Towards increased social acceptability of marine renewable energy

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Abstract— **The required decarbonization of our societies needs, amongst other things, the development and mass deployment of renewable energy technologies and related infrastructure – both on-shore and off-shore. Traditionally, such deployment has been considered from a primarily techno-economic (and to an extent regulatory) perspective. However, the scale of the mass deployment required to meet our climate targets means that this is no longer sufficient (if indeed it ever was). The move away from a reliance of carbon intensive fuels has been significantly hindered by public opposition, sometimes to certain technologies themselves, but more often to the siting of particular projects. Effective programmes are needed to educate the public about the technology and to inform prospective host communities about proposed deployments, but also importantly to listen to, and learn from, such communities. This paper presents the work within the SafeWAVE project to develop an education and public engagement framework and create tailored programmes building on lessons of a critical review of selected programmes associated with marine energy and infrastructure deployments.**

Keywords—**marine renewals; education and public engagement; acceptability**

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I. INTRODUCTION

If we, as a species, are to limit global temperature rises meaningfully (never mind keeping such an increase to under 1.5°C above pre-industrial levels – as agreed with the 2015 Paris Climate Agreement), we have only a few decades to practically decarbonize the way in which we organize and live our lives. This will include significant changes in the way we generate, store, and produce energy. Key to this will be the development and deployment of innovative renewable energy technologies in the marine space, including wave energy, offshore wind, and tidal energy.

However, technology innovation on its own is not sufficient to realize a transition away from fossil fuels. Technology adoption and diffusion are quite dependent on the sociological, economic, and socio-political context. For instance, the invention of the aeolipile steam engine did not ignite an industrial revolution in First Century AD Greece, because there was no incentive to use steam power to produce work in a slave-based economy. Indeed, the societal disruption promised by such a use would have been feared [1]. Technology adoption and diffusion requires also a measure of societal trust. The current discussions on the dangers to humanity of artificial intelligence [2] for example, seem likely to slow down diffusion of A.I., for now at least. Somewhat similarly, contrasting societal attitudes across European countries [3] led to substantially different policies on nuclear energy.

Non-technical barriers (whether regulatory, economic, environmental or social in nature) can be a substantial impediment to the deployment of technologies, including renewable energy in the marine space. Perhaps somewhat counterintuitively, while efforts are typically focused on achieving technological breakthroughs, as illustrated by the examples above, non-technical barriers can often be just as difficult to overcome and present a real challenge to the adoption and diffusion of innovations. Societal opposition is a significant challenge for site selection for renewable energy projects and related infrastructure. So much so, that it threatens to substantially slow down Europe's decarbonization efforts. Such is the ambition for the marine renewable energy (MRE) sector in Europe and

elsewhere, that the required infrastructure deployment will not be possible without widespread societal buy-in. Thus, realising the potential for MRE technologies such as wave energy will require both societal acceptance of the technology in general and specific project-level acceptance by prospective host communities for deployment of installations such as wave energy. Cognizant of the importance of engaging the public, within the SafeWAVE project we are working to co-develop and demonstrate a framework for education and public engagement (EPE), specifically aimed at ocean literacy for coastal communities in France, Ireland, Portugal and Spain. This framework aims to go beyond social acceptance, which is often equated to acquiescence to a fait accompli, and is designed to contribute to the development of projects which exhibit inherent social acceptability.

This paper presents work within SafeWAVE to develop an EPE framework with input from communities. First, a critical review of selected MRE and related EPE programmes is described – the methods adopted in each case analysed, key challenges faced identified, and best practices documented. Next, a framework for public education and engagement is presented, which builds on this review and draws from literature across multiple disciplines – including sociology, psychology, political science, and education. Finally, leveraging this developed knowledge the process of devising programmes on ocean literacy around MRE for the focal communities is outlined and described. The paper concludes by discussing the experience of developing the bespoke programmes, outlining emergent feedback from the trialling of key elements of the programmes, discussing experiences and proffering guidance based on lessons learned.

II.   CRITICAL REVIEW OF EDUCATION AND PUBLIC ENGAGEMENT PROGRAMMES

A. Methodology

The critical review involved an exploration of public engagement practice comprising a desk study and review of case studies. Prospective cases were identified through a scoping exercise (which included partners' networks). Inclusion criteria for the cases included: diversity in outcomes; accessibility of literature; and the availability of potential informants. Four of the selected sites were linked in some way with SafeWAVE partners (which assisted in access), and a further two cases were selected to add additional perspectives [6]:

- OWC Mutriku, one of Europe's first commercial wave plant, located in the Basque Country, northern Spain, with installed capacity of 296 kW. Engagement strategy refined to respond to opposition arising from noise impact [7].

- Pentland Firth and Orkney Waters is an area under pressure from MRE and other marine activities. Consultation initially has a very good response, but within a couple of years 'consultation fatigue' had set in [8].
- Biscay Marine Energy Platform (BiMEP), test site located off the coast at Armintza, Spain. Recent discussion about offshore wind have raised fears as this is a special protection area for birds.
- SEM-REV, marine energy test site located off the coast of Pays de la Loire, France. An exhibition centre is to be launched to inform visitors about marine renewable energies to discover and raise awareness of the challenges in the sector.
- Aguçadora, test site in Portugal available to developers for research and project demonstration purposes. Public demonstration was a government-led process in which developers are not involved.
- Wave Hub, offshore renewables energy pre-commercial facility, based in Cornwall, UK. It used internet forums to facilitate discussions between supporters and opponents [9].

First, a systematic literature review was undertaken to identify perceived best practices in EPE of renewable energy projects generally, and to feed into the characterization of the selected case studies. The review was used to gather evidence on public participation, its successes and shortcomings, especially in wave energy contexts. Database searches were undertaken using keyword search constructions comprising words, phrases and Boolean operators. The identified literature was screened for practical (e.g., accessible, obtainable) and quality considerations (e.g., methodology) resulting in a more focused collection of a manageable size [10]. The literature was reviewed iteratively involving cycles of reading, annotating, organizing, summarising, analysing, and finally synthesising [11].

Then, each of the cases were characterized through a comprehensive desk study combined with semi-structured interviews with key informants. Semi-structured interviews contain a number of key questions, allowing the topic to be defined, while also allowing for the areas of particular interest (to either the interviewer or interviewee) to be explored in more detail. This characterization was to explore perspectives on EPE programmes in the case studies. In this task, we stressed the importance of allowing sufficient time and scope in the interview such that interviewees feel that they are allowed to give their point of view and to tell 'their story' [12]. Potential interviewees were identified through a scoping exercise on the selected case studies. Prospective respondents were contacted and invited to participate. A total of seven semi-structured interviews were conducted with informants associated with selected case studies. Interviews were held remotely using video conferencing, with pre-formed interview schedules of concise, open-

ended questions. As required, prompts and probes were used to draw out relevant information, and extensive notes (including where relevant on non-verbal communication) were taken during the interview. Subsequently (pre-agreed) recordings of the interviews were used to complete the notes [10].

The interview notes were analysed through a generic qualitative approach, interpreting and theorising through thematic analysis. This process started with repeated reading of the text until it became familiar, the text was then iteratively ordered, categorized and coded. Codes are described by [13] as *'… a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data'*. Codes were used to segregate, classify, and link data iteratively as themes were identified, and meaning and explanation emerged from the analysis [10].

B. Key Findings

Drawing from the analysis of the six case studies and the desk study, and informed by related work in [12], examples of good practice for designing and implementing EPE programmes are presented below:

Early engagement: reaching out to stakeholders and raising awareness from the early stages of a project is key to promoting understanding and support from local communities. The conventional approach of only speaking to external stakeholders once a decision has been made is counterproductive – this so-called DAD (decide, announce, defend) approach often becomes DADA (decide, announce, defend … abandon). Early communication can act to dispel misconceptions about the proposed development before they have a chance to take root, and importantly can reveal public concerns and expectations that may not even be necessarily within the scope of the development. Open and bi-directional communication of this nature helps to build community relationships. It facilitates developers to appreciate the values and perspectives of prospective host communities enabling them to be considered in the design and realization of the development. Adopting a partnership approach to public engagement and being seen to take local concerns seriously engenders trusts and fosters goodwill which may well be needed as the project is developed [10].

Engaging key informants: identifying and engaging key individuals who act as the voice of relevant stakeholder groups (formally or informally), is critical for the successful deployment of MRE infrastructure. These so-called gatekeepers can play a variety of roles within the context of a development, including monitoring, listening, information sharing, bridge-building and on occasion even advocacy [14]. As one informant suggested *"Find the right person … try to understand issues from her perspective. Once concerns have been addressed it will be less likely for formal complaints to be raised"*. For OWC Mutriku for instance reaching out to the local Mayor was a key

step to both understand the local context of a development and to gain access to communication channels giving a broader reach to stakeholders [10]. Hiring locally trusted people as project liaisons can also be a good approach in reaching out to and building relationships with local communities. While there may be a challenge with scalability with large engagements, the benefits of having local, trusted individuals to engage with communities, respond to concerns and pre-empt issues before there become problems is significant. Moreover, the advantages to having local accents speaking about the project cannot be overestimated [12].

Framing the development: people like to be part of a positive story – positioning MRE projects, for example, as part of a broader, somewhat integrated, response to anthropogenic climate change offers a good constructive basis on which to develop a dialogue with local communities. Most people have pride in their locality, framing a development as contributing positively to the place-based distinctiveness of the area, can also be productive in promoting social acceptability. One informant commented that *"Mutriku is now on the map"* due to hosting an innovative wave energy plant – in other words it was seen as a matter of pride for the community. For other communities, *e.g.*, those with less economic privilege, framing developments in terms of economic growth and job creation may be more relevant. It is important to appreciate the potentially differing relative importance of project attributes to different communities so that project can be framed in such a manner so as to speak to their concerns and priorities [10].

Blended communication: limiting communication to formal processes, can act as a barrier to identifying and resolving potential conflict points early on before positions become entrenched. Both formal and informal modes of communication should be used to create and maintain dialogue between developers and local communities. This communication should involve regular updates on changes to the project, the process and the procedures, as well as ensuring that all concerns and viewpoints from stakeholders (interpreted as inclusively as possible) are addressed in some way. An appropriately designed blended approach to communication can contribute to fostering what [15] describe as a "chain of trust" between the process leaders and local stakeholders. This entails supplementing formal structured communications with informal modes to achieve more effective outreach and to better build and/or maintain trust in the community [10][12].

Building trust: successful deployment at scale requires there to be an element of trust between developers and prospective host communities of MRE projects. If trust is lacking there is a risk of misinterpretation of communications, as all messaging will be seen though a hostile lens. It is important therefore to prioritize establishing relationships and building and maintaining the trust of the community. This includes amongst other

things demonstrating that the development is listening to local citizens and responsive to the concerns raised by the community. If a bad first impression has been made (or indeed trust has been lost) local communities will be suspicious and any action by the developer will be interpreted as hostile, until proven otherwise. It is difficult to recover from such a lack of trust, and it will take time. A good initial start however is admitting when mistakes are made and offering solutions in a collaborative way to address those mistakes – perhaps not always the easiest thing to do.

Quality tailored information: it is important to engage the communities in such a way that promotes the credibility of both the proposed development and the organisations promoting it. Transparency is important and information should be supplied to the public in as open a way as possible, subject only to commercial sensitivity and regulatory requirements. The information offered should be of a high quality and bespoke to the audience (in other words tailored to the sociocultural specificities and socioeconomic realities of the prospective host community). It is important too, in this context, that the any concerns expressed by communities are not dismissed out-of-hand, such (perceived) invalidation undermines communication and will lead to citizens engaging in alternative expressions of their concerns (and potential opposition). Honesty is also important, and notwithstanding the point made previously about framing a development there should be openness and honesty about motivations. There may be a temptation to underplay perceived selfish motivations and possible negatives impacts. However, the public will see through any such attempt, and this will engender scepticism and act to undermine the communication strategy [10][16].

III. FRAMING EDUCATION AND PUBLIC ENGAGEMENT

A. Introduction

As discussed above the deployment of ocean renewable energy technologies, such as wave energy, has the potential to evoke opposition within prospective host communities. In many cases this can lead to social mobilization and associated collective actions objecting to specific deployments and obstructing their realization. Reference [18] forwards three principal rationales for public engagement: Normative: the idea that projects should involve those individuals who have a stake in the decision (*e.g.,* communities impacted by MRE siting decisions); Substantive: a belief that involving the public will improve the decision-making quality by incorporating diverse knowledge; and Instrumental: used as a tool to achieve a specific goal, including e.g., increase acceptance, or foster trust. In this context, SafeWAVE has worked informed by coastal communities in France, Ireland, Portugal and Spain, to develop and demonstrate

a Framework for Education and Public Engagement. This framework – building on the review summarized in the previous section – focuses on ocean energy acceptability (particularly wave energy) from an ocean literacy perspective [17]. The framework aims to go beyond social acceptance, (often equated to a passive acquiescence to a fait accompli) and be designed to contribute to development of projects which exhibit inherent social acceptability.

B. Education

An educational programme in the public sphere is unlike that in a school setting because the way people learn differs according to setting. Participants are much more diverse in public education settings *e.g.,* in term of background, educational attainment, economic privilege, lived experience, *etc*. In institutional settings, instructors build upon a known prerequisite learning base and there is a focus on the acquisition of data and techniques. This approach is not considered appropriate public pedagogy [19]. It neglects people's culture and beliefs, as [20] observes '*An individual's self-identity and the social groups with whom he or she associates have a strong influence on how he or she perceives and contextualizes information*'.

Moreover, opposition to *e.g.,* MRE developments would traditionally have been attributed to people lacking knowledge or understanding – with the idea that such opposition could be overcome by the provision of information in other words giving them the knowledge to fully appreciate the benefits of the project in question. There is a growing realization that such information deficit-based models of instruction are not appropriate in many circumstances, as the issue is not knowledge deficit but rather a lack trust in the technology, the developers and/or those regulating them. Therefore, there is a need to move from traditional models of instruction to a more engaged and dialogue-centred approach in which fact and data are of course presented, but as a means to encourage dialogue, not supplanting it.

C. Public(s)

The way in which an organization considering EPE understands the public is fundamental and will determine the nature and extent of the engagement they will include in any programme [17]. We start from the position that there is not just one public, rather there are many varied publics that can be classified along multiple lines. Thus, developing a public engagement programme requires considering the questions raised by [21], namely: 'which public?' and 'whose public?'. In [17] we propose a simple typology of three types of publics, relevant for EPE programmes, based on their decision-making influence.

- Passive public that are already in existence, they function as mere recipients of information. The pedagogical theme applied is a top-down expert led unidirectional communication. It is assumed

that the public lacks knowledge or understanding and it is they who must change. Engagement for such a public is less costly and a more manageable process. However, such engagement arguably fails on both substantive and normative grounds.

- Participatory public that are already in existence, they are active and function as both providers and recipients of information. There is a participatory pedagogy with bidirectional communication. This public can be thought of as a manifestation of democracy, it comes together with a clear purpose of participating in decision-making processes. Engagement with this public can be instrumental, substantial, and normative in nature, and is considered to strengthen society. It does however require significant resources to implement. There is also a potential problem with self-selection bias.

- Empowered public that may be created from existent groups or newly established. This public is culturally and politically aware, it is active and participatory and the member capable actors, both individually and collectively. They exercise real power in decision making processes. A multidirectional participatory pedagogy is appropriate. This is the most demanding public for those engaging them. They are difficult to coordinate, and engagement requires a long-term commitment, or perhaps even a new entity. However, as a group they are passionate about change, committed participants and can in many ways be considered as democracy (or at least one form of it) in action.

Understanding how the design of EPE programmes influences which public will be engaged and appreciating what this means for the programme is an important starting point for such outreach.

D. Engagement

There has been a rise in recent years in public engagement. Reference [22] notes '... *a renewed focus on dialogue between government and citizens, and deliberation among stakeholders in the process of deciding priorities and actions.*' They go on to distinguish between episodic public 'consultation' and the presumably more sustained activities involved in 'engagement'.

While there are a number of approaches to categorizing public participation. Arnstein's seminal *ladder of participation* remains influential. It comprises eight rungs of participation with an assumed hierarchy. The bottom two levels (labelled manipulation and therapy) are considered non-participation, while the middle three (informing, consultation, and placation) are perceived as tokenism and the upper three (partnership, delegated power and citizen control) indicating citizen power [23]. Drawing from this work and informed by the three types of public discussed in the previous section, in [17] we

propose three levels for EPE. Each of which is mapped to one of the aforementioned publics.

Consultation maps to the previously described passive public. The objective of this type of EPE is to educate in accordance with the information deficit model of instruction. This form of engagement, which remains the most prevalent represents the least active form. However, this is not necessarily bad, there are occasions when a unidirectional top-down form of engagement is warranted, (*e.g.,* disseminating public health guidelines). Nevertheless, it is true that consultation forms of engagement have been used, and continue to be used, when a more participatory form is justified. They can lead to lack of trust amongst the public.

Collaboration maps to the so-called participatory public, it envisages an increase in public participation and an emphasis on two-way communication. It attempts to capture the public's values, concerns, and knowledge and ensure they are incorporated into a consensus-building, decision-making process. The focus in this process is not the act of decision making per se, but rather the process by which it is achieved. The form of engagement stresses the importance of dialogue and reasoned discussion. The emphasis on talking rather than voting is in keeping with deliberative democracy ideals and methods. Although some people will change their minds following such reasoned debate, the vast majority will not. However, the process itself contributes to mutual understanding, and while there may not always be a convergence of opinion, this understanding contributes to the legitimacy of the process and its outcomes.

Co-creation is mapped to the third category identified previously: the empowered public. In this form of engagement, a quadruple helix partnership involving government, academia, business, and the citizenry is formed to explicitly achieve change. The process is still deliberative, but the public have greater representation / influence in the decision-making processes. In this form of engagement governments and other institutions are required to listen to citizens and meaningfully engage with their opinions, perspectives and priorities. The process is intended to be more responsive to the voices of the public and less concerned with '*ritualistically carrying out invited public engagement processes as an end in themselves*' [24]. This is a relatively novel approach to engagement and while there may not be lot of case studies, lessons can be drawn from the emergent practice of living labs, which overlaps to a significant degree.

E. EPE framework

In [17] we forward a framework for education and public engagement that builds on previous sections. As shown in Fig. 1 below, we consider the EPE framework to be based on five components, namely: (1) the context in which the EPE is being created and delivered, (2) the approach taken to education, (3) the nature of the public

being addressed, (3) the type of <u>engagement</u> envisaged, and (4) the desired <u>outcome</u> from the programme. For each of these components, drawing from the work outlined above two guiding principles are suggested to enhance the effectiveness of the programme.
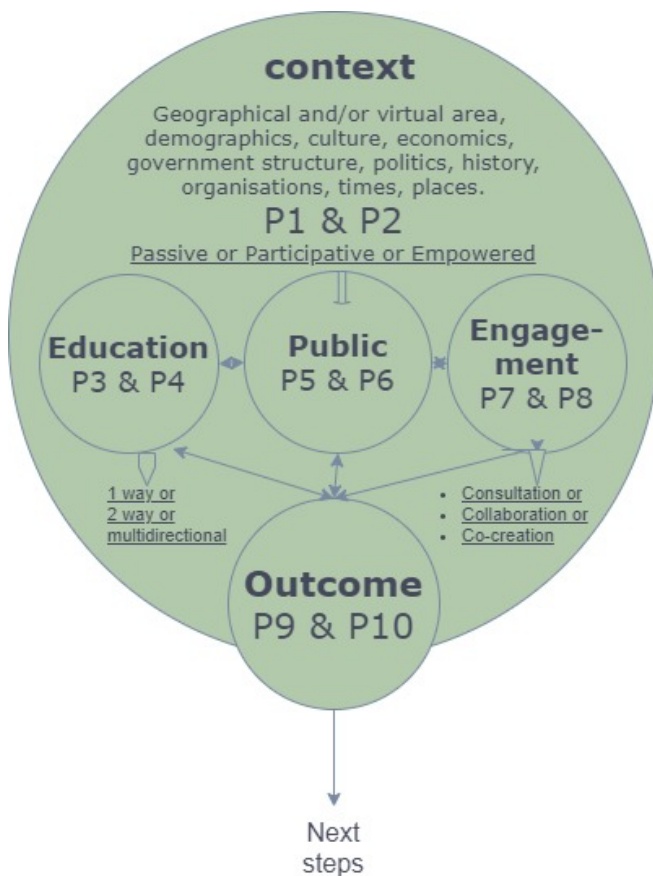

Fig. 1. Schematic of EPE framework and the associated principles

<u>Context</u>: Each programme should reflect the circumstances of the EPE process, it must speak to the intend audience, reflect the socio-political, and economic contexts and be informed by the geographical, socio-cultural, historical background to the engagement.

- *Principle 1*: the programme should be reflexively planned – it should be adequate to meet the needs of participating and nonparticipating stakeholders. Ideally, if done right, participation begins at the very first stage when key actors (*e.g.,* stakeholders, community leaders, subject experts, and facilitators) gather to plan and organize the programme.
- *Principle 2*: the programme should make a difference – not only to the object of its concern, but also be seen to have been worthwhile to participants and the wider community. If the EPE programme was impactful in this way, citizens will develop a sense of ownership of the results that their efforts helped to bring about.

<u>Education</u>: This component should ideally be bidirectional or multidirectional. There will be information that the programme wants to communicate,

but additionally the public will have information that may be of benefit to the programme. It should be considered a dialogue not just between the programme and the public, but also between members of the public.

- *Principle 3:* the programme should facilitate open and interactive spaces for learning. Active listening needs to be practiced and encouraged by all sides. All participants should be treated with respect. The inclusion of diverse voices is not tokenistic, rather a recognition that there is knowledge in the experiences of all people. Ideally, during the programme new understandings are generated and new possibilities discovered.
- *Principle 4*: the programme should foster respect and transparency. If facilitators have a respectful attitude and act in a fair and transparent manner, participants are more likely to trust the outcome of a process. If participants trust that that they were listened to, and that their perspectives were meaningfully considered, they are less likely to oppose an outcome even when they disagree.

<u>Public</u>: EPE programmes should reflect that the public is not a single homogenous monolithic group. There is no one public and the understanding the different publics that will be engaged is a vital part of EPE planning.

- *Principle 5:* the programme should strive for both inclusivity and diversity. It should be based on an inclusive process capturing a broad range of voices, including those who may be at the margins of society, and perhaps particularly marginalised in decision-making processes. Hard to reach groups might require special effort, but it can be worth it. Diversity is just as important as representativeness (if not more so) in ensuring a range of opinions are heard by the programme.
- *Principle 6:* the programme needs to have flexibility inherent in its design, so that it can respond to stakeholder needs – without becoming a 'farce of inclusivity'. Part of this involves using a variety of approaches and tools as different people favour different modes of engagement. Another example is responding to people's linguistic differences and preferences should be reflected in the programmes outreach.

<u>Engagement</u>: An EPE programme is about enabling (members of) the public to participate in agenda-setting, decision-making around a particular project or initiative. The engagement strategy selected reveals to a large extent how they conceive of their public(s) and the approaches they favour for educational outreach.

- *Principle 7:* the realization of a EPE programme should be seen as a collaborative partnership. Those implementing the programme should do so on an equal footing with participants, such a collaborative approach will improve the chances of success). Ideally, organisers and participants

deliberate and construct a shared vision with differences explored instead of ignored.

- *Principle 8*: the programme should encourage actionable dialogue. The process should be designed to follow a path through learning and discussion so that participants can build on previous insights. Priority should be given to participant discussions over expert presentations. Realizing actionable dialogue requires participants to reduce defensiveness and explore '*underlying shared "field" of meaning in which the interactions and conversations take place*' [25].

Outcomes: an EPE programme should not just be about meeting administrative requirements. The programme is a beginning, it is not an end in itself and the most successful programmes position themselves as part of a larger culture of civic participation. Explicit clear objectives and goals should be established for the programme to ensure it achieves what was intended.

- *Principle 9:* the programme should be designed to meet measurable goals. Such goals should lend themselves to defining performance indicators to evaluate the effectiveness of an EPE programme. Ideally, participants would be involved in the evaluation process and the evaluation results communicated back to the participants after the programme – maintaining the dialogue and sense of partnership. Insights from the evaluation can be applied to the improve the design of future EPE programmes.
- *Principle 10:* the programme's outcome should include a co-created plan for action. Concluding an EPE process with a defined plan for next steps reassures participants that their efforts were not wasted and that their contributions were valued. Ideally, the co-created action plan would include concrete deliverables, timelines, assign tasks, and define reporting responsibilities.

IV. DEVELOPING TAILORED ENGAGEMENT PLANS

A. Overview

Building on the framework for education and public engagement discussed in the previous section as presented in [17], the SafeWAVE project is developing and trialling four EPE plans for wave energy tailored to specific sites in France, Ireland, Portugal, and Spain. These EPE plans use the seven principles of ocean literacy as a framing mechanism to communicate about wave energy and the implications of prospective deployments in these sites. In particular, the EPE focuses on ocean literacy principle #6, the idea that the ocean and humans are inextricably linked.

Following the framework discussed above, in the development of these plans, EPE is seen as a process, not a product. The plans focus on how the EPE programmes should be implemented, given the specificities of the four focal sites. The developed plans are not intended as step-by-step roadmaps for implementation. Rather they are guidelines which suggest and provide resources for both different engagement techniques and indicative curated content.

B. Examples of activities

For each of the three levels of engagement discussed previously, we outline below some examples of the types of activities that could be implemented.

Consultation
- Virtual presence.
- Media content.
- Information campaigns.
- School programmes.
- Demonstration activities.

Collaboration
- Polls, surveys, and/or questionnaires.
- Focus group.
- Facilitated water-user forums.
- Town meetings or other similar dialogue sessions.
- Collaboration clinics.

Co-creation
- Web-learning site.
- Community education/training initiatives.
- Citizen science activities.
- Summer programme.
- Open access (copyleft) training material for use by third parties.

C. Learning areas

Six common learning areas have been identified for the EPE plans. While not all will be addressed at each stage in the EPE plan, over, the course of an entire programme it would be intended that citizens would be engaged in dialogue around these topics.

- The seven principles of ocean literacy are introduced in this initial learning area: the Earth has one big ocean with many features; the ocean and life in the ocean shape the feature of the Earth; the ocean is a major influence on weather and climate; the ocean made the Earth habitable; the ocean supports a great diversity of life and ecosystems; the ocean and humans are inextricability linked; the ocean is largely unexplored.
- This learning area drills down on the principle that humans and the oceans are inextricably linked. Understanding that an ocean literate person is one who can make informed decisions regarding the ocean, the importance of the ocean to humankind is explored enabling participants to communicate about the ocean in a meaningful way.

- The interaction of <u>climate change and the ocean</u> are explored in this learning area. Drawing from a variety of resources this area will consider topics such as *e.g.,* sea level rises, ice volume changes, storm surges, hurricanes and climate, impact on ecosystems, *etc*.
- <u>Ocean wave basics</u> will be introduced in the fifth learning area. It is important for participants to understand some basic ocean wave physics so that they can get a sense of the factors involved in creating a device that converts the motion of waves into electrical current.
- Building on the previous learning area, here different <u>wave energy converters</u> (WEC) will be presented to the participants, so they can gain an appreciation of the technology involved. Audio-visual resources will be used to introduce technologies such as oscillating water columns, point absorbers, rotating masses, *etc*.
- <u>Community ocean renewable energy</u> will be explored in those area will the community have mobilised to explore the potential of wav energy. In this area topics of interest to such collective actions will be explored including, *e.g.,* community coaching, organizational development, advocacy, and financing. *etc*.

D. EPE content

As explained above, the ocean literacy informed EPE programmes of the SafeWAVE project will engage local citizens in a dialogue about their relationship to the ocean and its influence upon their lives consistent with the UN's framework for action for ocean literacy and introduce participants to the science and technologies of ocean wave energy conversion as an expression of that literacy. Learning in an EPE programme is a process of discovering and constructing knowledge. The specifics of what is learned cannot be (completely) dictated beforehand, as they arise out of the process. Therefore, it can be seen that the significance and real value of the EPE plans resides in the processes and techniques (some of which are mentioned above) rather than in the specifics of the material being delivered.

It is however also important to consider the type of indicative content to be used in the realization of the EPE plans. While the plans do include some original (and interesting) content *e.g.,* infographics, leaflets, videos, learning games, soundscapes, *etc*. – most of the content is sourced from external third parties. This external content has been curated (selected, organized and presented along with suggestions for use) by the project team so that they meet the needs of the planned EPE processes and that they are suitable for end-users in the different focal sites. Different content has been curated for activities and modes of communication including *e.g.,*

- Slide decks for use in workshops and other meetings.

- Short video content for use in workshops and dissemination through social media.
- Longer video content for use in outreach engagement and for web content.
- Learning games for use in workshops and school programmes.
- Infographics for used in leaflets and on social media.
- Podcasts for additional information in participants' own time.

In trialling some of this content, the provenance of material has emerged as key to the credibility of EPE programmes. Participants are much more likely to accept the bone fides of content from perceived independent organisations of high standing including e.g., European Commission, government agencies, universities, public broadcasters, *etc*. Content sourced from industry or industry-aligned groups are less likely to be accepted at face value and may need to be contextualized. In any event the source of any content should be made known, by means of giving credit, but importantly to provide transparency to the EPE process.

Other findings from the early stages of the trialling are reenforcing the lessons from the review of EPE described earlier, including:

- Engagement cannot begin too early.
- Value of community liaisons.
- Advantages of a blended approach to communication.
- First impressions count.
- Need for good quality information.
- Listening is also part of communication.
- The way in which a project is framed can be important.
- Important to know your audience (and respond to it).

Future work involves the continued trialling of key elements of the EPE plans in the four focal sites, the development of community-informed performance indicators and their use to evaluate the plans, and finally the documentation of the process and its outcomes.

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