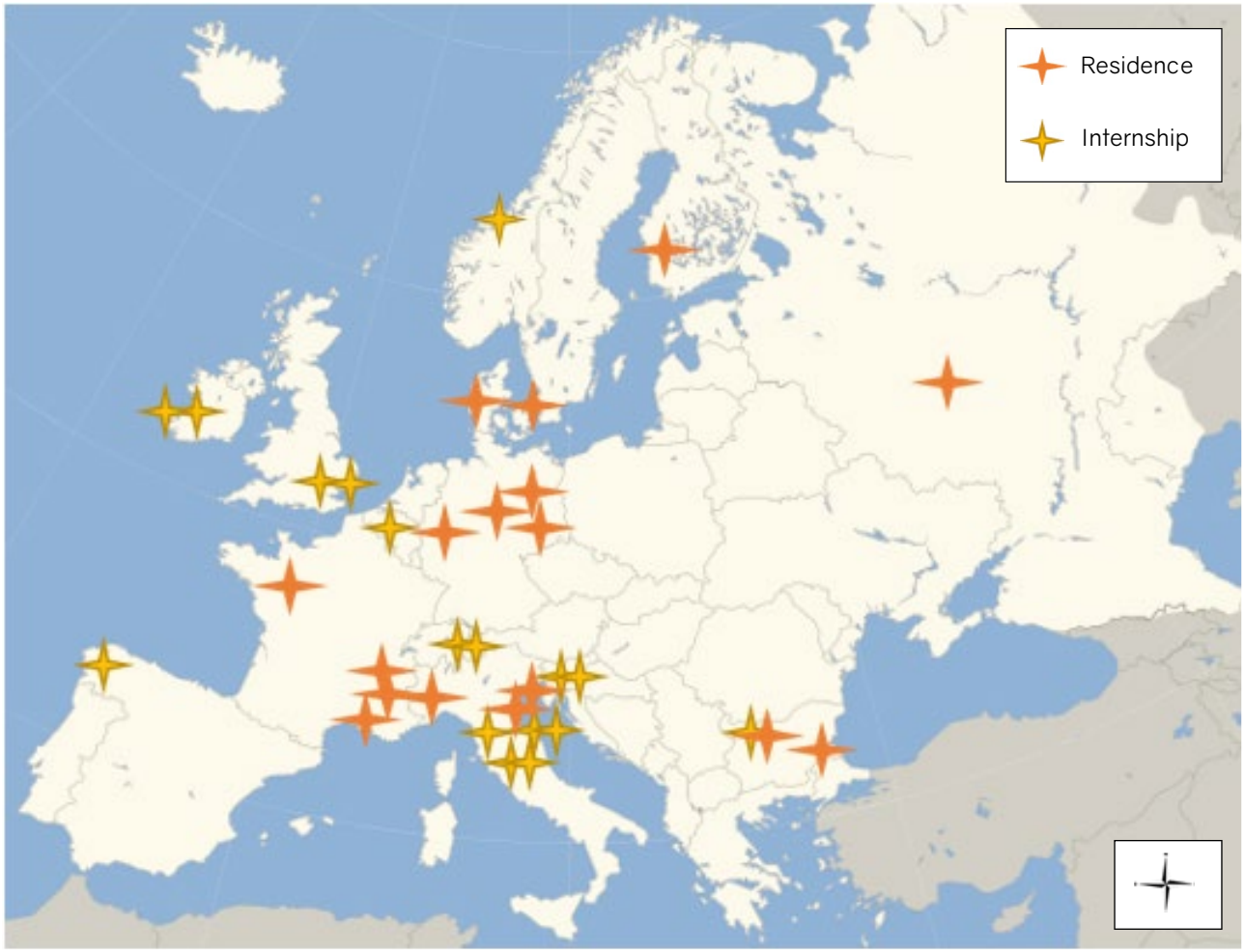


Figure 4. Mapping of places of residence and places of internship of the Early-Stage Researchers

2.5. Internship objectives

The overall missions and detailed objectives of the ESRs during their internships were developed between the ESRs and their hosts. They were mostly aimed at proposing or completing impact and evaluation studies for the projects. Some assessed the technical, economic and environmental feasibility of producing energy resources while others assessed the social acceptability of an energy innovation.

Some project coordinators expressed the need to identify social indicators to assess the social impacts of energy availability and ultimately to better understand the impact of energy supply and innovations on social systems and vice versa. Many of the students worked on exploring social and economic variables, including the development of social scenarios and new policies. They also examined the social effects and barriers linked to and produced by energy policies.

Although it was not necessarily presented as an objective, most of the ESRs had the opportunity to present their doctoral research and their PhD methodology in order to demonstrate the relevance of SSH to energy. They also held many discussions, particularly on interdisciplinarity, and exchanged ideas with several types of stakeholders (professional, institutional representatives, academics, technicians, citizens) during

workshops, meetings, seminars. Those times of knowledge sharing have had a positive effect and changed their perception of interdisciplinary work.

Across the 17 internships, five over-arching themes emerged within which these objectives fell:

1. *Development of survey and evaluation tools*: depending on the ESRs' internship, these were based on qualitative approaches (interviews, observation, comparative case studies, ethnography, Q-methodology), or quantitative approaches (triangulation method, mapping, questionnaires, game theoretic models, optimisation and modelling);
2. *Analysis of the literature* regarding public policies, case studies and comparative studies to provide qualitative and in-depth information on practices, uses and representations related to energy and public energy policies. Moreover, comparisons of policies between countries were conducted as well as comparisons between social and civic practices, including with a gender dimension;
3. *Development of recommendations and advice* about experimentation and tools, the implementation of public policies, energy planning from a sociological point of view, and the organisation and management of surveys of citizens;
4. *Results translation:* the aim here was often to help policy makers understand the implication of the technical results obtained by the team;
5. *A distanced analysis of the host project* itself through an analysis of the exchanges held between colleagues of the project and stakeholders. They were also asked to analyse the interdisciplinary or multidisciplinary dimension of the implementations and tools.

For further detail regarding the objectives of each intern, see Appendix 1.

3. Key findings

Once they had concluded their internship, each ESR completed a report detailing his/her experience during the placement and, if applicable, their collaboration with the other ESR hosted by the same project.[9] This exercise allowed the students to reflect on their research experience in a H2020 project and on interdisciplinary working. It also provided valuable qualitative data for SHAPE ENERGY on the integration of SSH into energy research. This section includes the key findings from analysis of these feedback reports, or 'internship diaries', illustrated by quotes (in italics) from the ESRs themselves.

3.1. Going beyond your comfort zone: working in an multi-, inter-, transdisciplinarity context

The practical, day-to-day work involved in bringing together different disciplines was a key element which the SHAPE ENERGY internship programme enabled exploration of. Overall, one common element in responses was that to work in an inter-, multi-, transdisciplinary context is certainly challenging and obliges us to go beyond our *"comfort zone"* which helps "*to come back to [one's] own research with new perspectives*".

> *[it is an] opportunity to inform research through different perspectives, and constantly reanalyze and reassess the research problem from multiple viewpoints. This can be challenging and necessarily involves wide stakeholder engagement, and pushing beyond one's comfort zone or area of expertise.*

> *I think the experience taught me that being 'pushed outside my comfort zone' and having a steep initial learning curve ultimately leads to a more holistic and rewarding experience and more thorough or at least more robust research as it is steeped in different types of knowledge.*

Working definitions of multi-, inter- and transdisciplinarity were given in the summer school report[4], however the following short sub-sections aim to reflect on how the ESRs saw these concepts themselves, as well as the implications they saw of working in such contexts.

3.1.1. Multidisciplinarity: a juxtaposition of disciplines

For the ESRs, the term multidisciplinary refers to a "*juxtaposition*" rather than a combination of several disciplines:

> *It is the juxtaposition of various disciplinary approaches to one single research topic or object.*

> *It is connecting two or more different science fields through one subject.*

Multidisciplinary research entails "*staying within the boundaries of each discipline*" while trying to solve a common problem approached separately:

9 See Appendix 2 for the template internship diary form each ESR completed.

> *Multidisciplinary research is addressing a same research with several different separate aspects from different angles.*

> *'Multidisciplinarity' refers to a research which is composed of several separate branches of academic disciplines or fields*

> *Multidisciplinarity does not include the search of the links between disciplines, but the research problem is just analysed by different disciplines (Choi and Pak, 2006). The focus is on the problem.*

3.1.2. Interdisciplarity: disciplines working together to solve a common problem

Interdisciplinarity, in contrast, goes a step further than multidisciplinary as it involves going beyond disciplinary limits and perhaps answering questions that one discipline alone cannot tackle:

> *It involves looking at [...] how the different disciplines can be enhanced and extended through collaboration with others from different disciplines.*

> *When people from different disciplines combine their specific knowledge and skills trying to find an answer to a broad research question that is not possible to be addressed only by one discipline.*

This combination of approaches, tools, and methods involves creativity but also a great deal of tension and potential for clashes:

> *It is definitely a very creative yet challenging process, which involves a continuous negotiation between the disciplines.*

Doing so requires innovation and a critical vision of one's own discipline, including its limits:

> *Interdisciplinarity [...] requires an open mind of all researchers and the capacity to re-discuss all your background without losing your way and your discipline.*

As well as requiring a willingness to expend effort in learning new approaches:

> *It involves an element beyond breaking down barriers to build new fields and ways of learning, and necessarily involves new tools to conduct research and analysis.*

All of this can take a great deal of groundwork, for example to build common languages in order to be able to work together, and even new methodologies:

> *A communication channel and a basic language should be built. Only later, can the researchers plan and make their interdisciplinary research, finding the links between disciplines.*

3.1.3. Transdisciplinarity: less well understood?

Finally, the notion of transdisciplinary seemed to be less clear than interdisciplinary, and few ESRs ventured to define it. For those who did, the main idea expressed was that 'trans' implies the total integration and/or transcending of disciplines:

> *Transdisciplinarity is creating a unity of intellectual frameworks beyond disciplinary perspectives*

> *Generating an overall knowledge which embraces all the disciplines.*

3.2. Interdisciplinary work is challenging

As highlighted earlier, however interesting interdisciplinary work may be, the ESRs emphasised that it is challenging and even somehow paradoxical in that it can be strengthened by strong disciplinary voices and knowledge, and thus individual researchers' need to be sure to maintain their disciplinary expertise.

> *The formula of a successful disciplinary integration in a project lies in the paradox outlined below:*
>
> - *Organizing in interdisciplinary teams is a way of achieving an efficient combination and integration of knowledge across disciplinary boundaries.*
> - *The team members must have deep enough expertise within their own knowledge domains and they should be able to integrate it with other knowledge domains.*
> - *Interdisciplinary teamwork tends to broaden the skills and knowledge across disciplinary boundaries that often leads to a decrease in depth within each individual's knowledge.*
> - *In long run, the collaboration might lead to a dilution of disciplinary expertise and hence impaired project performance.*

Interdisciplinarity is about translation

Interdisciplinary implies also an important work of translation:

> *I had some difficulties to understand their lexicon not only because of the jargon but also because sometimes we do use the same words while these words don't necessarily mean the same thing. That's why we constantly paid attention to explain what we meant exactly and we had to agree on a 'code' in order to really understand each other and avoid falling into the trap of a 'functional misunderstanding' that would have let us do the job without facing our own prejudices nor being able to any self-criticism and reflexivity.*

We note here the links with our work on the SHAPE ENERGY lexicon[10], which has also sought to emphasise that 'perfect' definitions do not exist for different terms in energy research. Instead, we suggest this process involves gradually learning and adapting to how other researchers are using terms; it is a very personal process often unique to each research team's make-up. It is interesting to note therefore that this ESR referred to it as a mutually defined 'code', rather than one researcher simply accepting another's definition.

Working between SSH and STEM implies clear objectives on both parts

Lack of clarity can lead to confusion quickly, when the researcher undertaking the work lacks the background to take particular key decisions on which direction to take, or indeed may feel another direction entirely would be most fruitful:

> *While some members of the staff were suggesting me to carry out a more general research on biofuels, others wanted me to restrict my focus to the Norwegian biomass production; while some thought that the economic feasibility of biofuels should have been at the centre of my analysis, others wanted me to look into the more problematic aspects of social acceptance and public biases. Sensing a great distance between me and my colleagues' perspectives on several issues - from the focus area of my work in the [...] project to the amount of time to dedicate to the internship activities - I became sceptical regarding the usefulness of my position in the project.*

3.3. Guidance for a successful internship step-by-step

The ESRs diaries pay testament to the positive contributions of the internship for their present and future experience. For some, it has really confirmed the idea that interdisciplinary is an interesting and useful approach, while others who were already convinced have benefited from their new interdisciplinary experiences.

The first benefit that the ESRs found from the internships was in relation to their overall training and their capacity as researcher to be opened up to a holistic approach to energy problems:

10 Foulds, C. and Robison, R., 2017. The SHAPE ENERGY Lexicon - interpreting energy-related social sciences and humanities terminology. Cambridge: SHAPE ENERGY. https://shapeenergy.eu/wp-content/uploads/2017/07/SHAPE_ENERGY_LEXICON.pdf

> *I think it is important, particularly at a PhD level and as an early-career researcher, to begin to look at problems (particularly related to energy) the way they exist in 'real life' – as cross-boundary, cross-cultural, and not defined solely by the way we have learned to evaluate and analyse issues. [...] I think this perspective is also key in the SHAPE program, where a wide background and differing experiences are valued and encouraged, and early career researchers are encouraged to push and challenge themselves to explore the intersection between different disciplines in energy.*

Moreover, the internship has helped to create the conditions for a dialogue with stakeholders and stressed the importance of this dialogue for the dissemination of research results:

> *This internship provided me the opportunity to link my research to institutional practices, and provide insights on the social dimension of energy policies aiming at helping and guiding local authorities for planning and monitoring energy strategies taking into account the voice and interests of different social groups. This represents a great opportunity to make accessible and usable research findings to policy-makers and experts committed in developing integrated sustainable strategies at regional and municipality level. Thus, the PhD internship has changed the expectations regarding the potential influence of my own research in the political and organizational field, as often in my experience research outputs remain limited to the access and use of academics and do not have significant effect in contextual realities.*

Through the diaries, some common steps appeared helpful to implement interdisciplinarity and ensure effective working together, and these are outlined here, with examples.

Step 1. A clear first definition of the objectives and tasks

"The very first step into our collaboration consisted in the definition of my task as an intern that my hosts wrote down in two different and complementary documents:

- *"Social and Ethical Context of European Decarbonisation. Internship project in response to SHAPE ENERGY Project call for internships";*
- *The internship information sheet required by the SHAPE ENERGY internship organizers before starting the internship.*

[...] these documents were crucial [...] to progressively become familiar with the context of our internships on one hand and aware of the way our work as social scientists is perceived by 'laymen' and may be integrated into a very technical project on the other hand."

Step 2. Getting acquainted with the project and its objectives

"I firstly read through the project proposal and the existing reports of working packages to make myself familiar with ISAAC."

"A second step was the last Skype exchange we all had before we started our internships: the coordinators presented a preliminary study upon social indicators they thought they might be relevant for the MEDEAS model. In doing so, they aimed at giving me an idea of the links between (de)carbonisation and social issues. [...] Thanks to this presentation, I became familiar with the different components of indexes, i.e. the way they are both built and organized."

Step 3. Getting to know each other's academic backgrounds

"When I too presented my work, i.e. my academic trajectory and my disciplinary background and briefly explained the historical features, methodological means and theoretical ground concepts that characterize anthropology. [...] The discussion inevitably led to a kind of... encounter or a confrontation between opposite approaches based upon dichotomies in our disciplinary grounds."

Step 4. Developing a more nuanced mutual understanding of the objectives and tasks

"The fourth, last formal step happened when I had to present my list of objectives to my hosts and co-workers during the first weekly call. It was a way to be sure we were all clear and agreed on what our tasks should be but it also pushed me into an explanation of what STS are as well as a brief presentation of the MLP and the lifestyle approach and the literature upon them. They seemed to be both a bit lost and curious so that they asked me to send them one or two articles dealing with the topic in order to better understand and be able to learn from it."

Step 5. To synthesize "broad perspectives, knowledge, skills, interconnections, and epistemology in a specific setting"

"During my internship, I think the easiest type of collaboration is to discuss and exchange ideas with people from different disciplines. On the contrary, the hardest one is the lack of synthesis – that is, people can provide multiple disciplinary perspectives, but fail to resolve the conflicts and achieve a coherent view of the subject."

Step 6. To present the results to each other in an understandable way

"Preparing a very structured presentation with goals and steps of my research was the key that made the second and third meetings much more organized and, eventually, beneficial. While describing how I had tried to combine the technical information received from [host] and the other staff members together with theories and methods from social sciences and humanities, I sensed that the distance between me and my colleagues was getting shorter. They came with a lot of useful feedback, suggested me specific sources to look into and eventually acknowledged the usefulness and originality of a socio-humanistic point of view."

3.4. Why energy needs interdisciplinarity

The ESRs shared their experiences and thinking regarding interdisciplinary research specifically in the field of energy, as well as of the place of SSH in academic and applied research in the field of energy and sustainable development. Their written critical feedback provides insight into the disciplinary and policy issues of scientific research at the local and global levels.

Energy: a complex issue requiring a holistic perspective...

Energy is a complex issue implying a wide range of actors with different agendas:

> *Bruno Latour, one of the fathers of actor-network theory describes the latter by saying that 'gas pipelines are not made of "gas", but rather of steel tubing, pumping, stations, international treaties, Russian Mafiosi, pylons anchored in the permafrost, frostbitten technicians, and Ukrainian politicians' (Latour, 2013:32). Through these few lines, Latour vividly points out how energy infrastructures can be addressed as unexpectedly dynamic, relational and transformative objects, which comprise many scales and many different understandings.*

Energy is inherently relational in the sense that it involves and affects a large group of diversely positioned people (including in terms of power relationships), places and interests. Energy issues can never be researched without taking into account global and transnational contexts. They necessarily entail expanding and challenging existing frameworks and approaches.

...and different thinking.

> *As Albert Einstein once said, "We cannot solve our problems with the same thinking we used when we created them." I think this concept is particularly pertinent in the field of energy, because just as the problems we face in supplying clean and sustainable energy are not limited to specific disciplines or subjects, so too should our solutions look beyond particular disciplines.*

Collaboration of STEM and SSH is essential to tackle energy issues using different levels of analysis ...

This need to *"begin to work towards sustainable and holistic solutions"* implies the need to include the contributions and perspectives from several academic disciplines because exploration of the development, promotion, diffusion, adoption, and use of technologies requires a multitude of different theoretical perspectives, levels of analysis and methods:

> *For example, regarding the adoption and use of technologies, the attention usually focuses on the micro level of analysis, paying attention to and emphasizing meanings and agency/behaviour of (isolated) individuals, often overlooking the role of wider situational, contextual/physical and relational aspects underlying and influencing/shaping them. This is represented in my view by the mainstream psychological perspective on energy behaviour, which often explains and treat social change as coinciding to the -sum of- individual behavioural change guided by personal attitudes and beliefs mapped and measured with quantitative methods and positivist assumptions.*

Interdisciplinarity can contribute to solutions that are more creative. It will help raise new and unexpected questions. Moreover, this interdisciplinary work need to be across STEM and SSH:

> *Energy problems require the contribution from science, technology, engineering and mathematics disciplines as well as from social sciences and humanities in order that scientific and technological innovations, ecosystem (with its services and functions), and human societies (implying its cultural, legal, political and economic systems) can co-evolve harmoniously together facing global environmental challenges.*

Tackling the energy issue across the micro-, meso-, and macro-level requires interdisciplinary commitment between STEM and SSH disciplines, as well as recognition of the huge variety within SSH and indeed interdisciplinary work between SSH fields which may work on quite different levels:

> - *at the micro-level individual attitudes, beliefs, concerns, values, choices and behaviours with regard to technologies, policies, and the wider social change embedded in low-carbon transition;*
> - *at the meso level, to investigate (interpersonal and intergroup) interactions, communication and relationships with regard to energy issues, such as their role in policy formulation, market and legal innovations shaping technological trajectories and the adoption of low-carbon technologies and environmental protection measures - paying attention to the relational and spatial/territorial aspects of social processes;*
> - *and at the macro level of structure, as for instance institutions, infrastructures, political, socio-cultural, ecological and economic systems representing the wider context in which change occurs or not.*

... and to understand the social, political, economic and technical dimensions of energy.

SSH is essential to understand the social, political, economic and technical dimensions of energy. It stems from the 'relational' nature of energy. Far from being a linear process guided by general attitudes, behavioural change is shaped by numerous factor mediating and moderating the relation between external context, inner processes and action:

> *[...] when the nature of problem and research question is well-defined, integration of theories should focus in my opinion on what levels of analysis are required to tackle and better understand the problem from different perspectives, and to what disciplinary and methodological orientation research should rely to answer to research question so posed.*

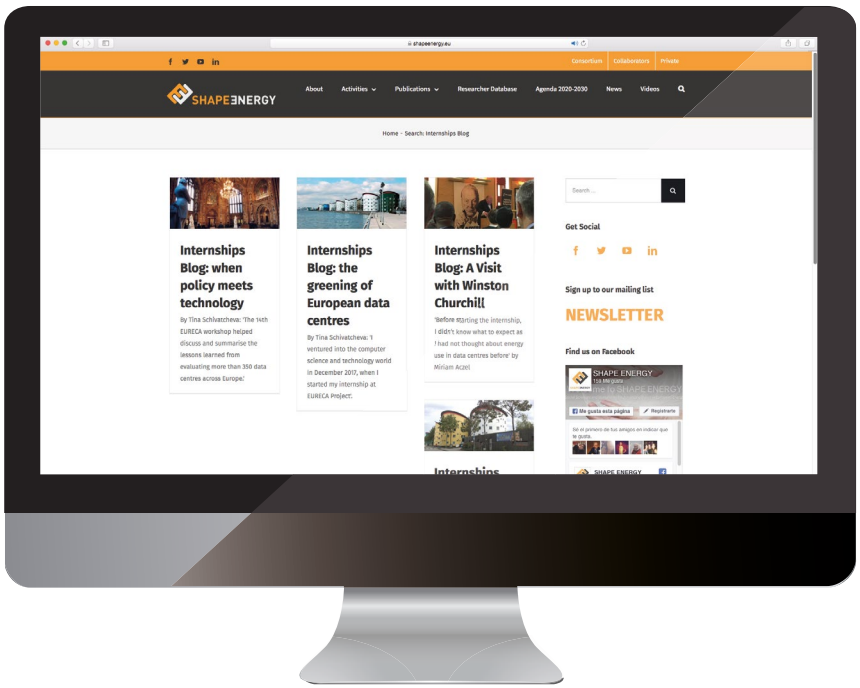
Interdisciplinary work is hard but unavoidable to address energy issues

> *I conceive collaborative work with different disciplines as the challenge for the future, especially for energy and environmental social sciences. It means remain cognizant of the fact that – "nothing advances theory better than tackling a practical problem by integrating different perspectives" (Stern, 2014, p.3, Nature). This means a huge work and attempt to find a common ground in order to communicate and collaborate with other disciplines and theoretical perspectives. A challenge that is for its nature energy/time consuming, but with a strong potential to advance our understanding of the social and human dimension of environmental problems and solutions in a comprehensive way.*

> *Due to its complex nature it is often termed as 'wicked problem' which needs to apply research that combines methods from different disciplines. The uniqueness of energy problems in matters of interdisciplinarity is the solution of such problems which lie in the course of interdisciplinarity which requires an improved knowledge, methodology and collaboration across diciplines such as clean renewable energy, soil science, atmospheric sciences, ecosystem sciences as well as computer science knowledge.*

4. Communicating the internships

The webinar held with interns towards the start of their internship was also aimed at raising awareness of the communication tools of the SHAPE ENEGY project. They were invited to take photos and videos of their experience and work environment, and contribute blogs to the website during or after their internships. SHAPE ENERGY's communications partner Acento Comunicacion collected and utilised a number of images and short films of the ESRs, posted on Facebook, Twitter (including Twitter 'Moments') and the PhD internships section of the SHAPE ENERGY website. These visual and written stories complement the feedback information collected for this report.



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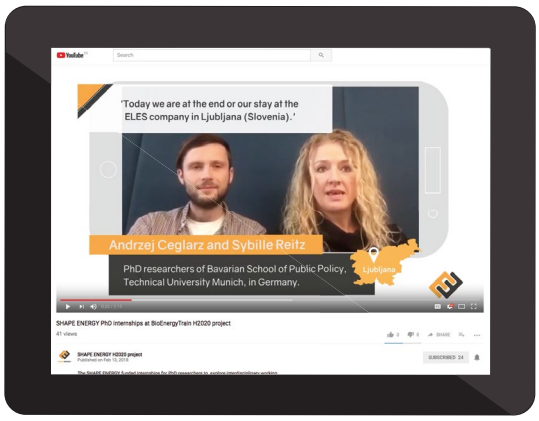

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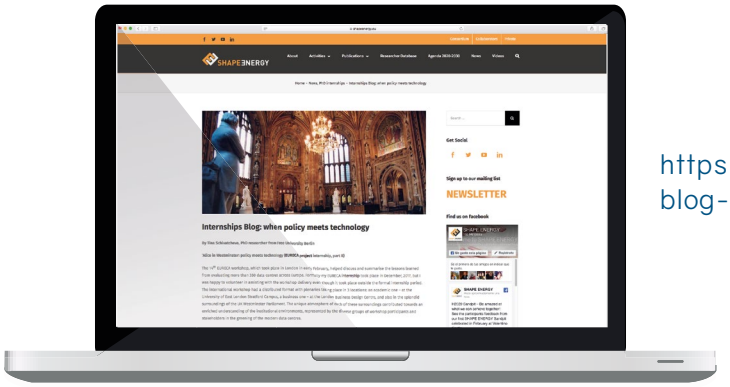

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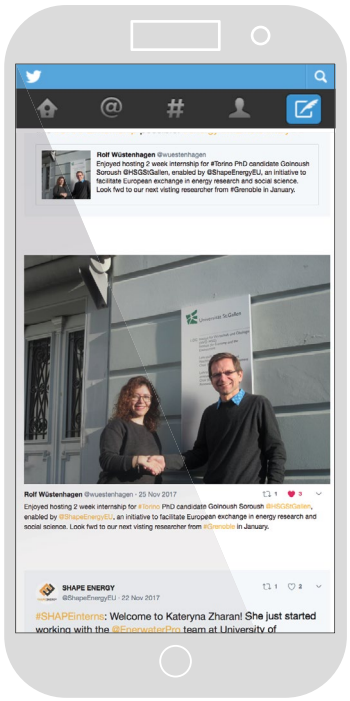

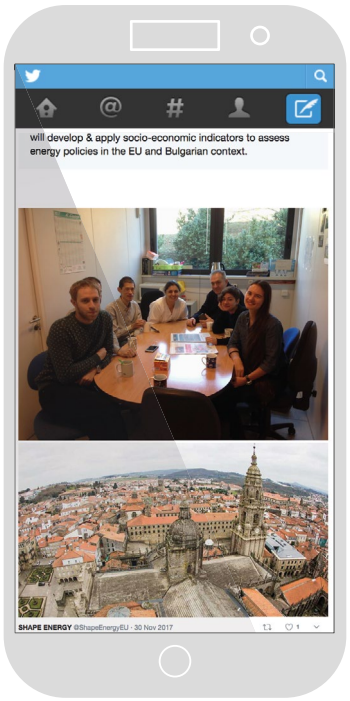

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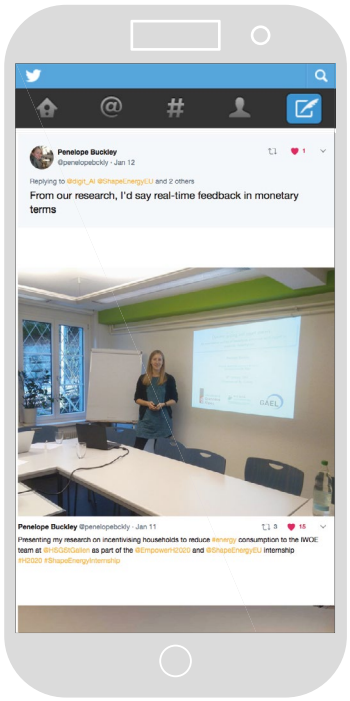

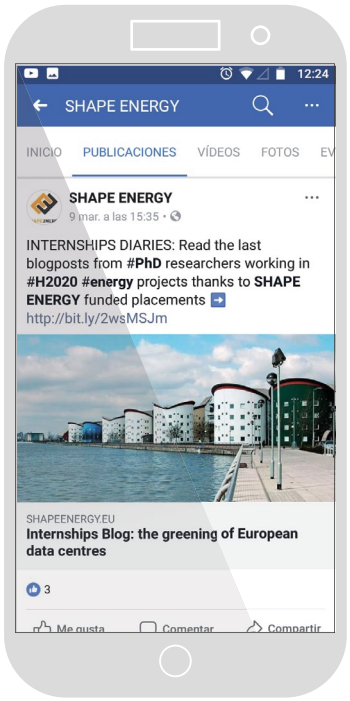

https://www.facebook.com/ShapeEnergyEU/

5. Conclusions

Out of these internship experiences of ESRs within interdisciplinary and multidisciplinary H2020 projects in the field of energy – projects which mostly have a strong STEM emphasis – three different key lessons can be taken.

The first is about the type of objectives that were chosen within these interdisciplinary collaborations; five types of over-arching categories were apparent, and obtained successful results:

1. *Development of survey and evaluation tools;*
2. *Analysis of the literature;*
3. *Development of recommendations and advice;*
4. *Results translation; and*
5. *A distanced analysis of the host project.*

The second is about the setting of a framework to make interdisciplinary work a success. The ESRs stressed that interdisciplinary is rewarding but challenging and has changed the way they understand and frame research questions. However:

- Interdisciplinarity is paradoxical if by working to achieve an efficient combination and integration of knowledge across disciplinary boundaries, interdisciplinary teamwork decreases the depth of each individual's knowledge. This implies that the team members must have deep enough expertise within their own knowledge domains and they should be able to integrate it with other knowledge domains.
- Interdisciplinarity is about translation to be able to understand each other and work in an efficient way; this often takes place in a very tailored way specific to each project and combination of researchers.
- Working across disciplines requires clear objectives on all sides as stressed in the guidance for a successful internship outlined in this report.

The third lesson is about the necessity of working in interdisciplinarity in the field of energy. The ESRs stressed that if interdisciplinarity is hard it is nevertheless needed since energy is a complex technical and social issue involving a wide range of actors with different agendas, and requires creative and different thinking. Within this context the collaboration of STEM and SSH is essential to tackle the energy issue across the micro-, meso-, and macro-level and to understand the social, political, economic and technical dimensions of energy.

6. Acknowledgements

We are thankful to Lenke Balint for her review comments. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731264.

Appendix 1. The ESRs and their tasks

Miriam ACZEL is a student of Imperial College of London and she lives in France. Her internship manager was Rabih Bashroush, University of East London, coordinator of the EURECA project. Her tasks were: to analyse integration of energy efficiency and environmental sustainability in data centres; promoting energy efficiency and sustainability in decision-making processes.

Qiu CHEN is a student of the Center for Development Research (ZEF), University of Bonn. She was hosted by the ISAAC project. Her internship manager was Serena Drigo, of AzzeroCO2, in Rome. Her tasks were: to elaborate and test the data and suggest improvements about a tool on the evaluation of biogas/biomethane production and the socio-economic impact on the territory.

Valeria GUERRIERI is a student of the University of Copenhagen. She was hosted by SINTEF Materials and Chemistry in Trondheim, with the AMBITION H2020 project. Her tasks were: to evaluate the technical, economic and environmental feasibility of integrating biofuels production into today's energy system.

Adven MASIH is a student of the Ural Federal University in Russia. He was hosted by the H2020 project ECOLED. His manager was Sciubba Maria Eleonora, of Sustainable LED Light in Belgium. His tasks were: to explore and define business models for circular economy for the lighting sector; find different models and then make a selection; find out whether circular economy can be used in situations where traditional business models fail.

Soroush GOLNOUSH is a student of the Politecnico di Torino. She was hosted by the H2020 project EMPOWER. Her managers were Rolf Wüstenhagen and Emmanuelle Reuter, Institute for Economy and the Environment in St Gallen. Her tasks were: to question the state of the Italian regulatory environment with respect to decentral energy markets; identify the kind of revisions that decentral energy markets can be implemented in Italy.

Javanshir FOULADVAND is a student of Delft University of Technology (TU Delft) in the Netherlands. He was hosted by the ISAAC project. His manager of the internship was Serena Drigo, of AzzeroCO2, in Rome. His tasks were: to analyse the crowdfunding effect on the territory, propose the best model to be applied for the project; analyse the socio-economic effect of crowdfunding on NIMBY / acceptability of a new plant.

Fulvio BIDDAU is a student of the University of Padova, in Italy. He was hosted by the EMPOWERING project and his manager was Barbara Di Pietro. His tasks were: to participate in project meetings; conduct additional interviews with stakeholders and additional analysis of collected data; to design and administer a Q-method survey revealing social perspectives on regional energy vision; to run a capacity building workshop for regional and municipality public officers.

Jessica BALEST is a student of the University of Padua, in Italy. She was hosted by EMPOWERING and her manager was Barbara Di Pietro. Her tasks were: to analyse territorial energy municipalities from a sociological viewpoint; cluster of homogeneous municipalities for effective energy planning; social guidelines to energy planners.

Katerina Zharan is a student of TU Bergakademie Freiberg, in Germany. She was hosted by the project ENERWATER. Her manager was Almudena Hospido of the University of Santiago de Compostela, Group of Environmental Biotechnology, in Spain. Her tasks were: to design questionnaires to be answered by plant operators and managers (fully); propose a methodology to be carried out with ENERWATER partners, and in particular with water utilities, to estimate the satisfaction, engagement of operators with efficiency at different WWTPs and for different water utilities.

Mariya Trifonova is a student of Sofia University, in Bulgaria. She was hosted by MEDEAS. Her manager was Dr Davide Natalini of Anglia Ruskin University, Cambridge, in the United Kingdom. Her tasks were: to review the effective decarbonisation policies implemented in countries with characteristics similar to Bulgaria; to

conduct an ex-ante evaluation of the social effects and social barriers related to possible decarbonisation policies for Bulgaria.

Pauline CLAUDOT is a student of the Ecole Normale Supérieure de Lyon, in France. She was hosted by MEDEAS. Her manager was Davide Natalini of Anglia Ruskin University, Cambridge, in United Kingdom. Her tasks were: to perform research on social indicators, in particular exploring how they can help in evaluating the social impacts of the energy availability, in Europe and worldwide.

Tina SCHIVATCHEVA is a student of the Free University of Berlin, Department of Political and Social Sciences and University of Cambridge. She was hosted by EURECA and her manager was Dr Rabih Bashroush of University of East London, in United Kingdom. Her task was to address SSH elements in terms of integrating energy efficiency in public sector procurement in the field of data centres.

Andrzej Ceglarz and Sybille Reitz are students of Bavarian School of Public Policy, Technical University Munich, in Germany. They were hosted by BioEnergyTrain and their manager was Maša Repež Gril, in Ljubljana (Slovenia). Their areas of interest were: the policy of ELES regarding the stakeholder's engagement in decision-making processes on development of new power lines; the internal approach to the participation in such project like BioEnergyTrain and the quality of cooperation with other consortium members.

Penelope Buckley is a student of the Grenoble Applied Economics Laboratory, in France. She was hosted by the project EMPOWER and her manager was Rolf Wüstenhagen, Institute for Economy and the Environment, in St. Gallen, Switzerland. Her tasks were to provide feedback on the draft design of a survey of Swiss energy consumers; to participate to the discussion with policy makers; to analyse the effectiveness of nudges vs. financial incentives for promoting electric cars.

Pasi Toivanen is student of the University of Tampere, in Finland. He was hosted by the project ENERGISE and his manager was Frances Fahy, National University of Ireland, Galway. His task was to compare Finnish and Irish energy policy.

Giulia Mininni is PhD student of Keele University and she lives at Grenoble, in France. She was hosted by the project ENERGISE and her manager was Frances Fahy, National University of Ireland, Galway. Her task was to explore gender aspects of the ENERGISE project.

Appendix 2. SHAPE ENERGY internship diary form

SHAPE ENERGY

For too long energy-related Social Sciences and Humanities (energy-SSH) research has been overlooked as an evidence base for energy policy. Consequently, the European Commission (EC) are keen to more centrally utilise insights from energy-SSH, to complement and/or contrast with the Science, Technology, Engineering and Mathemathics (STEM) disciplines that have dominated energy policymaking to date. This has led to EC calls for more policy-relevant energy-SSH research, as well as promotion of greater interdisciplinarity in energy (policy) research. Such moves are hoped to assist in fulfilling its European Energy Union ambitions, which involve: connecting national energy infrastructures; improving energy security; reducing energy use by ≥27% by 2030; and reducing emissions by ≥40% by 2030; to name only a few headlines.

In these contexts, the SHAPE ENERGY* Platform is funding 20 internships in 10 H2020 projects in an interdisciplinary context. We would like you to detail what you learned from that experience.

E-MAIL:

DEMOGRAPHIC INFORMATION

NAME: ..... NATIONALITY: .....

GENDER: ☐ MALE ☐ FEMALE ☐ OTHERS WHAT COUNTRY DO YOU CURRENTLY STUDY/WORK IN?

AGE: ....

Within your report you can highlight sections you feel may be suitable to appear in a blog post on the Shape Energy website. You can also authored and send us a blog post during your internship that will be published on the website.

Personal disciplinary trajectory

- To be completed before starting your internship or at the very beginning and for those working in pair this could be used for discussion (3 to 6 pages).
- What is your academic background? In which discipline(s) have you graduated?
- What is (are) the discipline(s) of your PhD?
- What does "interdisciplinarity" mean for you? Could you explain in what way it is different from "multidisciplinarity" or "transdisciplinarity"?
- According to you, is interdisciplinarity a norm in nowadays research?
- Please write down the story of your own disciplinary trajectory ("disciplinary autobiography"). Feel free to describe whatever you think has an importance in your own history and try to answer some of these questions:
  - What is the academic background of your parents? Of your siblings?
  - How did you perceive and evaluate the different disciplines you were taught as a child and later on in high school?
  - Why have you chosen and studied certain disciplines over others?
  - Think about the influences of your social environment, of your family, friends and/or teachers, as well as the opportunities or limitations you experienced (e.g. related to education supply, education costs, available time and manageable timetables, job market features, etc.) and of course your own knowledge interests and career projects. Please describe what seems relevant to you.
  - Did you experience interdisciplinary courses or projects when you were at school or at the university? If yes, please describe them (place, time, duration, goals, contents, effects and lessons learnt...).

YOUR EXPERIENCE during the internship

- Please complete each section in prose, and cover the prompt questions as you see fit (4 to 10 pages)
- What did you do during your internship?
- What did you get out of this experience?
- How has it changed or not the way you see your own work?
- How would you define what collaborative work with different disciplines means?
- During your internship what types of collaboration have been the easiest?

*The €2m EU Horizon 2020 funded (2017-2019) Social sciences and Humanities for Advancing Policy in European ENERGY (SHAPE ENERGY) Platform.

- Which ones were the hardest? Could you analyse why?
- Did you explicitly discuss interdisciplinarity or exchange information about your own disciplines (courses, methods, literature...)? If yes, please describe the tone and the atmosphere that characterized your exchanges. Did such discussions help you develop a better collaboration at work? If not, why?
- To which extent have you felt obliged to negotiate or reach a compromise or even to give up some of your own ideas, needs and/or beliefs in order to make the collaboration with the project host work and to bring the project forward? Please give some precise examples (situations, discussions, results...). How did that affect you?
- Could you retrospectively detail the steps of your collaboration in the project and describe when, why and how disciplinary debates took place? If applicable, were you able as well as willing to integrate them into an effective interdisciplinary approach of your task?
- What theoretical and/or methodological tools have been developed and/or underutilised in the pursuit of your integration to the project? Was it problematic?
- Have you been able to observe the relationships between the various partners of the project? What were they?
- According to you, what does it mean to be fully part of a team?

Collaboration with the other ESR (if applicable)

- Was another ESR working in the same project?
- Could you describe what the discipline(s) of the other ESR you worked with is (are) and could you explain what this (those) discipline(s) is (are) about (content, methods, theories...)?
- What did you get about the collaboration?
- How often did you meet/get into contact?
- How and to what extent did the quality of your relationship with the other ESR influence both your collaboration and your results?
- What difficulties or problems did you experience while working with the other ESR? Do not focus only on the main and most obvious problems you had, try to think about any little inconveniences, hassles that might have happened. Did you overcome them? If yes, through what means or ways did you work the situation out? If not, why? Did these big or little difficulties have an impact on your wellness and/or motivation at work?

Some last open questions

Please elaborate on two or more of the following questions (2 to 4 pages):

- What do you think is a 'successful' disciplinary integration in a project?
- What do you see as the ontological practicalities of bringing together contrasting theoretical perspectives?
- What are disciplines to you and with what implications for energy policy?
- What do you feel is unique to the 'energy' problem(s) in matters of interdisciplinarity?
- How do you think theories could be innovatively integrated for the benefit of energy policy?
- What type of domination exists in your opinion of some SSH disciplines over others? What is specific to the energy domain?

If you have any queries, please feel free to contact: Dr Delphine Burguet (delphine.burguet@entpe.fr), Dr Nathalie Ortar (nathalie.ortar@entpe.fr) LAET, ENTPE, France.

The feedback document must be submitted at the same time as the activity evaluation questionnaire.

☐ Please confirm you understand information submitted to this call will be anonymised if you wish so (please email delphine.burguet@entpe.fr and nathalie.ortar@entpe.fr) and used for a report that will be made publicly available online.

☐ Please confirm that you are at least 18 years old.

☐ Data Protection: Please tick to confirm you understand that data may be shared with SHAPE ENERGY partners, some of whom are based outside the EU, but all of whom are contractually bound to abide by EU data protection law. Personal data will be held for a maximum of 2 years after the end of the project (i.e. up to 31 January 2021), after which time it will be destroyed.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731264.

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