**TITLE:** **HYDROPOWER-EUROPE**

**Proposal acronym:** **HYDROPOWER-EUROPE**

**Duration:** 36 months

**Requested EU Contribution:** **€993,571**

**Type of action:** Coordination and Support Action

**Work Programme topic addressed:** LC-SC3-CC-4-2018
Building a low carbon, climate resilient future
(2) Hydropower Sector

**Keywords:** Energy, fuels and petroleum engineering

**Free words:** Renewable Energy, Hydropower, Research, Innovation, Technology Roadmap

| Part. No | Participant organisation name | Country |
|---|---|---|
| 1 Coordinator | International Commission on Large Dams (ICOLD) | France |
| 2 | Samui France SARL (SAMUI) | France |
| 3 | European Association for Storage of Energy (EASE) | Belgium |
| 4 | Association of European Renewable Energy Research Centres - EUREC EESV (EUREC) | Belgium |
| 5 | VGB PowerTech e.V. (VGB) | Germany |
| 6 | ZABALA Brussels SPRL (ZABALA) | Belgium |
| 7 | European Renewable Energies Federation (EREF) | Belgium |
| 8 | International Hydropower Association (IHA) | UK |

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# 1 Excellence

## 1.1 Objectives

### 1.1.1 Context

The Energy Union Strategy proposes a fundamental transformation of Europe's energy system with the ambition to achieve a low-carbon climate-resilient future in a cost-effective way.

**One of the best energy contributors towards a low-carbon climate-resilient future is hydropower**. Hydropower has the best recovery of gain factor of primary energy (i.e. the best ratio of produced energy by a power plant during its life time compared to the expense of other non-renewable energy sources during their production life time (Frischknecht et al. 2012 & Schleiss 2017)). Moreover, hydropower is a very flexible energy supply which can be used to store and supply electricity generated by other sources, so providing an essential link for aiding the integration of different renewable supplies within the grid.

Europe has the ambition to be the world number one in renewable energy. To fulfil this objective, it must **lead the development of the next generation of hydropower technologies, and to integrate its high storage and flexibility capacities into the current energy system,** efficiently and cost-effectively.

The Integrated Strategic Energy Technology (SET) plan draws up the framework for moving to more sustainable, secure and competitive energy sources; the H2020 Research and Innovation (R&I) program constitutes a crucial pillar of the SET plan to help fulfil this objective. The growing commercialization of off-shore wind and photovoltaic (PV) technologies are the main successes of this strategy based on innovation and attractive market support. Knowing that about 70% of the economically feasible hydropower potential is used so far within Europe, and dialogue is required to balance positive and negative views with different stakeholders (see campaign "save the blue heart of Europe" of Riverwatch and EuroNatur), a **comprehensive roadmap is needed for the sustainable use of existing hydropower and the development of the untapped hydropower potential under environmental and socio-economical constraints**.

**Europe is the cradle of hydropower**. The two main world associations addressing hydropower infrastructures and equipment, ICOLD (1928), IHA (1995) are based in Europe, and they were joined by VGB in 2000 and by EASE in 2011. Europe hosts many companies involved in this field (operators like EDF, EDP, ENEL, ENGIE, ENBW, IBERDROLA, PPC, STATKRAFT, UNIPER, VATTENFALL, VERBUND, manufacturers and suppliers like ANDRITZ, GE Hydro, VOITH, consultancy companies like PoÏry, RSW, Tractebel, Sweco, and construction companies like Impregilo, Skanska, Strabag). However, currently, within the energy sector, investments for wind and photovoltaic generation have increased sharply (triggered by favourable market support mechanism in some countries), while investments decrease for hydropower due to the distorted and low prices of the European electricity spot market. Moreover, most of the current investments by the most important European hydropower stakeholders are made outside of Europe. Although Eurelectric has been focusing on political advocacy in hydropower for more than two decades, **the hydropower industry needs support from Europe to fuel economic growth and job creation.**

At the same time, in this difficult period, the European associations representing hydropower to the European Commission, namely the Hydro Equipment Association (EHA) and the European Small Power Association (ESHA), collapsed, leaving the industry isolated and without support. There are a lot of technical associations, but **representation as one voice is missing for discussion with the European Commission or public authorities especially regarding further development and research needs in the hydropower sector**.

Hydropower in Europe is undergoing a great number of future challenges (see Section 1.2.1). To face this unique set of policy, environmental, societal, technological and market challenges, **the hydropower sector needs to become more cost competitive and find novel approaches to future development in accordance with environmental and social demand**.

The **H2020 LC-SC3-CC-4-2018**: "Support to sectorial fora" provides a **unique opportunity** to develop a roadmap of research and innovation for new hydropower technologies and innovative mitigation measures. It offers a fundamental step to support the industry, to provide a cost-effective energy strategy, an effective contribution to climate change adaptation, to preserve the environment and to respect the societal demands defined by an honest and transparent public debate.

### 1.1.2 OVERALL OBJECTIVE

The HYDROPOWER-EUROPE project is built on the ambition to achieve a research and innovation agenda and a technology roadmap for the hydropower sector, based on the synthesis of technical fora and transparent public debates through a forum that gathers all relevant stakeholders of the hydropower sector.

### 1.1.3 SPECIFIC OBJECTIVES

To achieve these goals, three specific objectives will be pursued:

1. To engage all relevant stakeholders
2. To address the challenges and prioritize needs.
3. To write and disseminate the R&I agenda and the technology road map.

The actions required to achieve these objectives are presented in Table 1-1. These actions are gathered within three work packages, as reflected by the shading (see Section 1.3.1 and Figures 3.1 and 3.2).

Table 1-1 Expected objectives and associated actions

| | **Specific objectives** | | |
|---|---|---|---|
| **Specific actions** | **1 - The engagement of all relevant stakeholders** | **2 - Addressing the challenges by identifying needs** | **3 - Writing the road map and the R&I agenda** |
| **Action 1** | 1.1 Mapping of all relevant stakeholders | 2.1 Collection of up to date information | 3.1 Synthesis of expected development & research needs |
| **Action 2** | 1.2 Creation of Consortium Online Work Area | 2.2 Links to up to date information | 3.2 Prioritization of expected research needs for the coming decades |
| **Action 3** | 1.3 Management of technical fora, working groups & data processing | 2.3 Identify needs from basic science, research and industrial value chain | 3.3 Innovation agenda for hydropower infrastructures and equipment including digitalization in operation and maintenance |
| **Action 4** | 1.4 Management of workshops on social and environmental impacts & data processing | 2.4 Identify needs for agreement between industry, civil society and authorities | 3.4 Technology road map |

## 1.2 Relation to the work programme

This proposal relates to "Support to sectorial fora" LC-SC3-CC-4-2018, item 2: "bringing together stakeholders of the hydropower sector in a forum**"**.

### 1.2.1 Understanding specific challenge

The objective here is "Building a low-carbon, climate resilient future" to boost innovations, to support EU competitiveness, to improve quality of life and to protect nature. This unique set of policy, technological and scientific challenges deeply changes the relation between consumers and generators. To address this in a democratic, efficient and transparent way requires the engagement of all stakeholders within the hydropower sector.

#### *1.2.1.1 Unique set of policy, technological and scientific challenges*

A transformation of Europe's energy system is underway. Wind and photovoltaic have seen a rapid decline in their costs. This has propelled them to the position of the most commonly installed form of generation capacity within Europe, whilst at the same time hydropower development is becoming more and more difficult, due to economic boundaries and public acceptance.

However, wind and solar energy output is variable. This implies a need for compensatory flexibility elsewhere within the energy system and requires the increased use of all types of storage technologies, including hydropower, to help balance the grid and manage this variability. This could be found in re-purposing hydro plants as a source of balancing power, and through the use of pumped-storage plants, which are the cleanest and most cost-effective form of energy storage existing today (https://setis.ec.europa.eu/setis-reports/setis-magazine/power-storage/europe-experience-pumped-storage-boom).

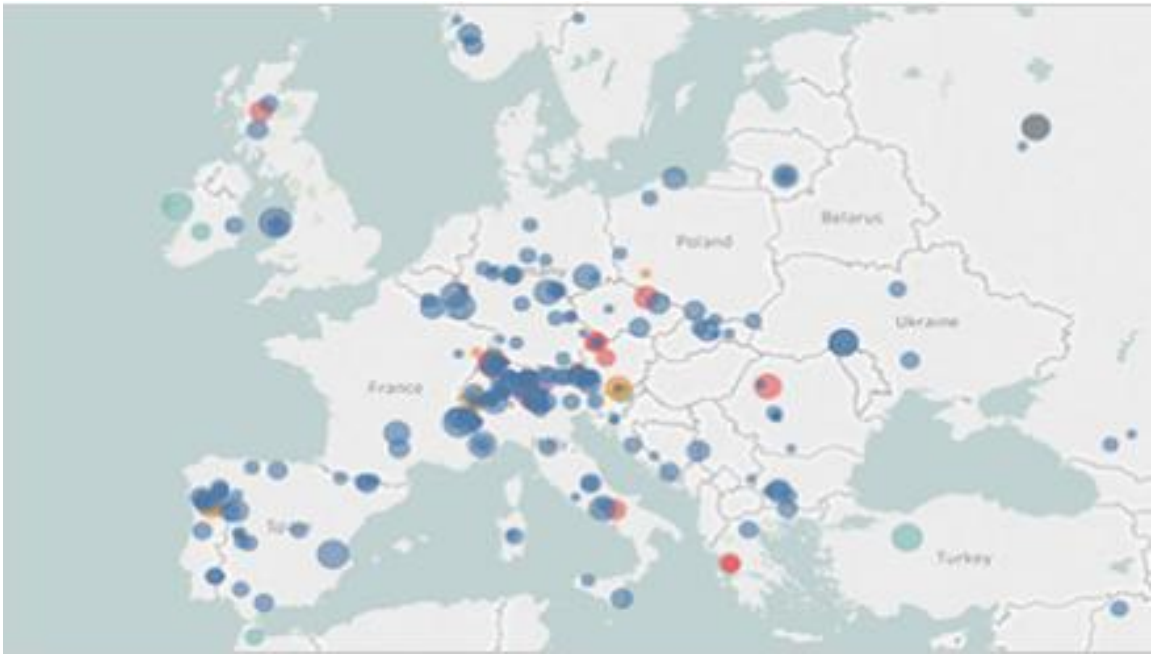



Figure 1-1 The pumped-storage plants in operation in Europe (IHA 2017)

Different views need to be balanced against each other to determine hydropower's future role. These include: maximising production versus concessions to fish-friendliness and nimbyism, which can add to costs. Hydropower's role will also affect technology choices; for example, to design plants for efficiency of operation at optimal steady state or for consistent but lower efficiency over variable electricity output (or input, if pumping).

Thus, technological and scientific responses need to be found for rapidly emerging policy challenges. No longer is the goal of hydropower plant operators to generate the lowest cost electricity, but rather they are challenged to seek out value in the electricity market while operating and building plants in environmentally sensitive ways.

Through the transformation of Europe's energy system, hydropower is experiencing a lot of challenges - see Table 1-2.

Table 1-2 Set of policy, technological and scientific challenges for Hydropower

| Europe goals | Hydropower challenges |
|---|---|
| A low-carbon climate-resilient future | To address uncertain social, economic and political views considered within the design and the construction of new hydropower plants or the extension of existing ones (demonstration of limited impacts, convergence of national legislation and drop of taxes) |
| Fundamental transformation of Europe's energy system | To adapt existing infrastructures to increase their efficiency of generation and achieve higher operation flexibility during seasonal and daily peak demands |
| Fundamental transformation of Europe's energy system | To respond to new and highly fluctuating demands causing new and more demanding operation regimes |
| Fundamental transformation of Europe's energy system | To contribute to adequacy improvement-extension of the transmission lines/ grids connections at national/international scale |
| Sustainability | To contribute to autonomous economic sustainability |
| Sustainability | To further increase public security by including improvements of resilience of infrastructures and operation of power plant operation: cybersecurity, digital innovations |
| Sustainability | To optimize environmental flow releases, fish migration and sediment transport dynamics; |
| Sustainability | To design multipurpose schemes which includes added value for the local population in order to obtain wider acceptance |
| Hydro marine solutions | To improve marine technologies and to combine tidal energy projects together with additional services (Shore protection, Multi-energy solutions, tourism, sports, cultural activities development) |
| Mitigating effects of global warming and climate change | To mitigate production changes due to effects of future climate forcing, which are expected to impact water availability (droughts, water scarcity, more floods) |
| Mitigating effects of global warming and climate change | To improve safety of structures and operation in view of increased natural hazards (floods, landslides, sediment evacuation, floating debris) |

Addressing each of these challenges is at the heart of the HYDROPOWER-EUROPE project. The scope of these challenges is very large and requires consultation with all actors within the Hydropower value chain. During this consultation process, additional challenges to those above may well be identified and included. **By creating the Hydropower forum and implementing an extensive programme of consultation, we will identify and prioritise the steps needed to address all of these challenges** via creation of the Research and Innovation Agenda (technical actions / specifications) and the Technology Roadmap (programme for implementation).

#### *1.2.1.2 Changes to the interrelations between all actors*

HYDROPOWER-EUROPE shall help to change relations between stakeholders, change the relation between hydropower and other sectors and manage future conflicts, by aligning views of industry, civil society and authorities, based on science and innovations.

The HYDROPOWER-EUROPE project will align positions and opinions of all relevant stakeholders with European objectives. This will be done by focussing on supporting the development of technological advances complemented by activities facilitating the market uptake of energy technologies and services. By including broader stakeholders view the project shall foster social innovation, remove non-technological barriers and promote standards. This will be undertaken through a process of transparent, democratic and scientific debate facilitated by the HYDROPOWER-EUROPE forum.

Specific and successive actions will be to:

- gather all relevant stakeholders,
- establish the current status of hydropower science, industry and generation,
- understand the current relations between all relevant actors in the hydropower value chain,
- gather the research and innovation needs of all relevant actors in the hydropower value chain,
- understand how energy system transition and policy against global warming will change relations,
- anticipate changing roles in the economy (potential application of the flexibility of hydropower,...),
- support new "clean technologies" innovation (share and integrate digitalization…) within a R&IA,
- find the right balance between positive and negative views, allowing consensus between stakeholders,
- use all of the outputs from this process to produce a technology roadmap, paving the way for the future,
- foster synergies between EU and national funding streams,
- coordinate with the European SET-Plan, with other stakeholder activities in the context of energy transition, specifically the ETIP-SNET and EERA

#### *1.2.1.3 Engagement of all stakeholders*

The Technology Roadmap (TR) and Research and Innovation Agenda (RIA) in the hydropower sector, targeting an energy system with high flexibility and renewable share, is the final step of a three-step process, of which the first step is the engagement of all stakeholders (
Figure 1-2).


Figure 1-2 The engagement of all stakeholders is the base of the work programme

The consortium plans **four checks to ensure the engagement of all stakeholders**:

1. The core partners of the **consortium span the entire Hydropower value chain** (Figure 2-1). More than 50 top experts coming from across Europe have registered interest and support for the HYDROPOWER-EUROPE project
2. The **Consultation Experts Panel** (CEP) will be a network of around 20 closely associated experts covering all of the technological needs identified by the core partners (see details in Section 5). The CEP is already established to assist the consortium with writing the Technology Roadmap and Research & Innovation Agenda. Some of these experts are included within this proposal as Linked Third Parties and the others (called External Experts) have indicated their support.
3. The project will collect the views of a wide variety of stakeholders and identify their commonly held **views through three channels**: (i) the networks of the core partners (which are substantial), (ii) communication via national and international professional associations, utilities, local, regional and national public agencies and NGOs and (iii) communication through social media networks.
4. **Civil society and authorities will be engaged at regional, European and international levels** (e.g. WWC), through online questionnaires and processing the results of questionnaires within the regional and international workshops.

### 1.2.2 Addressing the specific challenges and scope

The three steps of the HYDROPOWER-EUROPE programme (Figure 1-3) address the specific challenges and scope of the call text, as detailed hereunder:

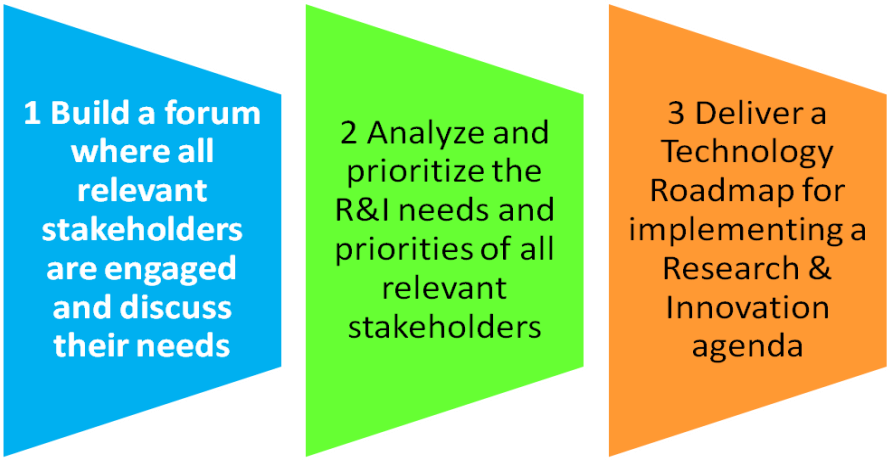



Figure 1-3 Main 3 steps of HYDROPOWER-EUROPE project matching the scope of the forum

These three steps are addressed by a programme of activities (under WP2, WP3 and WP4) and are planned to ensure that the outputs of the HYDROPOWER-EUROPE project include:

- Mapping all the Hydropower stakeholders
- Bringing together all relevant stakeholders of the hydropower sector
- Consultation of all relevant stakeholders to collate knowledge and needs for the sector via workshops, expert groups and online discussion.
- Sharing and dissemination of the collated knowledge
- Analyses to establish priorities and future direction
- Production of a synthesis of expected research developments and research needs for the coming decades in a research and innovation agenda for the hydropower sector
- Production of a technology roadmap, supporting implementation of the RIA, for the hydropower sector.

The approach for implementing these activities is detailed in Section 1.3 below.

## 1.3 Concept and Methodology

### 1.3.1 The concept: the forum is a unique opportunity to address the challenges

Currently, the hydropower sector has no single, focussed entity representing stakeholder's views, which often leads to fragmented messages and approaches, and a failure to present the bigger picture. This applies to material and equipment research and the demonstration of such results, but also to research on regulation, which influences the applicability of any technologies developed.

The **concept of HYDROPOWER-EUROPE is therefore to build a forum with a consultation process which will channel the inputs from all relevant stakeholders** regarding research needs from a technological and regulatory point of view culminating **in the first step in developing the Research and Innovation Agenda.** Integration of societal point of views related to hydropower (e.g. regulations, social and environmental impacts of existing and to be developed technologies) will be addressed through **the second step of developing a Technology Roadmap**.

The consultation process will allow a structured programme of stakeholder consultation through workshops and online discussion groups to seek perceptions, views and expectations on the current and future research and innovation needs of hydropower sector. The process will share knowledge and information at the EU level between basic science, the research and industrial value chain, civil society and European and national authorities.

**The consultation process is based on three loops of consultation activity:**

- Loop 1: initiation of the consultation: initial draft of R&IA completed with initial consultation outputs.
- Loop 2: Consultation on the current status of technology and required priorities.
- Loop 3: Consultation on drafts of the Research and Innovation Agenda and the Technology Roadmap.

Contributors involved in the various stages of these three loops include (Figure 1-4):

- The wide range of all stakeholders
- The expert topic groups
- The Consultation Experts Panel
- The drafting team

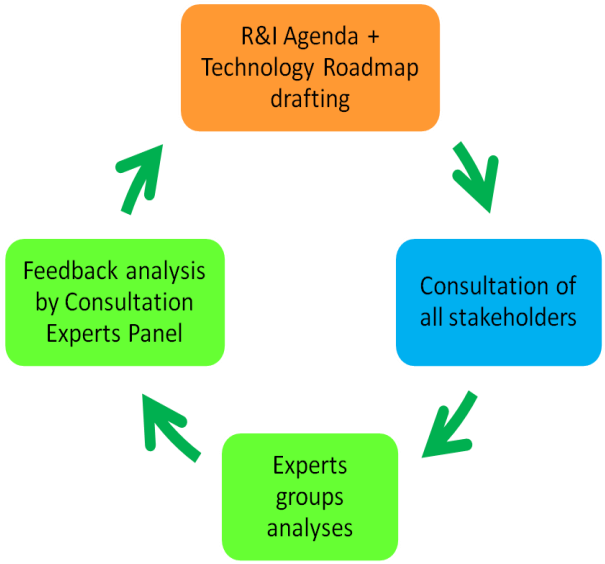



Figure 1-4 : The basic loop of the consultation process

### 1.3.2 The background

The core partners of the consortium have **considerable experience** in the **hydropower sector** (EREF, IHA, ICOLD, and VGB), related **research and innovation** (EUREC and EASE) and in the **consultation and communication process** (Zabala and Samui). More specifically:

- EASE produced an Energy Storage Technology Development Roadmap together with EERA in 2014 and made an update in 2017 by providing a comprehensive overview of the energy storage technologies being developed currently in Europe, including hydropower and identifying the RD&D needs and budgets in the coming decades. The association supports European Technology and Innovation Platform Smart Networks for Energy Transition (ETIP SNET) activities through a wide range of actions.
- EREF's ongoing activities for small hydropower providers gives information on best-practices on how sustainable quality of modern hydropower technology can enable an entente cordial between the objectives of the Water Framework Directive and the objectives to change towards renewable energy-based systems. This information will flow into the ongoing evaluation process of the Water Framework Directive.
- EUREC has experience in writing Research and Innovation Agendas through its work supporting European Technology and Innovation Platforms, and in the drafting of Implementation Plans of Temporary Working Groups (SET Plan) and editing or drafting the Hydro Equipment Association's two roadmaps (European Technology Roadmap of 2013 and Global Technology Roadmap of 2015).
- The European Club of ICOLD has developed working groups devoted on research & development since 1983, for compensating the low level of construction in Europe and keeping a high level of expertise within the profession.
- IHA covers all the items of the hydropower sector. For instance, right now, he has organised in April 2018 a 'Workshop on innovations and technological disruption in the hydropower sector' (USA).
- Samui-Fr has considerable experience of project coordination and participation in flood risk, dam and reservoir safety research under FR4, FP5, FP6, FP7 and H2020.
- Since 2000 VGB has provided a growing platform, including more than 7 permanent hydropower committees with currently more than 100 participating experts, for operators and manufacturers of hydropower plants for sharing experience and knowledge at a high level of expertise.
- Zabala leads the ETIP-SNET, being the coordinator of INTENSYS4EU CSA project that supports the ETIP SNET.

EREF, ICOLD, IHA and VGB contribute towards and enrich the ongoing promotion of European hydropower developers, investors and equipment producers in developing and enhancing export markets outside the EU, especially Africa and Latin America.

In addition, the following **57** organisations have expressed their support for the project by means of a letter of support (See Section 4).

| | **Company** | **Type of Organisation** | **Country** |
|---|---|---|---|
| 1 | Eurelectric | International association | Belgium |
| 2 | International Commission on Irrigation and Drainage (ICID) | International association | India |
| 3 | World Water Forum (WWF) | International association | France |
| 4 | Ministry of Infrastructure and transport | Ministry | Greece |
| 5 | Albania energy Association | National Hydro association | Albania |
| 6 | BDW (German Hydropower Association) | National Hydro association | Germany |
| 7 | Towarzystwo Elektrowni Wodnych (Polish Hydropower Association) | National Hydro association | Poland |
| 8 | Austrian Small Hydropower Association | National small hydro association | Austria |
| 9 | Small Hydro in Finland | National small hydro association | Finland |
| 10 | France HYDRO ELECTRICITE | National small hydro association | France |
| 11 | TRMEW (Polish association for small Hydro) | National small hydro association | Poland |
| 12 | Wasserkraft | Regional hydro association | Germany |
| 13 | VWB (Bayern hydropower Association) | Regional hydro association | Germany |
| 14 | EYDAP Athenes Water facility | Regional water facility | Greece |
| 15 | ATCOLD | National Committee of Large Dams | Austria |
| 16 | BDS (The British Dam Society) | National Committee of Large Dams | UK |
| 17 | BECOLD | National Committee of Large Dams | Belgium |
| 18 | CzCOLD | National Committee of Large Dams | Czech Repub |
| 19 | DTKOLD | National Committee of Large Dams | Germany |
| 20 | FRCOLD | National Committee of Large Dams | France |
| 21 | GCOLD | National Committee of Large Dams | Greece |
| 22 | IRCOLD | National Committee of Large Dams | Ireland |
| 23 | ISCOLD | National Committee of Large Dams | Iceland |
| 24 | ITCOLD | National Committee of Large Dams | Italy |
| 25 | MACOLD | National Committee of Large Dams | Macedonia |
| 26 | NNCOLD | National Committee of Large Dams | Norway |
| 27 | POCOLD | National Committee of Large Dams | Poland |
| 28 | PTCOLD | National Committee of Large Dams | Portugal |
| 29 | ROCOLD | National Committee of Large Dams | Romanian |
| 30 | SLOvaCOLD | National Committee of Large Dams | Slovakia |
| 31 | SLOvenCOLD | National Committee of Large Dams | Slovenia |
| 32 | SPANCOLD | National Committee of Large Dams | Spain |
| 33 | SwedCOLD | National Committee of Large Dams | Sweden |
| 34 | SWISSCOLD | National Committee of Large Dams | Switzerland |
| 35 | Andritz | Equipment manufacturer | Austria |
| 36 | ENERGIE AG | Equipment manufacturer | Austria |
| 37 | Voith Hydro | Equipment manufacturer | Germany |
| 38 | Alpiq AG | Operator | Switzerland |
| 39 | EDF-CIH | Operator | France |
| 40 | EDP | Operator | Portugal |

| | | | |
|---|---|---|---|
| 41 | ENEL | Operator | Italy |
| 42 | FORTUM | Operator | Finland |
| 43 | PPC-DHP | Operator | Greece |
| 44 | STATKRAFT | Operator | Norway |
| 45 | VATTENFALL | Operator | Sweden |
| 46 | VATTENFALL Vattenkraft | Operator | Germany |
| 47 | VERBUND Hydropower | Operator | Austria |
| 48 | INNOGY | Operator | Germany |
| 49 | CIRCE | Research Center | Spain |
| 50 | RSE | Research Centre | Italy |
| 51 | EPFL | University | Switzerland |
| 52 | IHE Delft | University | (UN) |
| 53 | LULLEA | University | Sweden |
| 54 | TUM | University | Germany |
| 55 | UIBK | University | Austria |
| 56 | UPM | University | Spain |
| 57 | European Technology & Innovation Platform for Smart Networks & Energy Transition | ETIP SNET Initiative | EU |

### 1.3.3 The overall methodology

The overall HYDROPOWER-EUROPE project methodology is shown in Figure 1-5.


Figure 1-5 : Overall methodology of HYDROPOWER-EUROPE project

The various stages within this process are outlined below.

*1.3.3.1 Mapping of all stakeholders*

**Consultation and Engagement Strategy.** Before initiating any steps in stakeholder consultation, the consortium will understand what stakeholder engagement means to the project (why engage? Who has the stake? What tactics? What lessons to be learned? Etc).

**Stakeholder targeting and identification.** The process will be iterative. The consortium and partner networks are key providers of initial stakeholder contacts, based on their extensive expertise and networks of contacts at all geographical levels. Another important source of stakeholder information will come from related European projects under FP6, FP7, Horizon 2020, LIFE, etc. The inventory will be further supplemented by contacts established at relevant workshops and meetings.

**Mapping, categorisation and registration of stakeholders in the HYDROPOWER-EUROPE database.** The project will register all the stakeholders representing the relevant organisations existing in the countries of the EU from all sectors of interest/value chain groups/work topics (Table 1-3). This database will help WP2 task managers decide which stakeholders are relevant according to different selection criteria (contribution, legitimacy, willingness to engage, influence, necessity of involvement etc). The selected criteria will be defined at the beginning of the project and the table will be reviewed during the project ensuring that it is kept up to date. During the preparation phase of this project, it was noted that operators from the East of Europe (except Greece) are minimal hence particular attention will be paid to ensure engagement of stakeholders from the Eastern Europe.

*1.3.3.2 Creation of the HYDROPOWER-EUROPE forum data base*

An online database will be developed to support the consultation, the prioritisation process, the development of the RIA and the TR and a longer term sustainable approach for the HYDROPOWER-EUROPE Forum.

Table 1-3 Categorisation of the stakeholder data base

| Sectors of interest | Value chain | Work topics |
|---|---|---|
| ***Public***<br><br>National: - Ministries /agencies responsible for Energy / climate issues/ R &I policies, funding R&I/ Water agencies/ etc.<br><br>Regional: -municipalities/ cities/provinces EU-level: - Relevant EC DG (Research and Innovation, Energy etc)<br><br>International: - organisations relevant to climate change mitigation: WWF, UNEP, WB, IFC, ICID<br><br>***Private***<br>- Manufacturers / Construction companies;<br>- Engineering design – large consulting companies/consultants;<br>- Owners / operators<br>- Industry associations and trade organisations<br>- Financial institutes / investors<br><br>***Others***<br>NGOs focusing on environmental and climate change issues;<br>Research organisations and universities (climate change mitigation)<br>Coordinators / managers of EU-funded projects (FP7, H2020, LIFE)<br>Labelling/standard organisations (as low-emission etc)<br>Trade unions<br>Consumer groups,<br>etc. | Policy<br><br>Research<br><br>Industry<br><br>Actors in the energy system (energy supply; energy distribution; water utilities)<br><br>End Users (Society Impacted)<br><br>Investors / Insurance | 1.Electro / mechanical equip<br><br>2.Electrical system (Grid impact)<br><br>3.Civil engineering<br><br>4.Hydraulic engineering<br><br>5.Environment<br><br>6.Society (including multifunction use)<br><br>7.Economic (inc tax)<br><br>8.Safety and security<br><br>9.Legislation<br><br>10.Market design |

*1.3.3.3 Creation and management of the consortium online work area*

**On line tools** will be used to manage the stakeholder data base and the consultation process. These will include, for example, tools and systems to (i) send online surveys, (ii) store and process survey data, (iii) mechanisms to support the analysis of information and synthesis of the RIA and TR, (iii) provision of a library facility for key documents, (iv) options to support future comment and amendment of the processed data and syntheses.

*1.3.3.4 Management of technical fora and topic working groups*

At the first stage, stakeholders will be officially invited to participate by email. These invitations will be followed up with targeted telephone interviews. Online surveys will get a broad sense of the sector's priorities and views. Following the first contact, discussion groups will be set up online topic by topic. The **topic discussion groups** will be focused on a comprehensive assessment of the state of art, discussion and amendment of position papers. Revision of the first draft of the RIA and TR will be implemented via a second wider consultation process implemented through a number of workshops and webinars.

Note that initial collation of priority issues and mapping of experts and organisational expertise has been undertaken as part of the HYDROPOWER-EUROPE proposal development. See Section 3.3 and Figure 3-7.

*1.3.3.5 Management of workshops*

The consortium will plan, manage and moderate a series of workshops:

- **Public workshops**, where the outputs focussed on all aspects of R&I are presented and amended with first reactions. Two public consultations will be held in Brussels at the start and the end of the project.
- **Cross-border workshops**, held in 3 different climatic areas of Europe (Mediterranean / central and Eastern Europe, Alpine, and Nordic), with high hydropower potential and challenges associated to different water uses, focused on the discussion between industry, civil society and authority for drafting the TR.
- **International Association workshops** (IHA, EURCOLD, EASE) where the consortium will support the consultation process and promote the EU's scientific leadership, industrial competitiveness, global commitments and external policies.

*1.3.3.6 Provide up-to-date information*

At the start of the project, key references and documents from all stakeholders will be compiled into an **online library** (for project access only). The collection and assessment of references will be supported by **three levels of consultation**: on line survey, on line topic discussion groups, position paper reporting topic state of art synthesis by external experts. The **state of the art** will be defined and updated as appropriate during the project.

*1.3.3.7 Share of knowledge between basic science, the research and industrial value chain*

The available collected information and intelligence will strengthen and open up the innovation process to all actors within the value chain so that knowledge can circulate more freely and be transformed into products and services that create new markets, fostering a stronger culture of innovation.

*1.3.3.8 Share of knowledge between science, industry, civil society and authorities*

The main issue will be to **prioritize actions in accordance with public acceptance**. Part of the consultation process will discuss the non-technical barriers to hydro deployment in an honest and transparent public debate, not only in the cross-border and international workshops but also in promoting the ITCOLD experience in all European countries. An ITCOLD working group has assessed how operators' actions which addressed sustainable host territories development were perceived by other stakeholders present in the same territory. The positive feedback found can raise awareness of European policy to support the role of hydropower. Sharing that knowledge shall support EU competitiveness through the delivery of ideas, development of technology, processes and innovative solutions for society's challenges: protecting environment through innovative mitigation of impacts, creating businesses, building market share and generating employment, by paying attention to the important cross-cutting

priorities like climate action, sustainable development and the social sciences and humanities (SSH) (as embedded in call item 4).

*1.3.3.9 Synthesis of developments, research and innovation needs in the coming decades*

A group of talented and skilled experts has been established, drawing on the resources of the core partners, linked third parties and other external organisations; this is called the Consultation Experts Panel (CEP). External organisations include large companies (operators and suppliers) and some consultants who have confirmed their interest to contribute to the consultation process. This panel (which is active under WP3) has several specific functions including: (i) assessment of drafts, (ii) initiation of technical contributions, (iii) editing of position papers, (iv) moderation of workshops, (v) feedback analyses and (vi) processing of inputs, and synthesis of research needs.

The CEP will be involved in the overall prioritization process. Criteria for prioritization (e.g. market creating innovation, time to maturation, breakthrough innovation and large-scale demonstrators) shall be set up at the start of the consultation process. Prioritization shall be checked throughout to ensure a truly interdisciplinary approach including the integration of SSH, crucial to solve global challenges and to create jobs and growth.

*1.3.3.10 Write RIA in hydropower for an energy system with high flexibility and renewable share*

The consortium has experience of creating RIA, containing itemised lists of research topics prioritised, budgeted, and pointing to the public or private sector for their financing (see Section 1.3.2). At the start of the project, based on the preliminary list of needs, which will be refined by the identified experts (see Section 3.3) the initial structure of the RIA will be defined for discussion, amendment and approval. Finally, four versions of the RIA will be written. All versions will be supported by the CEP comprising subgroups of specialized experts where appropriate and will be challenged by the whole hydropower community online. RIA drafts will be commented and discussed through two wider consultation workshops, where both national and European authorities will be invited to respond.

*1.3.3.11 Write the Technology Roadmap*

Understanding why communities support or reject hydropower projects will structure the prioritization of the research for bridging the gap between the different actors. Starting from the current state of hydropower operation in Europe, the document will promote the best practices of hydropower generation, providing an effective contribution to the energy system transition, preserving the environment, and increasing societal resilience. The main priorities will be explained, and the associated research direction will be planned. Finally, options for funding the research priorities for hydropower will be presented: for instance the project financed under item 4 of this call topic, and the projects financed under LC-SC3-JA-2-2018 and Public Procurement lot number 39 in the Energy Work Programme 2018-2020. The consortium hopes (even expects) also to have good contact to the winning FETFLAG-01-2018 proposal in radically new energy technology. During HYDROPOWER-EUROPE ’s three-year contract, a fully-fledged energy-related Future and Emerging Technology Flagship might launch, and it might have the capacity to fund some activities relevant to the hydropower sector.

The consortium will ensure that the key deliverables of the project are ready at a time when political decision-makers are best able to make use of them: **At around month 26, the first Work Programme of FP9; and around month 36, the 2020 revision of the Water Framework Directive**.

# 2 Impact

## 2.1 Expected impacts

At a very high level the following three impacts can be foreseen:

1. **Forum organization**: engagement of the whole hydropower sector through the creation of a forum, through which needs, priorities and actions may be pursued
2. **Civil society**: facilitating the alignment of views of civil society with industry and authorities
3. **European Commission**: supporting industry and job creation and security through development of a clear hydropower strategy and roadmap for development and market uptake.

A more detailed summary of the main expected impacts is given in
Table 2-1 below:

Table 2-1 Expected impacts from the HYDROPOWER-EUROPE forum on the Hydropower sector

| Stakeholders targets | Hydropower challenges |
|---|---|
| Forum organization | To gather all the stakeholders of the hydropower sector |
| Forum organization | To support an honest and transparent debate on the future development of Hydropower |
| Forum organization | To undertake an effective prioritization in accordance with European objectives (social responsibility and environmental protection) in order to get clear and long term objectives for research development and market uptake |
| Forum organization | To find the official channel for discussion with national authorities and Europe |
| Civil society | To demonstrate the positive services and the relevant environmental impact/footprint if the complete lifecycle is considered of hydropower to society and adopt a European framework for hydropower sustainability assessment |
| Civil society | To establish a clear understanding of the environmental impacts of hydropower, to explain the field of application of hydropower and to demonstrate how impacts can be minimized and recoverable. |
| European Commission | To support hydropower development within Europe and address non technological barriers |
| European Commission | To support European industry maintaining its leadership position and safeguard its competitiveness |
| European Commission | To fund research and innovation actions not only on new technologies but on optimization of environmental flow releases, fish migration and sediment transport |
| European Commission | To value (and quantify) all of the services provided by hydropower besides classical power generation |
| European Commission | To provide specific and extensive advice to EU policymakers on energy-related policy-making |
| European Commission | To fund large-scale demonstrators providing energy, increasing flexibility, efficiency and enhancing environmental and stakeholder engagement with new hydro generation technologies coupled with other social targets |

### 2.1.1 Expected impact (as outlined in the call text)

*2.1.1.1 Coordinated stakeholders' activities*

The project will create a 'forum' - i.e. the space for a group of people, with different opinions, to speak to each other and jointly find the best way forward for hydropower - by following the list of tasks set out in Section 3. The impact will be to **create a well-functioning structure that people enjoy working within and using to share their views**. The decisions made by this forum will not be binding on any particular party, but they will shape a strategy that is in the hydropower sector's common interest. The forum will help build trust between organisations and encourage members to act in the collective interest. The efficiency gains arising from collective action will **help the European industry maintain its leadership position and safeguard its competitiveness.**

*2.1.1.2 Providing specific and extensive advice to EU policymakers*

The impact of the specific and extensive advice that HYDROPOWER-EUROPE will provide to EU policymakers will be profound:

**R&D policy. The Research and Innovation Agenda will identify and prioritise actions and focus EU-level funding for hydropower research and innovation.** A well-balanced and coherent set of research topics will be identified, prioritised and budgeted. This will facilitate the process of EC and national funding of such actions, which in turn will support European actors taking future development risks, learning from their research and practice, and moving faster than their counterparts outside of Europe - so helping Europe continue to export its technology.

**Regulatory framework beyond funds for innovation.** Environmental laws at EU level govern the sharing of watercourses for various activities, and the impact of these activities on nature. The EU also directs Member States' energy policy. If the EU's policy-makers and politicians better understand the current potential of hydropower and its technological refinements, then they could put in place a market design that exploits this potential**. Europe needs climate-friendly sources of flexibility to accommodate variable energy inflows from wind and solar photovoltaics**. The impact of this project is that policymakers may manoeuvre the hydropower sector into a position to effectively fill this gap. The EU also controls competition policy including by issuing guidelines on State Aid. These guidelines can allow derogations for demonstration projects. In making DG Competition officials aware of the challenges of support needed for hydropower, and of the benefits of giving that support, state aid rules for hydro demonstration projects could become more favourable, allowing new technology to advance.

**Impact beyond the EU-level.** HYDROPOWER-EUROPE will offer a 'front row seat' in the development of hydropower technology not just to the European Commission overseeing the project, but also to any interested official from national administrations. By encouraging national representatives to follow the project work, they too can become familiar with hydropower, gain an understanding of the sector needs and the unique contribution that their country could make and hence consider putting hydropower-themed topics in their national programmes. Thus, the project, through its forum and documents, will impact national funding. Regional government representatives will be invited to the regional cross-border workshops in their area, as well as national representatives. They know the benefit of hydropower to the local economy, and they will be allies in helping to educate and convince national representatives to align national legislation and / or funding. The project should attract the interest of SET Plan (Strategic Energy Technology Plan) Steering Group members and H2020 and FP9 Work Programme Committee members, through which the opportunity exists to steer both national and EU funding strategies.

*2.1.1.3 Continuing to foster social innovation and social dialogue in the energy field at European level*

HYDROPOWER-EUROPE will provide a clear understanding of the social and environmental use of water in order to manage the conflicts and harmonize the relations between the different water stakeholders. The discussions focussed on the three regional perspectives of hydropower development in Europe, based on true case studies, will help to balance positive and negative externalities with all stakeholders. The negative and positive externalities of hydro generation will be fully acknowledged, transparent, and measurable. This global evaluation will be done and discussed to minimize these impacts, demonstrate the efficiency of current mitigating measures and define research needs and priorities. Four workshops organized by ITCOLD, the Italian Committee on Large Dams, have already demonstrated that these workshops are effective facilitating the dialogue and the intercommunication between two worlds that often have conflicts and opposite interests. Such experiences will be replicated in the HYDROPOWER-EUROPE project and the conclusions on state of agreement will pave the way for drafting the 'Technology Roadmap'.

*2.1.1.4 Contributing towards the progress of the strategic R&I Implementation Plans identified in the SET-Plan.*

While the project will produce a defined set of outputs, the consortium is willing also to produce input for the Commission ad hoc. This is consistent with our wish to build up a relationship of trust with the Commission. By being adaptable, flexible and reliable, we hope to provide the hydropower perspective into upcoming and currently unknown debates and policy dossiers. The dossiers could include a new exercise of the SET Plan (like the contributions to Towards an Integrated Roadmap[1]), ideas for ETS Innovation Fund, for Energy Demo Projects (EDP) Innovfin and potentially for a Communication on the EC's mid-century decarbonisation strategy in 2019.

[1] Reference to the 2014 adopted text; contributions from all sectors requested in 2013-early 2014

### 2.1.2 Annex H evaluation criteria for a CSA

*2.1.2.1 Exploit and disseminate the project results (including management of IPR), and to manage research data where relevant.*

The result of the project will be:

i) a close-knit **community** of people keen on helping hydropower reach its technological potential
ii) **documents** outlining the state of the art in hydropower, the ambitions of hydropower actors in Europe and the world
iii) better **knowledge** in public administrations of the hydropower sector.

**Legacy of community.** To exploit the fact that a community is created during the project, the project will also take steps to make sure that this community endures beyond the end of the project. The next incarnation of the community of stakeholders will be supported by a mandate from the Commission (it is intended), which will keep the channel open for information to flow between it and the Commission. The mandate will also shore up that community's credibility towards national policymakers, too, meaning also they can maintain their knowledge of the sector. The large database created as part of the project containing the raw inputs of many respondents to the Initial Online Contact (Task 2.4) and the Wider Stakeholder Consultations (Tasks 2.5 and 2.6) will be kept available up to 2030. Consequently, towards the end of the project, for ensuring continuation of support beyond the project, the question will be raised to all relevant stakeholders if they want the forum to exist beyond the end of the project. In such a case, the forum will be the nucleation point, potentially, for a permanent, self-financing platform of the European hydropower sector. If the EC is satisfied with the quality and relevance of the advice the forum is providing and wants to see it continue in future in a form like the ETIPs seen today, the consortium will assist in this transformation. ETIPs are European Technology and Innovation Platforms. They are stable, durable groups of stakeholders from an industry sector who, in return for operating openly, have a recognised role in shaping the EU's Framework Programmes for research and innovation.

**Documentation.** The model for disseminating documents will be that of European Technology and Innovation Platforms (like in CC-4-i), which members of the consortium have considerable experience in. All finalised documents will be available on the web and (at minimum) the Technology Roadmap and the Research and Innovation Agenda will be printed.

**Printed and posted.** The TR and the RIA will be posted to about 100 people. These will include the public officials who should help to fund the identified work or who are in a position to shape the regulatory framework. The document will also be sent to a number of MEPs (those most closely involved with energy or research policy, for example in the Industry Research and Energy Committee or Environment Committee) and any national and regional members of Parliament who will have had contact with the project during (for example during workshops). The printed document will be available until 2025 (at minimum) at conferences and workshops for the hydro community such as IHA, ICOLD, VGB & EREF conferences.

**Pdf and www.** The pdf versions will be disseminated to everyone who has participated in a project workshop or online consultation or who has requested to be kept informed of the project. It will be freely available on the web. The project website will stay live up to 2030.

*2.1.2.2 Management of barriers or obstacles*

No barriers, obstacles or framework conditions such as regulation and standards are expected to get in the way of writing the Technology Roadmap and the Research and Innovation Agenda, or of delivering other major tasks of the project.

*2.1.2.3 Dissemination of feedback and outputs and ensuring continuation of support beyond the project*

The decarbonisation of the energy system is an opportunity for the Hydropower sector to communicate that it can ensuring a larger generation in Europe, a more efficient energy use based on its flexibility, a secure supply of

energy for the grid, affordable prices and a very low release of carbon. HYDROPOWER-EUROPE will disseminate its findings to multiple stakeholder groups for improved decision making on Hydropower topics but also overall climate change mitigation options and policies at an EU and global level.

However, it is recognised that it is highly unlikely that the discussions with NGOs, civil society and authorities will lead to a complete consensus at the end of the project. In the meantime, the Hydropower Forum will offer an easy-to-find and authoritative point of contact for facilitating the discussion with civil society, the European Commission and public authorities.

## 2.2 Measures to maximise impact

The main impact of the HYDROPOWER-EUROPE project is to provide a **Research and Innovation Agenda**, and **Technology Roadmap**, which will provide a clear view of the future direction for hydropower in Europe.

To gain value from this work it is essential that both the European Commission and the Hydropower Sector support implementation of these strategic plans and hence the communication, dissemination and exploitation measures which are outlined below.

### 2.2.1 Overview

The HYDROPOWER-EUROPE consortium spans the entire hydro sector value chain and has established a range of activities to the promote visibility of the project and its results, supporting market uptake and effective knowledge transfer. This work is led by ZABALA Innovation Consulting and Samui France SARL, both of which have expertise in the organisation of European programmes, management and coordination of European networks and communication and dissemination activities. This complements the other HYDROPOWER-EUROPE consortium members who represent a range of different stakeholder associations (ICOLD, EASE, VGB, EUREC and EREF) and who will be strongly involved in the dissemination, communication and exploitation measures; each association has direct access to many different organisations within their networks, the combination of which spans the Hydro Sector value chain (see Figure 2-1).

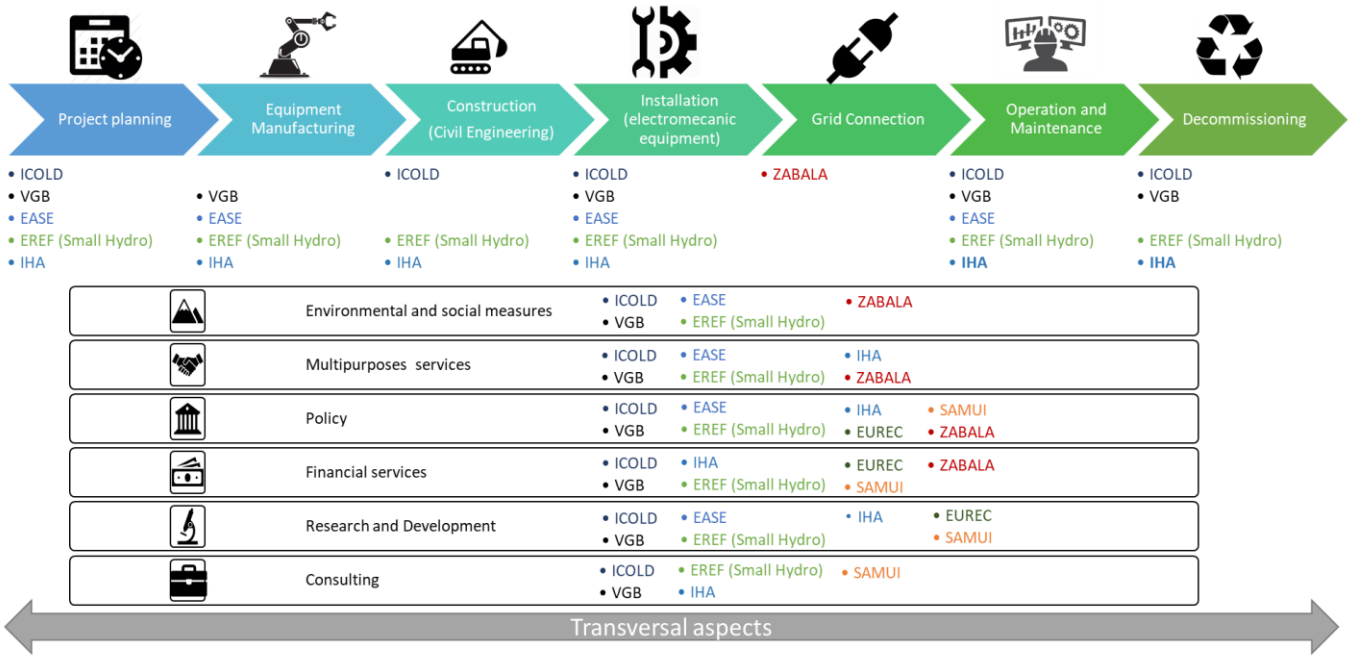



Figure 2-1 The role of HYDROPOWER-EUROPE consortium within the Hydropower value chain

The immediate potential outreach of the HYDROPOWER-EUROPE consortium is therefore very large:

EASE 40 member organisations across Europe in 15-20 countries

| | |
|---|---|
| EREF | 32 association members. |
| EUREC | 39 research centres |
| ICOLD | 100 member countries worldwide, 25 in Europe, 4000 people in Europe |
| IHA | 101 institutional members active in over 100 countries, with a third based in Europe |
| VGB | 452 members in 33 countries, with 1600 experts active in 90 technical committees |

Each of the HYDROPOWER-EUROPE partners will use their own communication resources, channels and services to boost the project impact though their newsletters, social networks, website, conferences and workshops. The largest industry associations (**EASE, ICOLD, IHA and VGB**) will be responsible for communication and dissemination activities towards the large **hydropower operators and industry**, **EREF** will be in charge of the **small hydro** community and **EUREC** will be responsible for the **research & academic** stakeholders. **ZABALA** given its role as coordinator of the ETIP SNET will ensure close contact with the **electricity system operators. EUREC and EASE,** with the support of **ZABALA,** will target **EU policy stakeholders. ICOLD, SAMUI and VGB** will address the **end-user community**.

Work package 5 is dedicated to communication and dissemination activities. The objective of these activities underpins the goals of the project (Table 2-2). Since the project is a coordination and support action, **communication and dissemination are at the heart** of most activities.

Table 2-2 The links between Project objectives and Communication and Dissemination objectives

| **Project Objectives (See Table 1-1)** | **Communication and Dissemination Objectives** |
|---|---|
| 1.1 Mapping of all stakeholders | Early contact across all sectors of the hydropower value chain to confirm engagement throughout three channels: associations network, web and social media networks.<br>Data base of stakeholders gathering all networks of associations in forum plus people recruited on social media networks |
| 1.2 Creation of Consortium Online Work Area | On line tools to support the consultation process: Web questionnaires, share space for collecting all contributions, data processing, and workshop booking. |
| 1.3 and 1.4 Management of technical fora, working groups and workshops on social and environmental impacts & data processing | Preparation on line with topic groups<br>Announcement throughout three channels: associations network, web and social media networks<br>Tools to support stakeholder participation in workshops |
| 2.1 Collection of and links up to date information | Creation of an online library with controlled access to the library for all engaged stakeholders; classification by topic |
| 2.3 and 2.4 Identify needs from basic science, research and industrial value chain, civil society and authorities | Consultation based on different modes of communication (phone / email, newsletters, workshops, video etc) Feeding the Consultation Experts Panel and the topic stakeholder groups |
| 3.1 and 3.2 Synthesis of expected development and research needs for the coming decades | On line consultation with different stakeholders to develop structure and component parts of RIA and TR. |
| 3.3 and 3.4 RIA for hydropower infrastructures and equipment including digitalization in operation and maintenance and TR | Development of working draft RIA and TR and validation of all stakeholders of draft RIA and TR with on line tools giving access to the wide community.<br>Dissemination of final RIA and TR via partner associations, stakeholder groups and a launch event. |

Communication activities are seen as interactions with stakeholders, where a dialogue exists and information flows in both directions. Dissemination activities are where information is pushed from one party (such as HYDROPOWER-EUROPE) to another (such as specific stakeholders). The following sections address:

- **Plan for Dissemination and Exploitation** (Section 2.2.2)
- **Communication Measures** (Section 2.2.3)
- **Data Management** (Section 2.2.4)

- **Knowledge Management and Protection** (Section 2.2.5)
- **Tracking Progress** (Section 2.2.6)

### 2.2.2 Plan for Dissemination and Exploitation of Results

To successfully develop the Research and Innovation Agenda (RIA) and Technology Roadmap (TR) for the hydropower sector in Europe **requires the participation, understanding and support of a wide range of stakeholders** including policy makers, industry operators and research, the academic stakeholder community and civil society.

**The HYDROPOWER-EUROPE website will be the main dissemination tool for the project and a portal to access various communication tools** through which a continuous flow and exchange of information between all participants and key actors and target groups will be maintained. The website will include the following functionalities:

- Overview of the concept, objectives, the partnership and the activities proposed within the forum
- Regular news and information service on forum activities
- Links to social media
- Access to a secured (consortium members only) collaborative space for shared working and communication including:
  - online tools to support team working (contacts, document management, reference materials, media management, progress reporting, cost tracking, etc)
  - online tools for facilitating stakeholder participation in consultation and surveys generated by the HYDROPOWER-EUROPE project
  - Gathering a library of supporting knowledge and information from partner networks and activities
  - Access to the HYDROPOWER-EUROPE knowledge base (see WP2) for storing and analysing stakeholder contributions.

A **Visual Identity** will be developed for HYDROPOWER-EUROPE in line with the H2020 visual guidelines and the website, report and PowerPoint templates and all dissemination material will use this.

The following **dissemination materials** will be produced:

- A **leaflet** showing the basic features of the HYDROPOWER-EUROPE forum, its objectives and expected results
- A **presentation** set for EU and local project communication gathering key messages
- A set of **roll-up stands** to support project communication visually at events
- A **promotional video** with the aim of explaining the complexity and depth of issues within the hydro power value chain, and the goals of the HYDROPOWER-EUROPE forum.

A biannual **Newsletter** with the latest news about the project will also be distributed. This news will also be posted via the project website, so increasing website traffic. The initial mailing will be via consortium partner associations, inviting interested stakeholders to register directly and so allowing the project to build an independent community of followers.

**Publications and articles:** HYDROPOWER-EUROPE results will be disseminated to journals and magazines in the field of hydropower and energy, as well as via partner networks.

- **Journalistic articles** will be actively promoted on the website and through social media, as well as through other dissemination channels such as magazines.
- **Press releases:** Press releases coinciding with the major project milestones, will be prepared and sent to the general and specialised media sector at European and national levels, depending upon the information relevance.

### 2.2.3 Communication Measures

A detailed communications implementation plan will be developed at the beginning of the project (see WP5) and will be updated in relation to stakeholder responses and project progress. The plan will define partner actions to be

undertaken in parallel with the other project technical activities. The actions will help to maximise the impact and visibility of the HYDROPOWER-EUROPE among all relevant stakeholders in the hydropower sector and more generally the energy sector at European level.

The plan structure will focus around:

- Identification of the target audiences that should be reached (WHO).
- Tailoring of the messages towards these target audiences (WHAT).
- Decision on the best communication channels and tools to reach the target audiences (HOW).
- Development of a detailed implementation plan (WHEN).

The following **target groups**, communication channels and types of information required have already been identified (Table 2-3); the clear categorisation of target groups allows for dedicated and targeted dissemination actions focused on key stakeholders. The goals are firstly to engage all stakeholders, secondly to support discussion with the civil society on the hydropower role and finally to show the added value of the HYDROPOWER-EUROPE technology roadmap to each target for its sector.

Table 2-3 Preliminary analysis for communication plan

| Target Groups | Policy makers & public bodies: | Industry | Research | Energy system actors | Financial | End Users (Society Impacted) |
|---|---|---|---|---|---|---|
| Target Sub Groups | - EC (and EP)<br>- National decision makers;<br>- SET plan steering group,<br>- ministry representatives<br>- Water agencies<br>- International institutions (IEA) | - Manufacturers<br>- Construction companies<br>- Engineering companies for building Hydropower plants with all required engineering fields | University Research centres | - Hydropower plant owners and operators<br>- grid operators | - Investors<br>- Banks<br>- Insurance companies | - Local communities impacted by hydropower generation<br><br>- End Users |
| Intermediary Channels | - Lobby associations<br>- Specialised media | - international/national technical associations<br>- Specialised media<br>- Communication channels of operators | | | | - NGOs<br>- Local Associations<br>- Local Media |
| Communication Channels | - High level conference/event<br>- Workshops<br>- Website<br>- Promotional videos<br>- On site visits | - High level conference/event<br>- Cross border and global workshops<br>- Local or national events<br>- Website<br>- newsletter<br>- interviews<br>- On site visits | | | - High level conference /event<br>- Press releases | - Consultations of local communities<br>- Website<br>- Social Media<br>- Promotional videos<br>- Press releases<br>- Interviews /Articles |
| Type of Information | - Forum participation<br>- R & I A with recommendations<br>- Benefits of Technology Roadmap | - Objectives of the forum<br>- Forum registration and participation<br>- Discussions outputs<br>- Scientific results & new technologies<br>- workshop results<br>- Research & Innovation Agenda<br>- New technology roadmap | | | - Economic studies<br>- Innovation on environmental and social impact assessment | - Benefits of hydropower for local development and employment<br>- Environmental impact assessments<br>- Case studies |

| | | | | |
|---|---|---|---|---|
| **Goal** | - Raise awareness<br>- Influence policy priorities<br>- Improve funding levels | - Mobilise and engage sectors of interest<br>- Improve cooperation & innovation<br>- Share knowledge<br>- Improve knowledge of research, demonstration and innovation projects | - Reduce uncertainty from investors´/ insurers' point of view | - Raise awareness on technologies<br>- Raise awareness on role of public funding<br>- Improve understanding of hydropower |

**Social Media Channels** will be established and fed with news and updated content from HYDROPOWER-EUROPE messages. It will allow the consortium to **create an active and participatory community of followers** around the project, and to increase visits to the website.

- **LinkedIn** will be used to promote project actions and messages among policy makers and stakeholders and foster networking.
- **Twitter** will be used to promote project actions and messages among stakeholders, mass media and general public and foster networking.
- **Other social media platforms** will be considered when developing the detailed strategy at the start of the project.

The focus of **workshops** and **meetings** will be designed in accordance with their specific goals and stakeholder groups. All events will have a presence on the website and many will also be communicated via social media. The foreseen events are spread among all WPs and Table 2-4 below provides an overview.

Table 2-4 Summary of project meetings and events

| EVENTS | Type[2] | WP | Month | Physical/Online/ Both | Place | Expected participants & target | Nb Particip. /event |
|---|---|---|---|---|---|---|---|
| Kick off Team Meeting | W | 2 | 4 | P | Brussels | Project Team | 40 |
| Expert Review meeting | M | 2 | 4 | P | | Technical experts + team | 60 |
| Regional stakeholder consult | W | 2 | 9 | P | Scandinavia | Part team / wider stakeholders | 300 |
| Regional stakeholder consult | W | 2 | 9 | P | Alps | Part team / wider stakeholders | 300 |
| Regional stakeholder consult | W | 2 | 9 | P | Medit | Part team / wider stakeholders | 300 |
| Yr1 Project Team Meeting | W | 3 | 12 | P | Alps | Project Team | 40 |
| Expert Review meeting | M | 3 | 12 | P | Alps | Technical experts + team | 60 |
| Expert Review meeting | M | 3 | 16 | O | Online | Technical experts + team | 60 |
| Yr2 Project Team Meeting | W | 4 | 24 | P | | Project Team | 40 |
| EASE Global Energy Storage Conference | C | 2 | 1 | P | Brussels | Part team / wider stakeholders | 350 |
| World Hydropower Congress | C | 2 | 8 | P | Paris | Part team / wider stakeholders | 900 |
| EURCOLD symposium | C | 2 | 12 | P | Greece | Part team / wider stakeholders | 350 |
| Project final dissem event | M | 5 | 36 | P | Brussels | Part team / stakeholders / policy makers | 75 |

[2] M= Meeting; W=Workshop; C=Conference

**Networking and interaction with other projects and initiatives** will be very strong within this project. The programme of wider stakeholder consultation and involvement specifically managed under WP2 will strengthen this further including outreach to civil society stakeholders.

### 2.2.4 Data management

The HYDROPOWER-EUROPE project, as a Coordination and Support Action (CSA), will not carry out research activities, however the project will collate and analyse extensive scientific information. This data will be stored in a **secure database** within the protected team working area (see WP2) for team analysis and use. The procedures followed for collecting the information and subsequently storing and managing the data will **comply with the ethics** and data management procedures defined in separate, respective reports.

### 2.2.5 Knowledge management and protection

The HYDROPOWER-EUROPE consortium is aware of the open access to scientific publications article as stated in the Article 29.2 of the H2020 Grant Agreement. Since HYDROPOWER-EUROPE is a Coordination and Support Action (CSA), it is not expected to have scientific publications, but if any scientific publications are produced, all the peer reviewed publications arising from HYDROPOWER-EUROPE will be made freely and openly available via an online repository. Actions taken by the project will include:

- All presentations, contributions and publications even partially funded by the project will include the project logo and prominently acknowledge the grant agreement number.
- Publications funded by the project will be uploaded to some specific Bibliographic social networks such as http://www.citeulike.org, http://www.mendeley.com or http://www.bibsonomy.org no later than six months after its original date of publication. This will guarantee open and free access to them.
- Include the following metadata under a standard format in the publication:
  - terms: "European Union (EU)" and "Horizon 2020".
  - title of the project, acronym and grant agreement number.
  - publication date.
  - persistent identifier: HYDROPOWER EUROPE -xxxxx (x meaning the GA number).

### 2.2.6 Tracking Progress

Implementation of the Communication and Dissemination Plan will be tracked by both WP5 and the Project Management Team. Close contact with the **communications teams of the European Commission** of the General Directorate Research of Environment, Energy and Competition will also be maintained to ensure that project progress and milestones are recognised and promoted to the widest audience as possible. Partners will also promote results to political stakeholders, countries and local communities through their own communication resources such as their websites, newsletters, social networks, events and workshops.

The **indicators** considered to measure the **effectiveness of communication** are presented in Table 2-5.

Table 2-5 Communication effectiveness indicators

| Measurement of effectiveness | |
|---|---|
| Indicators | Expected impacts |
| Website visitors | 80.000 for the whole project |
| Followers on Social Media | 500 for all channels |
| Newsletters | 6 (2 x 3 years) |
| Number of articles/papers | 30 |
| Impacts on press clipping | 50 |
| Number of participants in events | 2000 (online and physical) |
| Number of surveys & public consultations | 5 |

# 3 Implementation

## 3.1 Work plan – Work packages, deliverables and milestones

### 3.1.1 Overall structure of the HYDROPOWER-EUROPE Project

The overall structure and process by which the HYDROPOWER-EUROPE project delivers the core objectives (i.e. "*to produce a synthesis of expected research developments and research needs for the coming decades in a technology roadmap and research and innovation agenda in the hydropower sector, targeting an energy system with high flexibility and renewable share"*) is shown in Figures 3.1 to 3.3 below.

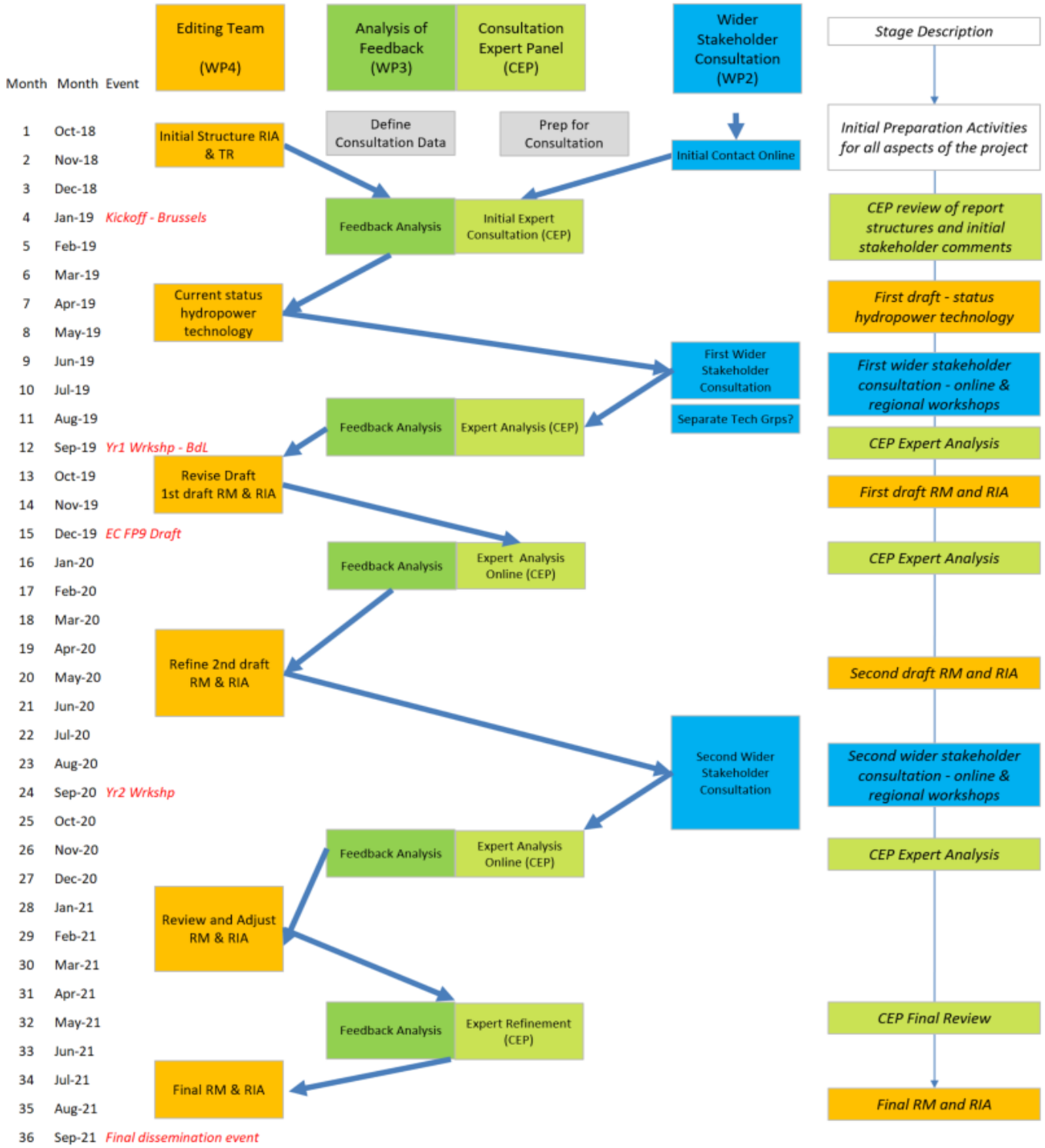



Figure 3-1 Information flow diagram showing the processes of consultation, analysis and drafting

The processes of consultation, analysis and drafting (Figure 3-1) follows:

- An initial structure for the RIA and TR is developed by the consortium partners
- This is shared with and reviewed by the CEP
- Initial expert recommendations and contributions are analysed and integrated into initial draft documents
- These are shared with a much wider stakeholder group for the first of two stakeholder feedback sessions
- As before, feedback is analysed, and key issues and priorities integrated into a second draft of the Technology Roadmap and Research and Innovation Agenda.

This process is then repeated to refine and 'fine tune' the contents. Figure 1-4 shows the 4 main steps of the flow of information: consultation, analysis, feedback and drafting.

Implementation of this work through the HYDROPOWER-EUROPE programme is via 5 work packages, as shown in the global PERT diagram (Figure 3-2) below and in the simplified GANTT diagram (Figure 3-2). These work packages address the 3 distinct aspects of the challenge, as reflected by the shading.

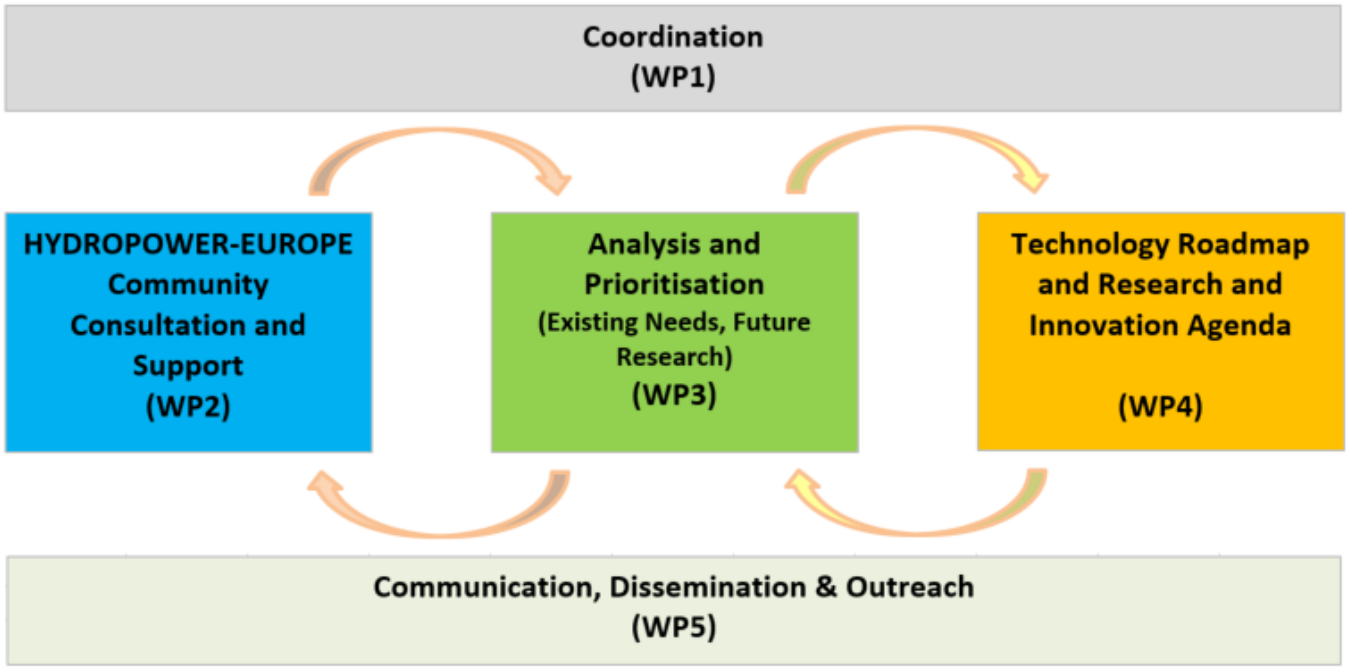



Figure 3-2 PERT diagram showing work package structure and interaction

### 3.1.2 Timing and description of the different work packages

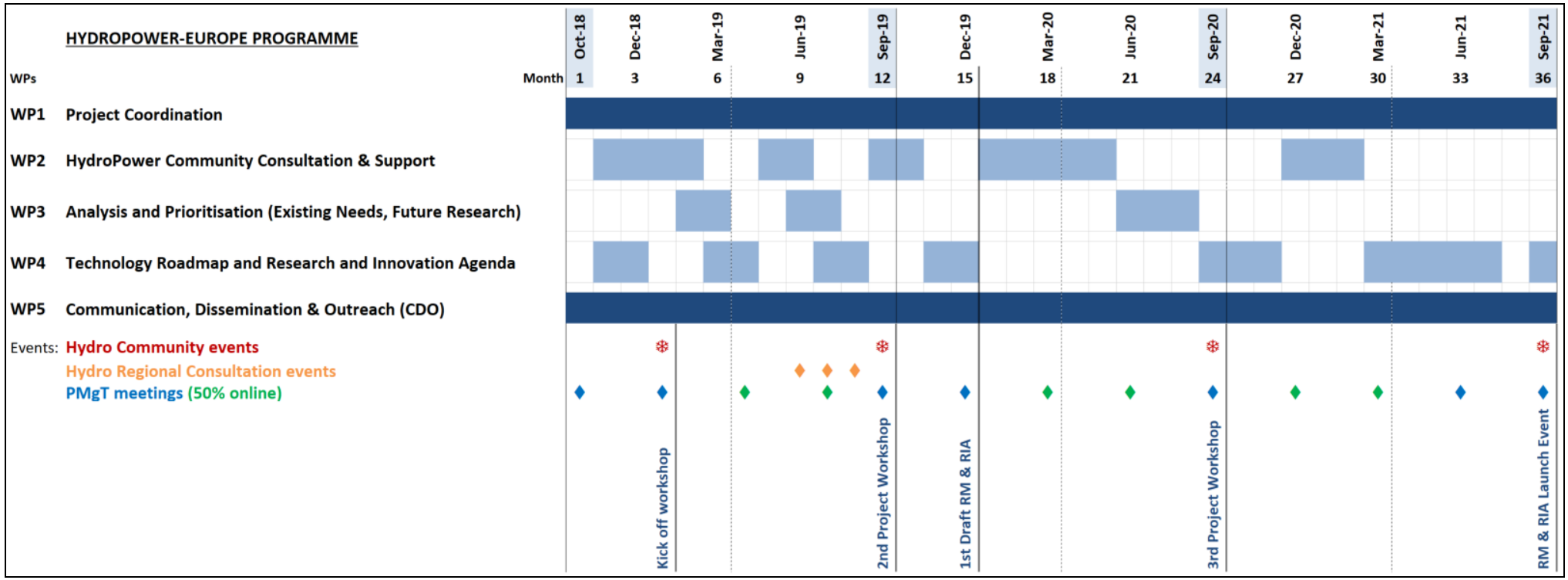



Figure 3-3 GANTT diagram showing work package timing and interaction

| Work Pack No. | **WP1** | | Lead: | **ICOLD** | | | | |
|---|---|---|---|---|---|---|---|---|
| Work Pack Title | **Project Coordination** | | | | | | | |
| Partner No. | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 |
| Short Name | **ICOLD** | SAMUI | EASE | EUREC | VGB | ZABALA | EREF | IHA |
| Person-months | 3.5 | 3.5 | | | | | | |
| | | | | | Start: | **Month 1** | End: | **Month 36** |

**Objective**

To coordinate project activities, ensure quality and timely project execution and deliverables, and to carry out the financial and administrative management of the project including:

1. To provide overall direction and a framework for the successful implementation of the project
2. To facilitate collaboration and interaction between partners and the wider practitioner networks
3. To facilitate communication between the EC and the consortium
4. To ensure timely and quality contractual reporting
5. To facilitate strong and effective involvement of the many different stakeholders bridging between local, regional, national and European networks and actors, and between the different sectors of research, policy and practice

**Description of work and role of participants**

WP1will ensure the efficient administrative and scientific coordination and management of the HYDROPOWER-EUROPE project. ICOLD will lead this process working closely with **a Project Management Team** (PMgT) which will comprise representatives of each Partner. The task includes two core activities.

**Task 1.1 Consortium management (Lead: ICOLD; Partners: Samui; M1-36)**

- Establish a **Project Method and Activity Plan** (PMAP) which defines overall project working procedures
- Facilitate development of each WP implementation plan (WIPs), ensuring clear and integrated programmes across all work packages (and confirming a clear programme of roles and responsibilities for all partners)
- Organise and chair PMgT meetings in which all WPs and key project actions are represented
- Manage project risks and resolve problems
- Routinely monitor and ensure effective project progress and quality of deliverables
- Organise and chair annual Partner General Assembly meetings
- Ensure ethical procedures are followed and that a data management plan is developed and implemented
- Act as liaison with the European Commission (EC)

**Task 1.2 Financial & administrative management (Lead: ICOLD; Partners: Samui; M1-36)**

- Fulfil obligations and reporting according to the grant agreement
- Obtain reports from WP-leaders on partner and WP progress
- Compile and submit reports in accordance with the EC contractual requirements
- Maintain a consortium agreement
- Implement amendments to contract where necessary

**Deliverables:**

| | | | |
|---|---|---|---|
| D1.1 | HYDROPOWER-EUROPE Project Method and Activity Plan (PMAP) | SAMUI | M2 |
| D1.2 | Risk Management Plan | ICOLD | M2 |
| D1.3 | Chair & meeting notes PMgT, Project Consortium and General Assembly meetings | ICOLD | M36 |
| D1.4 | Ethical Procedures and Approval Report | SAMUI | M3 |
| D1.5 | Data Management Plan prepared and maintained | SAMUI | M4 |

**Milestones:**

| | | |
|---|---|---|
| M1 | Project kick off meeting (KoM) implemented | M2 |
| M2 | Work Implementation Plans drafted for all WPs | M4 |
| M3 | Partner General Assembly meetings | M12,24,34 |
| M4 | Periodic reporting completed | M18, M36 |

| Work Pack No. | **WP2** | | Lead: | **EASE** | | | | |
|---|---|---|---|---|---|---|---|---|
| Work Pack Title | **HYDROPOWER-EUROPE Community Support** | | | | | | | |
| Partner No. | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 |
| Short Name | ICOLD | SAMUI | **EASE** | EUREC | VGB | ZABALA | EREF | IHA |
| Person-months | 3.10 | 4.70 | 5.80 | 1.50 | 1.60 | 1.20 | 1.00 | 1.00 |
| | | | | | Start: | **Month 1** | End: | **Month 36** |

**Objective**

The objective of WP2 is to:

- support and implement the wide-ranging consultation process with hydropower stakeholders throughout the duration of the project
- gather and manage the relevant data and information in order to support the writing of the Research and Innovation Agenda (RIA) and the Technology Roadmap (TR)
- support consortium working and communication in establishing the HYDROPOWER-EUROPE forum
- consider options and implement a solution for the sustainable future of the HDROPOWER EUROPE forum

Thus, WP2 will focus on the creation of the HYDROPOWER-EUROPE forum and supporting the involvement and contribution of all stakeholders in providing inputs, guidance and continuous feedback for use within activities under WP3 and WP4.

**Description of work and role of participants**

Figure 3-4 illustrates the scope of consultation that WP2 will manage as the project progresses:

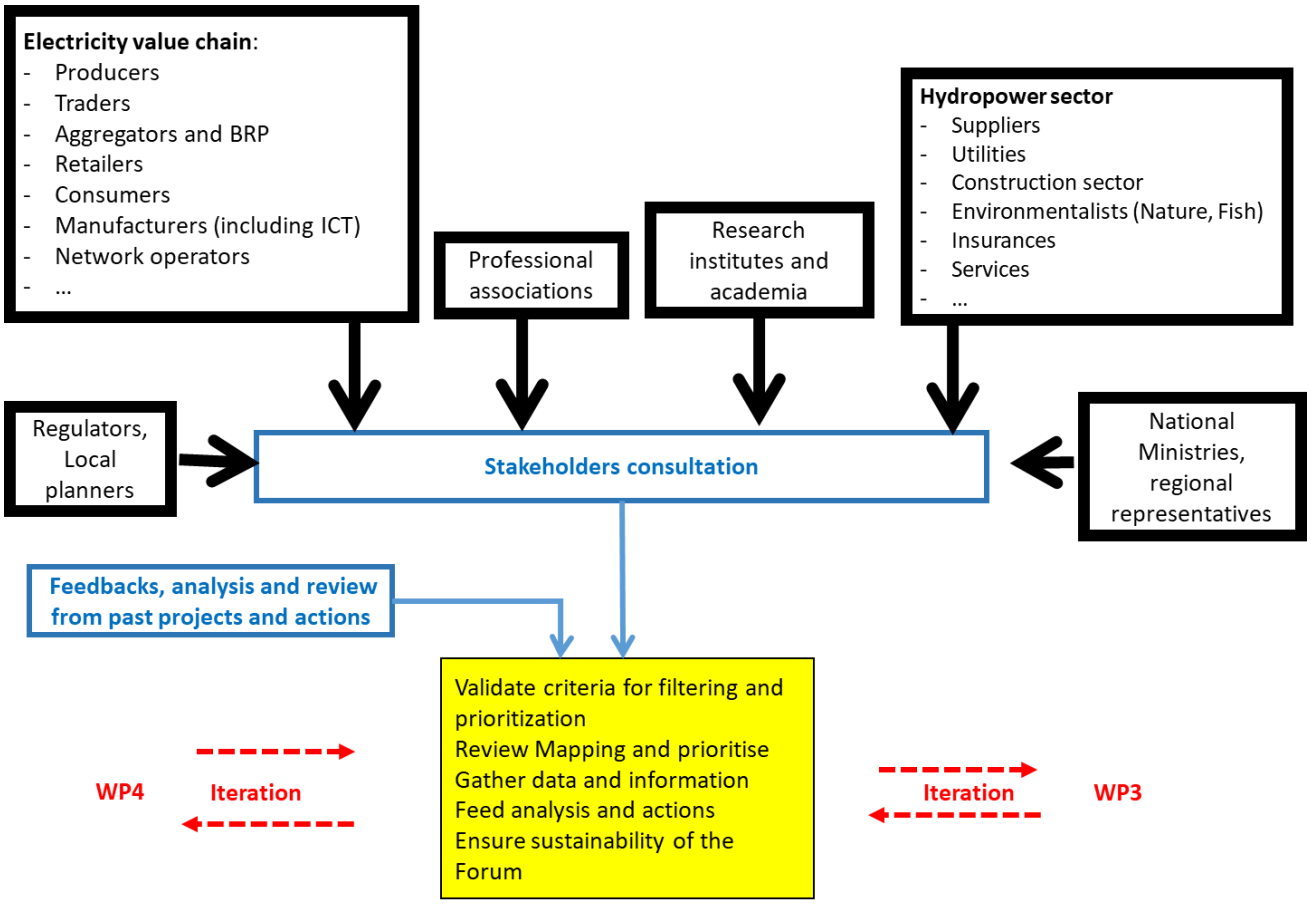



Figure 3-4 Scope of WP2 organization and consultation process

WP2 has the following specific objectives (aligned directly with the project information flow diagram Figure 3-1):

| | |
|---|---|
| **Task 2.1** | Establish a comprehensive Stakeholder consultation and engagement strategy and plan |
| **Task 2.2** | Create the **Hydropower Forum Database** supporting the mapping and analysis of research needs, priorities, specifications and ongoing initiatives. |
| **Task 2.3**: | Create the **Consortium Online Work Area** to support management of the project, network and events |
| **Task 2.4** | Stakeholder mapping and initial consultation |
| **Task 2.5** | External Experts online analysis |
| **Task 2.5** | Second consultation with the wider stakeholder group |
| **Task 2.6** | Third consultation with the wider stakeholder group |

**Task 2.1 Establish a comprehensive Stakeholder engagement and consultation plan (Lead: EASE; Partners: All ; M1-2)**

The main objectives of the task are to develop and facilitate stakeholder process, create and contribute to a functional European hydropower collaboration network, provide continuous support to related work packages but also other partners and ensure continuation of support beyond the project. Two pillars are required to contribute to these objectives:
The **Stakeholder engagement and consultation plan** will define the objectives of stakeholder engagement and indicate how involvement of stakeholders is achieved at each stage of the consultation process. The strategy will be publicly available and will include the vision for stakeholder engagement and the details of purpose, players, methods and responsibilities.

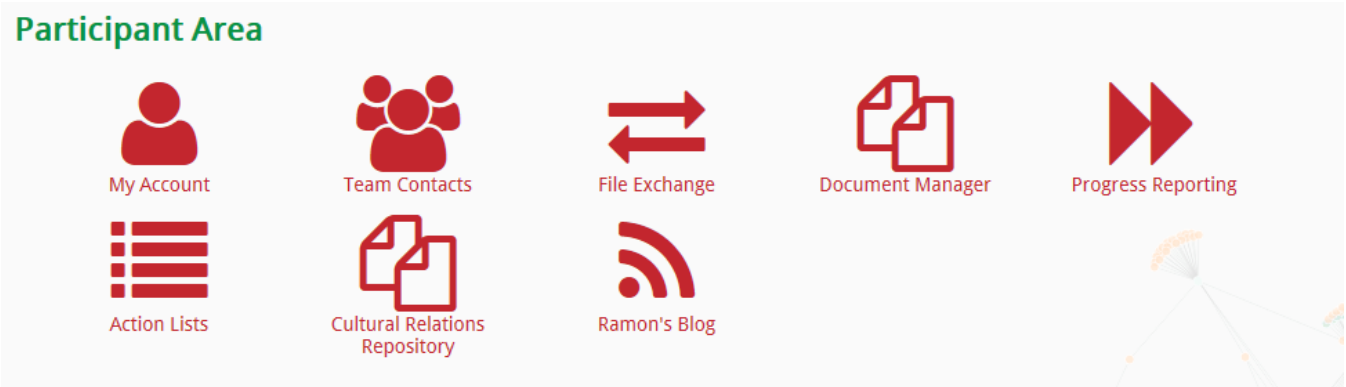
**Task 2.2 Create the HYDROPOWER-EUROPE Forum database supporting the mapping and analysis of research needs, priorities, specifications and ongoing initiatives (Lead: Samui; Partners: All; M1-3)**

An online database will be developed to support the easy storage, updating, analysis and prioritisation of the HYDROPOWER-EUROPE data. The database will be designed to **support the consultation and prioritisation process and production of the Research and Innovation Agenda and Technology Roadmap**. The database will also support a longer term sustainable approach for the HYDROPOWER-EUROPE Forum by providing a framework that allows for easy future updates and reprioritisation of actions, as priority goals are achieved, and new challenges identified in the future. The structuring and functionality of the database will be developed in close consultation with the wider consortium to ensure that it supports the different stages of the programme most effectively.

**Task 2.3 Create the Consortium online work area to support consultation, management of the project, network and events (Lead: Samui; Partners: All; M1-5)**

A team working area of the project website, the Consortium Online Work Area (COWA), will be created with tools and systems (Figure 3-5) to support team working, consultation and communication.

Figure 3-5 Example of functionality of team working area of the project website




The online tools will be developed to meet the specific needs of the project and project team. For instance, tools to support stakeholder mapping (HYDROPOWER-EUROPE Forum database), stakeholder participation in workshops, consultation process (e.g. management of events, T&S costs etc) and an open library accessible to all partners through this area, are included.

**Task 2.4 Stakeholder mapping and initial consultation (Lead: EASE; partner: ICOLD; M1-4)**

Mapping and categorisation of stakeholders will be undertaken, and initial contact made (online) to validate their involvement. This will be initially via the existing partner associations, web and social media and will also allow for stakeholders to provide initial (unstructured) contributions on needs and priorities. This information will feed into the first expert workshop (Month 5) under WP3.

**Task 2.5 First wider consultation and knowledge gathering to optimise topic (needs, priorities etc) selection (Lead: EASE; All Partners; M10)**

A first round of wider consultation will be undertaken through both online consultation and a series of three regional workshops. This will use material arising from the first expert workshop (M5, WP3) and create a first portfolio of topics which identify the main challenges (technical, business, economic, environmental, social, cultural, legal, etc.) regarding the hydropower sector. The three regional workshops will be carried out in different climatic regions of Europe (Nordic, Alpine, Mediterranean / Eastern) to address their specific climatic, environmental and social issues and to promote appropriate innovations for solving these specific challenges. Online consultation (both stakeholder and topic orientated) will allow both widening of scope and refinement of specific topic issues. The consultation feedback from this process will feed the CEP analysis process under Task 3.2.

**Task 2.6 Second wider consultation and information consolidation (Lead: EASE; All Partners: M25)**

The second wider consultation process will take place in Brussels, where the EC and key stakeholders will be invited to review and provide feedback on the evolving draft of Technology Roadmap and Research and Innovation Agenda. The event will focus on both technical and social, environmental and development questions. The event will also be streamed online, with online participation and feedback encouraged to ensure as wide a participation as possible. Feedback gathered from this process will feed the CEP analysis process under Task 3.4.

**Task 2.7 Sustainability of the HYDROPOWER-EUROPE Forum (Lead: ICOLD, Samui; Partners: ALL: M24-36)**

The HYDROPOWER-EUROPE project will facilitate structuring of the hydropower community within Europe and the creation of a Research and Innovation Agenda and Roadmap for implementation. However, after the 3yr lifecycle of the HYDROPOWER-EUROPE initiative there will need to be a plan in place for future sustainability. Under this task, a review of potential options to ensure the future sustainability of the HYDROPOWER-EUROPE forum (and hence the Research & Innovation Agenda) will be undertaken and the preferred option will be initiated during the final year of the project to ensure a smooth transition beyond project completion.

**Deliverables:**

| | | | |
|---|---|---|---|
| D2.1 | Stakeholder engagement and consultation plan | EASE | M2 |
| D2.2 | HYDRO-EUROPE forum database Preliminary Version (V0) | SAMUI | M4 |
| D2.3 | Report on the first wider stakeholder consultation process (three regional consultation workshops plus online consultation) | EASE | M10 |
| D2.4 | Online tools supporting project team work, networking, online library and events | SAMUI | M6 |
| D2.5 | Report on the second wider consultation process | EASE | M25 |
| D2.6 | HYDRO-EUROPE forum database final Version (V1) updated for sustainable strategy | SAMUI | M36 |
| D2.7 | HYDRO-EUROPE Community sustainability strategy | ICOLD | M36 |

**Milestones:**

| | | |
|---|---|---|
| M1 | 1st round of consultation (on line) complete | M4 |
| M2 | 2nd round of consultation (cross border workshops at the end of the 1st wider consultation) complete | M12 |
| M3 | 3rd round of consultation (cross border workshops at the end of the 2nd wider consultation) complete | M26 |

| Work Pack No. | **WP3** | | Lead: | **VGB** | | | | |
|---|---|---|---|---|---|---|---|---|
| Work Pack Title | **Analysis and Prioritisation** | | | | | | | |
| Partner No. | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 |
| Short Name | ICOLD | SAMUI | EASE | EUREC | **VGB** | ZABALA | EREF | IHA |
| Person-months | 2.60 | 0.40 | 2.05 | 1.50 | 3.35 | 0.40 | 0.40 | 0.40 |
| | | | | | Start: | **Month 2** | End: | **Month 33** |

**Objectives**

WP3 concentrates on nominating members for an expert group, the Consultation Expert Panel (CEP), consisting of representatives of the whole hydropower community with a wide range of technical, economic, environmental, legal and social knowledge, supported by subgroups of experts. The focus of the CEP´s work is set on the one hand to evaluate the structure of the research roadmap regarding its application in a consulting process with all stakeholders and on the other hand to analyse and prioritize the comprehensive information based on the upstream consulting processes (WP2).

**Description of work and role of participants**

The CEP, with a wide range of knowledge on research needs, will categorize and prioritize the topics for the RIA and TR from the perspective of practical implementation, added value for the hydropower community and the significance of implementation. The CEP will use information from stakeholder consultation (WP2) and feed recommendations to the editing team (WP4). The evaluation, assignments and categorization will take place through workshops with different content-depth or online by the group of experts.

**Task 3.1 Workshop for the evaluation of the first draft of the RIA and TR including the conclusions of the first stakeholder consultation process (Lead: VGB; Partners: ALL; M5)**

In a first workshop in Brussels, the proposed documents structure (from the editing team - see Tasks 4.1 and 4.2) will be evaluated, and the methodology for the research categorisation and prioritisation process will be defined by the CEP, taking into account feedback from the first stakeholder consultation (online) (WP2).
Key actions include:

- Bundling and structuring the information from the online consulting process (see Task 2.4) and preparing documents for the workshop.
- Organising and moderating the workshop. In this workshop the CEP will approve the first draft structure of the RIA and TR, clarify the methodology for the categorisation and the prioritisation, draw up the current state of the art for Tasks 4.3 & 4.4, and prepare questions for the wider stakeholder consultation process (see Task 2.5).

**Task 3.2 Workshop for categorisation and prioritisation (Lead: VGB; Partners: ALL; M12-13)**

Following the three regional workshops, the expert groups (CEP and any expert subgroups) will determine the first categorization and prioritisation of the topics, based on the material coming from the first wider consultation (see Task 2.5) for preparing the first draft of the RIA and TR (see Tasks 4.5 and 4.6).
Key actions include:

- Collecting and pooling the topics for the preparation of the workshop
- Organising and moderating the workshop. In this workshop the expert group will allocate the feedback into categories and implement the methodology for categorisation and the prioritisation.
- Establishing subgroups for detailed clarifications on demand

**Task 3.3 Online consultation for clarification of open points (Lead: VGB; Partners: ALL; M17)**

Open points and further detailed information, regarding the first draft of the RIA and TR coming from the editing team (see Tasks 4.5 and 4.6), will be clarified through an online consulting process with the CEP and any subgroups of external experts.

**Task 3.4 Workshop for evaluation of the information of the second stakeholder consultation process (Lead: VGB; Partners: ALL; M27)**

All comments and additional information of the second stakeholder process (see Task 2.6) will be evaluated by the

expert group (CEP) in a workshop. Amendments will be proposed to the editing team (see Tasks 4.7 and 4.8).

**Task 3.5 Online consultation for clarification of open points for the final version** (**Lead: VGB; Partners: ALL; M33)**

Open points coming from the editing team (see Tasks 4.7 and 4.8) will be clarified via in an online consulting process with the expert group and subgroups.

**Deliverables:**

| | | | |
|---|---|---|---|
| D3.1 | CEP recommendations on the initial structure of RIA & TR and the current status of hydropower technology | VGB | M5 |
| D3.2 | CEP recommendations arising from the 1st wider stakeholder consultation process | VGB | M12 |
| D3.3 | CEP recommendations on the 1st draft RIA & TR | VGB | M17 |
| D3.4 | CEP recommendations arising from the 2nd wider stakeholder consultation process | VGB | M27 |
| D3.5 | CEP recommendations for the final RIA & TR | VGB | M33 |

**Milestones:**

| | | |
|---|---|---|
| M1 | Initial CEP workshop completed | M5 |
| M2 | Second CEP analysis workshop completed | M12 |
| M3 | Online CEP analysis performed | M17 |
| M4 | Third CEP analysis workshop completed | M27 |
| M5 | Final online CEP analysis performed | M33 |

| Work Pack No. | **WP4** | | Lead: | **EUREC** | | | | |
|---|---|---|---|---|---|---|---|---|
| Work Pack Title | **Technology Roadmap and Research and Innovation Agenda** | | | | | | | |
| Partner No. | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 |
| Short Name | ICOLD | SAMUI | EASE | **EUREC** | VGB | ZABALA | EREF | IHA |
| Person-months | 4.65 | 0.40 | 2.45 | 6.00 | 2.15 | 0.40 | 0.65 | 0.65 |
| | | | | | Start: | **Month 2** | End: | **Month 35** |

**Objectives**

The call topic demands that the project "support the discussion (around hydropower) with up-to-date information". Thus, the hydropower community needs to be surveyed, and the results of the survey published soon after. Up to date information on the status of technology must be gathered. This Work Package consists of the writing of the contents of two documents (with WP5 responsible for document design and dissemination). The two documents comprise:

**[1] "Research and Innovation Agenda"**
This document concerns:

- Status of hydropower technology (including, to the extent practicable, a review of running projects)
- Research and innovation actions: prioritised, budgeted, with an indication of the kind of funding needed
- Comparison with the last hydropower roadmap (HEA, Global Technology Roadmap 2015)

**[2] "Technology Roadmap"**
This document will discuss the non-technical barriers to hydro deployment:

- Understanding why communities support or reject hydropower projects
- Bridging the gap between the parties: best practice in bridging the divide
- Finding finance for hydropower including pumped storage by overcoming the concerns of investors

The consortium reserves the right to choose a different name for these documents, if a more suitable name can be found.

**Description of work and role of participants**

**Task 4.1 Initial structure of the Research and Innovation Agenda (Lead: EUREC; Partners: ALL: M1)**
The experience of consortium members who have worked on similar documents (e.g. Strategic Research Agendas or Implementation Plans) will be sought. Those documents may be used as templates. The list of priorities and the strategic directions defined by the consortium and refined by the technical experts will be used (see Section 3.3). The draft structure of the document at the level of headings, subheadings and within chapters will be determined.

**Task 4.2 Initial structure of the Technology Roadmap (Lead: ICOLD; Partners: ALL; M1)**
In a preliminary questionnaire, the consortium has defined 7 key research directions (see Section 5) supporting the role and the development of hydropower for providing an effective contribution to climate change adaptation, preserving the environment, and increasing societal resilience and local job employment. These 7 directions will provide the framework of the Technology Roadmap. The draft structure of the document at the level of headings, subheadings and within chapters will be determined.

**Task 4.3 Produce document entitled "Current status of hydropower technology" (Lead: EUREC; Partners: ALL; M8)**
Input from 3.1 and 3.2 will be put into readable, concise text that brings out the main messages. It will be a discussion document for the First Wider Stakeholder consultation. The consultees will be prompted for answers that relate to the content of the document. The output will be the draft "Current status of hydropower technology"

**Task 4.4 Discussion document for Technology Roadmap (Lead: EUREC; Partners: ALL; M8)**
Material from the "Initial Contact Online" (input from Task 2.4) will be used to write a background document, updating the challenges addressed by hydropower development for the First Wider Stakeholder consultation process (WP2).

**Task 4.5 1st and 2nd drafts of Research and Innovation Agenda (Lead: EUREC; Partners: ALL; M14 and M21)**
The analysis performed by WP3 Task 3.3 will be transformed into highly readable text (1st draft). This will then be sent for review by the CEP Experts (WP 3 Task 3.4). The second draft will also be produced in close collaboration with WP3 and the CEP Experts. The first draft of the Research and Innovation Agenda will be produced by Month 14 and the second draft by Month 21. The European Commission will be consulted to find the optimal time to provide the first draft so that it may contribute towards the first FP9 Work Programme.

**Task 4.6 1st and 2nd drafts of Technology Roadmap (Lead: EUREC; Partners: ALL; M14 and M21)**
The same process undertaken for the RIA will be applied for development of the TR. This process will benefit from an honest and transparent public debate with the civil society and the national and international authorities (WP2).

**Task 4.7 Final feedback loop for Research and Innovation Agenda (Lead: EUREC; Partners: ALL; M30 and M35)**
Further edits to produce a final draft RIA will be undertaken by Month 30, building upon feedback gathered through the second wider stakeholder analysis process (WP2, WP3). The revised draft final RIA will then be passed to the CEP (WP3) for a final review, before creation of the final document by Month 35.

**Task 4.8 Final feedback loop for Technology Roadmap (Lead: ICOLD; Partners: ALL; M30 and M35)**
Concurrent with, and mirroring Task 4.7, Task 4.8 will produce the final version of the Technology Roadmap (final draft TR Month 30 and final document by Month 35).

**Deliverables:**

| | | | |
|---|---|---|---|
| D4.1 | Draft structure of the Research and Innovation Agenda | EUREC | M1 |
| D4.2 | Draft structure of the Technology Roadmap | ICOLD | M1 |
| D4.3 | Document entitled "Current status of hydropower technology » | EUREC | M8 |
| D4.4 | Discussion document for the Technology Roadmap | EUREC | M8 |
| D4.5 | 1st drafts of Research and Innovation Agenda and Technology Roadmap | EUREC | M14 |
| D4.6 | 2nd drafts of Research and Innovation Agenda and Technology Roadmap | EUREC | M21 |
| D4.7 | Final version of the Research and Innovation Agenda | EUREC | M35 |
| D4.8 | Final version of Technology Roadmap | ICOLD | M35 |

**Milestones:**

| | | |
|---|---|---|
| M1 | 1st draft RIA and TR achieved | M14 |
| M5 | 2nd draft RIA and TR achieved | M21 |

| Work Pack No. | **WP5** | | Lead: | **ZABALA** | | | | |
|---|---|---|---|---|---|---|---|---|
| Work Pack Title | **Communication, Dissemination and Outreach (CDO)** | | | | | | | |
| Partner No. | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 |
| Short Name | ICOLD | SAMUI | EASE | EUREC | VGB | **ZABALA** | EREF | IHA |
| Person-months | 2.05 | 5.30 | 1.05 | 1.45 | 1.15 | 9.55 | 0.60 | 0.60 |
| | | | | | Start: | **Month 1** | End: | **Month 36** |

**Objectives**

The objectives of this work package are to structure, plan and implement communication, dissemination and outreach activities supporting the successful implementation of the HYDROPOWER-EUROPE project. These activities support both the project team in their work, and implementation of the various tasks and activities across all work packages.

**Description of work and role of participants**

To achieve these objectives, the following tasks are planned:

**T5.1 Communication and dissemination master plan (Lead: ZABALA, Partners: all; M1)**

ZABALA will prepare a detailed communication master plan based upon the structure outlined in Section 2.2 including a detailed overview of partner actions to be undertaken during the HYDROPOWER-EUROPE project. The master plan will be reviewed and updated 6-monthly during the project.

**T5.2 Project image and leaflet (Lead: SAMUI; Partners: all; M3)**

At the start of the project, a project brand will be developed, including the development of a logo, and a corporate design identity as regards, fonts, colours and style which will be used to generate all branded project material (e.g. website, publications, document and PPT templates etc).

A leaflet explaining the objective, composition of the consortium and the main goals of HYDROPOWER-EUROPE will be created during the third month and available in print and digital formats.

**T5.3 Website - the central information hub (Lead: SAMUI; Partners: ZABALA; M1-36)**

The HYDROPOWER-EUROPE website will be the core dissemination channel of the project. It will play the role of a knowledge information hub gathering material and work developed in previous or by the partners (ESHA; EHA; EREF; EASE). The website will disseminate project results to the hydropower stakeholders and will aid the communication of information about hydropower to the wider audience (society). SAMUI will develop the website structure; ZABALA will be in charge of content updates. The website will include a section of news and events which will be updated at least once a month with contributions from all partners. Website access will be monitored regularly with 6 monthly statistical reports for review (and action) by the Project Management Team.

**T5.4 Dissemination activities (Lead: ZABALA, partners: all; M1-36)**

Multiple dissemination actions will be under taken:

- **Presentations at external events** to disseminate the HYDROPOWER-EUROPE activities and outcomes. ZABALA together with the other partners will maintain a list of events (either their own or other HYDROPOWER-EUROPE stakeholders' events), and it will be their shared responsibility to speak at these events on behalf of the HYDROPOWER-EUROPE project. ZABALA will prepare the basic set of slides and update them regularly.
- A half-yearly **newsletter** will be sent out which will gather HYDROPOWER-EUROPE news, future events, information and events from the sector. The style of the newsletter will be based on the corporate design template. The newsletter will be sent to the database of stakeholders developed under WP2. The partners of HYDROPOWER-EUROPE will also distribute the newsletter publications through their own channels (website/newsletter/social media…).
- **Periodic mailings** will be made to inform about up-coming news, events, workshops, webinars or consultation

actions. Mailings will have a similar style as the newsletter to ensure a consistency in the image. Each mailing and newsletter sent out will include the possibility to opt-in or out of the mailing list.

- HYDROPOWER-EUROPE will also regularly communicate through **social media** about its activities. An assessment of the most relevant platforms will be undertaken when preparing the master plan. The expected main social platforms that will be used are LinkedIn and Twitter. **LinkedIn** to disseminate HYDROPOWER-EUROPE activities and outcomes to the community of stakeholders, mainly industry and research community by posting opinion articles or announcement of events and consultations; **Twitter** to reach a wider public and media. ZABALA will coordinate this task and will require the active involvement of all project partners.
- A short and effective **video** presenting the HDROPOWER EUROPE project will be prepared, in collaboration with the main stakeholders (Month 6) and used in multiple ways at events, workshops, conferences, policy conference and through social media. It will include a message showing the sustainable vision of the roadmap to the end-user community.

**T5.5 Publications (Lead: ZABALA; partners: all; M 1-36)**

Although the content of the RIA and TR publications have to be developed mainly within WP4, their edition, publication and coordination of their dissemination will be done within this task by the WP leader in order to streamline the visual identity and writing style, and show a coherent and professional image. Partners with strong communication department (operators) will support the task leader to review these documents.

**T5.6 Media communication (ZABALA; partners: all; M1-36)**

ZABALA will coordinate the media strategy. Stakeholders associations which have strong communication teams/professionals will also have a very important role here in disseminating the press releases or involving media. A **press release** will be prepared and launched at the following important milestones of HYDROPOWER-EUROPE such as: Project kick-off; consultation workshops, high-level conference in Brussels, Research & Innovation Agenda publication, Technology Roadmap publication.

A data base of specialised journalists will be developed at the EU level with the support of the 5 associations and reviewed after each press release. The database will also receive the press releases in order to ensure maximum outreach. When organising a consultation workshop in a specific region, specific local media communication will be foreseen, with the possibility to organise a site visit of one our partners.

**T5.7 High level events: International and Policy conferences (ZABALA; partners: all; M 36)**

This task aims to present and discuss the initial structure and first drafts of HYDROPOWER-EUROPE RD&I Agenda and TR to the profession sector (IHA World Congress in May 2019 and EurCOLD European Symposium in October 2019 and EASE Global Energy Storage Conference 2020) and the final RIA and TR to European Policy stakeholders, national policy stakeholders as well as to the industry, research and finance communities (in Brussels 2021 where 200 participants are expected).

**Deliverables:**

| | | | |
|---|---|---|---|
| D5.1 | Communication and dissemination master plan | ZABALA | M1 |
| D5.2 | Project brand design and templates | SAMUI | M3 |
| D5.3 | Project leaflet | ZABALA | M3 |
| D5.4 | Project website | SAMUI | M4-36 |
| D5.5 | Yearly communication report | ZABALA | M12,25,36 |

**Milestones:**

| | | |
|---|---|---|
| M1 | Website online | M4 |
| M2 | Social media accounts active | M4 |

Table 3.1a: List of work packages

| | Work Package Title | Lead Participant | | Person Months | Start | End |
|---|---|---|---|---|---|---|
| WP1 | Project Coordination | P01 | ICOLD | 7.00 | M1 | M36 |
| WP2 | Hydro-Europe Community Support | P03 | EASE | 19.90 | M1 | M36 |
| WP3 | Analysis and Prioritisation | P05 | VGB | 11.10 | M2 | M33 |
| WP4 | Technology Roadmap and Research and Innovation Agenda | P04 | EUREC | 17.35 | M2 | M35 |
| WP5 | Communication, Dissemination and Outreach (CDO) | P06 | ZABALA | 21.75 | M1 | M36 |
| | **Total Person Months** | | | **77.10** | | |

Table 3.1b: List of Deliverables

| | Deliverable name | WP No. | Lead partner | Type [3] | Diss. level [4] | Del. date |
|---|---|---|---|---|---|---|
| D1.1 | HYDROPOWER-EUROPE Project Method and Activity Plan (PMAP) | WP1 | SAMUI | R | PU | M2 |
| D1.2 | Risk Management Plan | WP1 | ICOLD | R | PU | M2 |
| D1.3 | Chair & meeting notes PMgT, Project Consortium and General Assembly meetings | WP1 | ICOLD | R | CO | M36 |
| D1.4 | Ethical Procedures and Approval Report | WP1 | SAMUI | R | PU | M3 |
| D1.5 | Data Management Plan prepared and maintained | WP1 | SAMUI | R | PU | M4 |
| D2.1 | Stakeholder engagement and consultation plan | WP2 | EASE | R | PU | M2 |
| D2.2 | HYDRO-EUROPE forum database Preliminary Version (V0) | WP2 | SAMUI | O | CO | M4 |
| D2.3 | Report on the first wider stakeholder consultation process (three regional consultation workshops plus online consultation) | WP2 | EASE | R | PU | M10 |
| D2.4 | Online tools supporting project team work, networking, online library and events | WP2 | SAMUI | O | PU | M6 |
| D2.5 | Report on the second wider consultation process | WP2 | EASE | R | PU | M25 |
| D2.6 | HYDRO-EUROPE forum database final Version (V1) updated for sustainable strategy | WP2 | SAMUI | O | CO | M36 |
| D2.7 | HYDRO-EUROPE Community sustainability strategy | WP3 | ICOLD | R | PU | M36 |
| D3.1 | CEP recommendations on the initial structure of RIA & TR and the current status of hydropower technology | WP3 | VGB | R | PU | M5 |
| D3.2 | CEP recommendations arising from the 1st wider stakeholder consultation process | WP3 | VGB | R | PU | M12 |
| D3.3 | CEP recommendations on the 1st draft RIA & TR | WP3 | VGB | R | PU | M17 |
| D3.4 | CEP recommendations arising from the 2nd wider stakeholder consultation process | WP3 | VGB | R | PU | M27 |
| D3.5 | CEP recommendations for the final RIA & TR | WP3 | VGB | R | PU | M33 |
| D4.1 | Draft structure of the Research and Innovation Agenda | WP4 | EUREC | R | PU | M1 |
| D4.2 | Draft structure of the Technology Roadmap | WP4 | ICOLD | R | PU | M1 |
| D4.3 | Document entitled “Current status of hydropower technology » | WP4 | EUREC | R | PU | M8 |
| D4.4 | Discussion document for the Technology Roadmap | WP4 | EUREC | R | PU | M8 |
| D4.5 | 1st drafts of RIA and TR | WP4 | EUREC | R | PU | M14 |
| D4.6 | 2nd drafts of RIA and TR | WP4 | EUREC | R | PU | M21 |
| D4.7 | Final version of the Research and Innovation Agenda | WP4 | EUREC | R | PU | M35 |

[3] R = Document, Report
D = Websites, patents filing, market studies, press and media actions, videos etc.
O = Other (Software, technical diagram etc)

[4] PU = Public, fully open
CO = Confidential, restricted under conditions set out in MGA
CI = Classified information as referred to in Commission Decision 2001/844/EC

| | | | | | | |
|---|---|---|---|---|---|---|
| D4.8 | Final version of Technology Roadmap | WP4 | ICOLD | R | PU | M35 |
| D5.1 | Communication and dissemination master plan | WP5 | ZABALA | R | PU | M1 |
| D5.2 | Project brand design and templates | WP5 | SAMUI | O | PU | M3 |
| D5.3 | Project leaflet | WP5 | ZABALA | D | PU | M3 |
| D5.4 | Project website | WP5 | SAMUI | D | PU | M4 |
| D5.5 | Yearly communication report | WP5 | ZABALA | R | PU | M12 |
| | | | | | | |

## 3.2 Management structure and procedures

### 3.2.1 Organisational structure and the decision-making

The organisational and management structure for **HYDROPOWER-EUROPE** is shown in Figure 3.1.

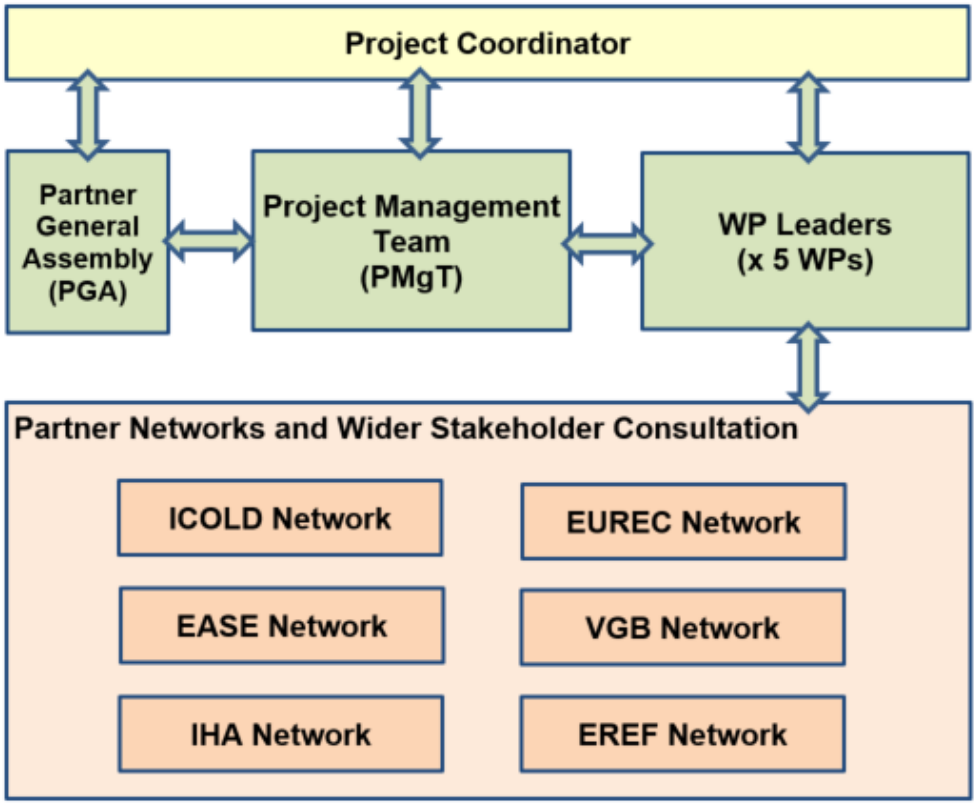



Figure 3.1 Management structure of HYDROPOWER-EUROPE

***Coordination:***

The **HYDROPOWER-EUROPE** project will be coordinated by Anton Schleiss (ICOLD), with close support provided by Jean Jacques Fry (ICOLD), Mark Morris (Samui France) and the wider Project Management Team (PMgT).

Prof. Anton Schleiss graduated in Civil Engineering from the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland. After having obtained a PhD on the topic of pressure tunnel design of hydropower plants (HPP), he worked for 11 years in an Int. Eng. Consulting Company in Zurich and was involved in the design of many HPP projects around the world as an expert in hydraulic engineering and project manager. In 1997, he was nominated full professor and director of the Laboratory of Hydraulic Constructions (LCH) of the Swiss Federal Institute of Technology Lausanne (EPFL). He supervised more than 50 PhD and Postdoc research projects in the field of water infrastructures. He participated also to EU research projects addressing topics of HPP under FP5 (Thematic Network on Small Hydropower), Interreg IIIB (ALPRESERV), FP7 (STREST) and H2020 (SediTrans).

He was listed in 2011 among the 20 international personalities that "have made the biggest difference to the sector Water Power & Dam Construction over the last 10 years". Since 2015 he is president of the International Commission on Large Dams (ICOLD).

Mark Morris is a professional engineer who has worked in the flood risk sector for 30 years, with a particular emphasis on levee and dam failure and emergency response. Mark has considerable experience of working as a knowledge broker, interfacing between research / academia and industry applications. Mark has worked on European research projects under FP4, FP5, FP6, FP7 and H2020. These projects have ranged in size from small concerted actions to large integrated projects, with research teams ranging from a dozen to over 250 personnel spread across many different countries. Over the years, Mark has participated as a researcher, WP leader, coordination support and coordinator on these various projects so is well placed to support coordination of the HYDROPOWER-EUROPE project.

***The Project Management Team (PMgT):***

The Project Management Team (PMgT) will oversee and guide overall implementation of the project. The PMgT will comprise representatives of each partner, hence also representing each of the WP Leaders. The PMgT will meet quarterly throughout the project to ensure that work progresses effectively. Two meetings per year will be face to face meetings and two using web-based conferencing technology. Where possible, the face to face meetings will be held in series with other events for the project in order to minimise travel. The PMgT will:

- Be the decision body of HYDROPOWER-EUROPE
- Review the overall progress of the project, undertake risk analysis and take any appropriate actions
- Evaluate any change proposals and make suitable decisions for the next steps
- Review progress of the communication and dissemination strategy for the project
- Assess the impact of any change to contract suggested by the European Commission and respond accordingly
- Resolve any conflict (technical, managerial, legal or financial) which may arise amongst the project members

***Work package management:***

Each of the 5 work packages is led by a different partner, however all partners also work on tasks under any of the work packages according to their specific expertise and interests. The work package leader is ultimately responsible for delivery of the work package scope of work, and specified deliverables. As specified below, each WP Leader will draw up a work implementation plan for their work package at the start of the project to ensure that roles and responsibilities of partners within each work package are clear.

***Partner General Assembly (PGA):***

The Partner General Assembly is a mechanism through which any issues regarding project implementation that requires the approval of all partners are discussed and agreed. A PGA will be held annually and require that a representative of each partner organisation participates.

***Consortium stakeholder networks and linked third parties:***

Six of the main partners represent large networks of stakeholders at a European level. These are:

- ICOLD – International Commission on Large Dams has been involved in hydropower since 1928
- VGB – International Technical Association for Generation and Storage of Power and Heat
- EREF – European Renewable Energies Federation federates Small Hydro Associations
- EASE – European Association for Storage Energy gathers the largest hydropower operators
- EUREC – Association of European Renewable Energy Research gathers research centres
- IHA – International Hydropower Association

Drafting of the research and innovation agenda, and roadmap for implementation, will draw on consultation via these networks and a wider range of stakeholders. In order to support technical drafting contributions, two financial models have been adopted:

1. Inclusion of specific linked third parties, where expertise in relation to priority topics has already been identified
2. Allocation of a travel and subsistence budget to support the participation of additional expertise in the drafting process. Some of this expertise will come via the partner networks whilst others will come via the wider stakeholder consultation process.

Hence, **10** linked third parties have been included within the project and a budget for travel and subsidence supporting the involvement of up to **12** other experts (per technical workshop) has been allocated.

***Project Method and Activity Plan (PMAP):***
A key challenge for managing any consortium or network with a large and dispersed team is to ensure that:

- The overall aims and objectives of the project are clear
- The scope of work for each partner is clear
- The method of communicating intra team is clear
- The method of working and reporting is clear
- Procedures for dealing with any problems or issues as they arise are clear

The project method and activity plan (PMAP) will be established by SAMUI in Month 1 of the project and agreed by the PMgT. This document will detail working methods and procedures addressing each of the issues above so that all team members can work in a consistent, efficient and effective manner from the outset. The PMAP and supporting online tools, documents and templates will be provided through an online team working area.

***Overall aims and objectives of the project***
A 'Kick Off' meeting (KoM) will be held in Month 4 of the project. At this time, a review of the overall schedule and steps planned for each WP will be undertaken. This will also integrate with development of the WIPs (see below). The overall aims and goals of the project will be revisited to ensure that they remain appropriate, to see whether they can be enhanced and to ensure that the team has a common vision. The agreed aims will be recorded and accessible online throughout the project to ensure no deviation from the project objectives.

***Scope of work for each partner – Work Implementation Plans (WIPs)***
The budget for HYDROPOWER-EUROPE has already been developed using a detailed plan of proposed activities for each partner. The detail of these plans will be expanded through development of work package implementation plans (WIPs). Whilst the WP description tables provide a clear summary of the work proposed, they do not detail the specific actions of each partner. WIPs will provide an expanded description of the work programme for each work package. The description will be such that any person could review and understand the steps of work that all partners involved in that work package will be undertaking. The contents of the WIP will include:

- Detailed description of work and partner roles
- Description of deliverables
- Schedule
- Review of risks

Through this mechanism the specific roles of each partner across the whole project will be confirmed and recorded. This avoids any confusion later in the project should there be any dispute as to scope of agreed work.

***Use of web-based tools and procedures***
It has been found that the use of web-based tools and procedures can significantly enhance the team working process, facilitating team communication, remote working and project management. Members of the PMgT have been using web-based tools to support EU project coordination for over 20 years, with many of the tools, methods and procedures having evolved through experience on different projects. As such, the methods proposed for HYDROPOWER-EUROPE are proven to work in practice and have the flexibility to adapt to different teams and project structures. It is envisaged that these tools will include:

- Team contacts
- Document management system
- Meetings & Events management system
- Guidance and templates
- Progress reporting
- EC reporting
- File exchange
- Media material library
- Social media interfaces
- Workshop / conference events support facilities
- Newsletters / press

***Web conference Systems***
Web conference tools will also be used to support team communication. Half of the PMGT meetings will be performed remotely using an online web conferencing system. Virtual meeting room space will be created at the start of the project and used each time the team or PMgT wish to communicate online.

***Templates and document control***
To help ensure consistency and quality in products from the project, a set of document templates will be produced so that all products, whether team working material or public facing material, will be recognisable from the HYDROPOWER-EUROPE community and in a consistent style and format. In doing this, document control procedures such as file naming, document development histories etc. will also be introduced to the team.

***Tracking and Managing Progress***
An online system of progress reporting will also be adopted so that the PMgT is able to track project progress. The system operates on the basis of reporting by exception – i.e. reporting when problems occur, rather than describing actions completed, which should be routine for a successful project. In this way the burden of progress reporting is minimised for all partners but remains effective for managing overall implementation of the project.

**This organisational structure and decision-making mechanisms are considered appropriate for this project since:**

- The structure has been kept as simple as possible, whilst including mechanisms to ensure that all partners are involved in overseeing project implementation
- The consortium includes linked third parties and additional budgets to support the inclusion of specific technical drafting contributions which are an essential part of developing the research and innovation agenda
- The consortium includes six partners each representing substantial networks of stakeholders. This structure instantly provides HYDROPOWER-EUROPE with a substantial stakeholder consultation base which will then be expanded during the consultation process.
- The use of web-based tools and systems, proven on other projects and adaptable to specific needs of this project, helps to ensure effective team working and team communication.
- The application of a bespoke web-based system for managing stakeholder consultation, analysis and prioritisation of research and innovation needs provides a cost effective and manageable solution to help deliver the core project objectives.

Table 3.2a: List of milestones

| | Milestone name | Rel WP | Est. date | Means of verification |
|---|---|---|---|---|
| M1.1 | Project kick off meeting (KoM) implemented | WP1 | M2 | Workshop notes and presentations online |
| M1.2 | Work Implementation Plans drafted for all WPs | WP1 | M4 | WIPs available online |
| M1.3 | Partner General Assembly meetings | WP1 | M12, 24,34 | Meeting notes online |
| M1.4 | Periodic reporting completed | WP1 | M18, 36 | Reports submitted to EC |
| M2.1 | 1st round of consultation (on line) complete | WP2 | M4 | Consultation data passed to WP3 |
| M2.2 | 2nd round of consultation (cross border workshops at the end of the 1st wider consultation) complete | WP2 | M12 | Consultation data passed to WP3 |
| M2.3 | 3rd round of consultation (cross border workshops at the end of the 2nd wider consultation) complete | WP2 | M26 | Consultation data passed to WP3 |
| M3.1 | Initial CEP workshop completed | WP3 | M5 | Recommendations passed to WP4 |
| M3.2 | Second CEP analysis workshop completed | WP3 | M12 | Recommendations passed to WP4 |
| M3.3 | Online CEP analysis performed | WP3 | M17 | Recommendations passed to WP4 |
| M3.4 | Third CEP analysis workshop completed | WP3 | M27 | Recommendations passed to WP4 |
| M3.5 | Final online CEP analysis performed | WP3 | M33 | Recommendations passed to WP4 |
| M4.1 | 1st draft RIA and TR achieved | WP4 | M14 | Available online |

| | | | | |
|---|---|---|---|---|
| M4.2 | 2nd draft RIA and TR achieved | WP4 | M21 | Available online |
| M5.1 | Website online | WP5 | M4 | Accessible online |
| M5.2 | Social media accounts active | WP5 | M4 | Available to follow online |

### 3.2.2 Innovation management

Innovation is at the heart of the HYDROPOWER-EUROPE project, since a core objective is to *"produce a synthesis of expected research developments and research needs for the coming decades in a technology roadmap and research and innovation agenda in the hydropower sector, targeting an energy system with high flexibility and renewable share"*.

The process of identifying expected research developments and research needs is described in Sections 1.2 and 1.3. This process forms the core of the HYDROPOWER-EUROPE project and builds on wide ranging stakeholder consultation. The stakeholder base is already well established through the networks represented by six of the consortium partners; this will be widened during the project to also reflect wider regional and national interests, with the process of consultation, feedback, analysis and prioritisation supported through the development and use of a bespoke web-based database system. Once established, this system will allow for further refinement and prioritisation of research and innovation needs both during and beyond the lifetime of the project.

To help ensure that the RIA items are identified correctly, and appropriately detailed, specific technical and environmental experts will be used to provide draft text contributions. These experts have been identified from initial research priority analyses performed by the consortium partners; they will belong to the CEP, the Consultation Experts Panel, drawn from the consortium linked third parties as well as other organisations that have been determined as part of the work programme (see extensive supporting letters, CVs etc under Section 4). These experts will bring an appropriate level of understanding of market, environmental and technological problems, allowing the consortium partners to then integrate and prioritise a wide range of issues into the overall RIA and TR.

Since six of the HYDROPOWER-EUROPE partners also represent large networks with varying interests in the sector, they are also driven to find solutions for successfully implementing steps towards new products, services or processes. Fundamentally, this means finding ways to collaborate or integrate different sources of funding or different parallel research and innovation programmes. These aspects will also be at the heart of the stakeholder consultation process, allowing a wider understanding of industry, academia, national and European interests in any particular issue or topic.

### 3.2.3 Critical risks

A risk management plan will be developed by Month 2 (Task 1.2) and used to monitor and manage risks during the lifetime of the project. The risk management plan will be a standing item for the quarterly PMgT meetings. Risks will be classified broadly as internal (administrative, technical, financial) or external – recognising that whilst external risks can significantly affect project programmes, our ability to deal with them directly is more limited. An initial list of risks for implementation of the HYDROPOWER-EUROPE project is listed below.

Table. 3.2b: Critical risks for implementation

| **Description of risk** | **WPs involved** | **Proposed risk management measures** |
|---|---|---|
| *Administrative* | | |
| Failure to produce deliverables or meet milestones on time [Low] | ALL | – Work implementation plans are set up at the start of the project ensuring all partners understand their roles and responsibilities to the consortium<br>– Progress on each WP is monitored by the PMgT using quarterly online progress reporting<br>– PMgT to instigate remedial action plan in case of significant delays |
| Unclear communication between partners | ALL | – Amongst the online tools supporting the team will be a contacts database; all partners will register and maintain |

| | | |
|---|---|---|
| [Low] | | details of staff working on the project and their roles |
| Failure to follow agreed working procedures<br>[Low] | ALL | - The combination of Consortium Agreement and PMAP document (Task 1.1) will clearly define working processes and procedures. Failure to follow these will be taken up by the PMgT and remedial actions put in place. |
| *Technical* | | |
| Failure to reach consensus between industry and NGO on the sustainable future option<br><br>[High] | WP2 | - The consortium will facilitate discussion on real case studies (most ICOLD National Committees will provide case studies).<br>- Latest research studies will fuel discussion.<br>- Any item without agreement will be quoted as research need.<br>- The forum will ensure continuation of discussion beyond the project |
| Failure to receive sufficient response or to reach a wide enough stakeholder audience<br>[Low] | WP2 | - Three of the consortium partners represent large networks of Hydropower 'actors', spanning the overall chain of value and ensuring that the project already has a substantial reach for stakeholder consultation. |
| Failure to receive detailed information relating to research priorities and innovation opportunities<br>[Low] | WP2 | - Preliminary analysis of research priorities has already been undertaken via consortium partner networks. This has allowed for the identification of a number of linked third party partners, who will provide specific technical contributions.<br>- Priorities and wider contributions will be refined and extended during the project, with a budget allocated to support the participation of additional technical experts. |
| Failure of different sectors within Hydro Community to agree on research priorities<br>[Med] | WP3 | - If EEs not agree then conflict is reported to EC and PMgT decides and explains the reasons of the choice. |
| CEP and/or EE biased the results of consultation<br>[Med] | WP3 | - At the start of the project, careful validation of the representativeness of the whole chain value will be done.<br>- A large proportion of consultants and academics will be involved. Special attention will be paid to multidisciplinarity in the composition of this body. E.g. SSH (social science and humanity) shall be involved.<br>- A chart of equity and transparency will be signed by all members.<br>- The three loops of consultation will ensure a repetitive control by the hydropower community |
| *Financial* | | |
| The large number of partners and the larger participation exceeds the budget [Med] | | - Detail carefully the organization to cut the overlaps<br>- Mobilize the External experts and the largest stakeholders for sharing the tasks and the costs |
| *External* | | |
| No problems foreseen | | |

## 3.3 Consortium as a whole

There is no single European association representing hydropower in Europe (or to the European Commission in Brussels). This is the reason underpinning the large number of organizations associated in the consortium for implementing this project despite the relatively limited financial support. **The support of wider networks from these organizations ensures that HYDROPOWER-EUROPE fully covers all interests of the sector**, as seen in Figure 3-6. These organizations are complementary, because:

IHA spans the whole value chain, ICOLD is mainly a consultant engineering association which focuses on structures and VGB is mainly an operator association, which focuses on equipment. EASE is representing the large suppliers and operators, EREF is representing the small ones. Research and Innovation is the heart of activity of EUREC. SAMUI and ZABALA are complementary of technical association like ICOLD and VGB, they have large experience in consultation, communication and dissemination at a European level.

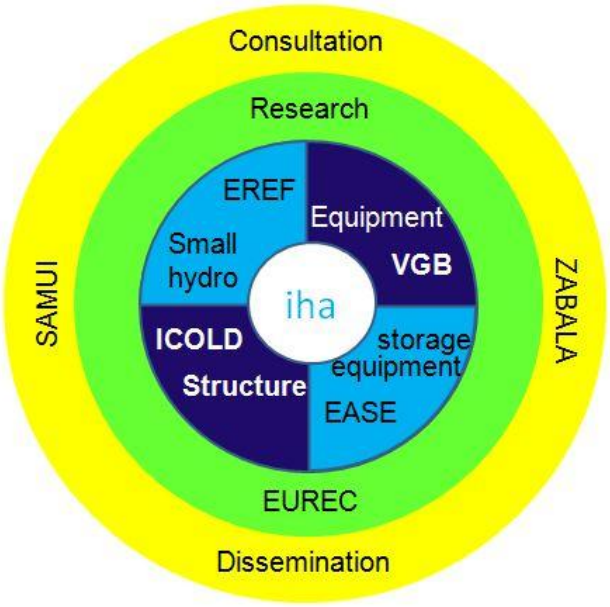



Figure 3-6 : Complementarities of core partners of the consortium

Table 3-1 Immediate potential outreach of the HYDROPOWER-EUROPE consortium partners

| Name | Organisations Represented | Comments |
|---|---|---|
| **EASE** - European Association for Storage of Energy | 40 members with departments in Europe: utilities, research institutes, associations, providers, start-ups, manufacturers, developers, suppliers, TSOs-DSOs | The EASE network reach is not limited to only our members but also encompasses all other partners and stakeholders from previous projects, current platforms, network of non-member groups / dropped members, independent experts etc. |
| **EREF** - European Renewable Energies Federation | 32 association members | National renewable energy associations from 19 EU Member States. EREF's Small Hydropower Chapter cooperates with all (small) hydropower associations in Europe |
| **EUREC** - Association of European Renewable Energy Research | 39 research centres from Member States and Associated Countries to Horizon 2020 | Established in 1991. Experience in writing Research and Innovation Agendas for many renewable energy technologies. Staff member assigned to this project has specific experience, too, in hydropower. |
| **ICOLD** - International Commission on Large Dams | 100 member countries and around 10 000 experts over the world. 30 Technical committees.170 technical bulletins | 25 member countries in Europe. A network of about 4000 experts in Europe. National authorities are embedded in national committees. 7 working groups focussed on development |
| **IHA –** International Hydropower Association | 101 Institutional members | Established in 1994. IHA is an international organization which builds and shares knowledge in the hydropower sector, with a focus on international good practice and sustainable development. |
| **VGB** - International Technical Association for | 452 members located in 33 countries represent a power plant capacity of 433,000 MW. About 1600 experts from | Existing since 1920. VGB PowerTech Hydro provides a growing platform of 74 operators representing about 64,000 MW of installed hydro power capacity, 3 hydro-equipment manufacturers and 2 hydropower |

| | | |
|---|---|---|
| Generation and Storage of Power and Heat | members are active in more than 90 technical committees to exchange operating experience | consulting companies to share experience and knowledge at a high level of expertise. More than 100 experts are actively participating in VGB hydropower committees |

The consortium is supported by the whole hydropower community. A list of 83 external experts already identified was set up (ICOLD, EDP, Statkraft, Vattenfall, ENEL Green Power, EDF, PPC SA, VHP, RSE, IHE Delft, EPFL, UIBK, TUM/FIThydro, NTNU-HydroCen, UPM) and provided initial (proposal stage) mapping of research priorities and organisational expertise in these sectors.

This initial mapping was structured according to 7 strategic priorities, namely:

1. Market conditions, new revenue flow for hydro generation and regulatory framework issues
2. 2050 Safe energy supply: Increase of hydropower production and storage capacity
3. Increase the value of hydro generation
4. Enhancing the environmental and social values of Hydropower
5. Ageing and Resilience of equipment and HP infrastructures
6. Developing emerging Hydro marine energy solutions: tidal range, tidal stream, tidal fence and tidal garden projects
7. Mitigating effects of Global warming and climate change on hydropower production

This mapping will form the starting point for the detailed stakeholder consultation process – see Figure 3-7 below (as an indication of the scope and complexity of the current mapping. **It is recognised that we cannot include all detail here at a scale for reading given the extent of the data mapped and the proposal page limitations**.)

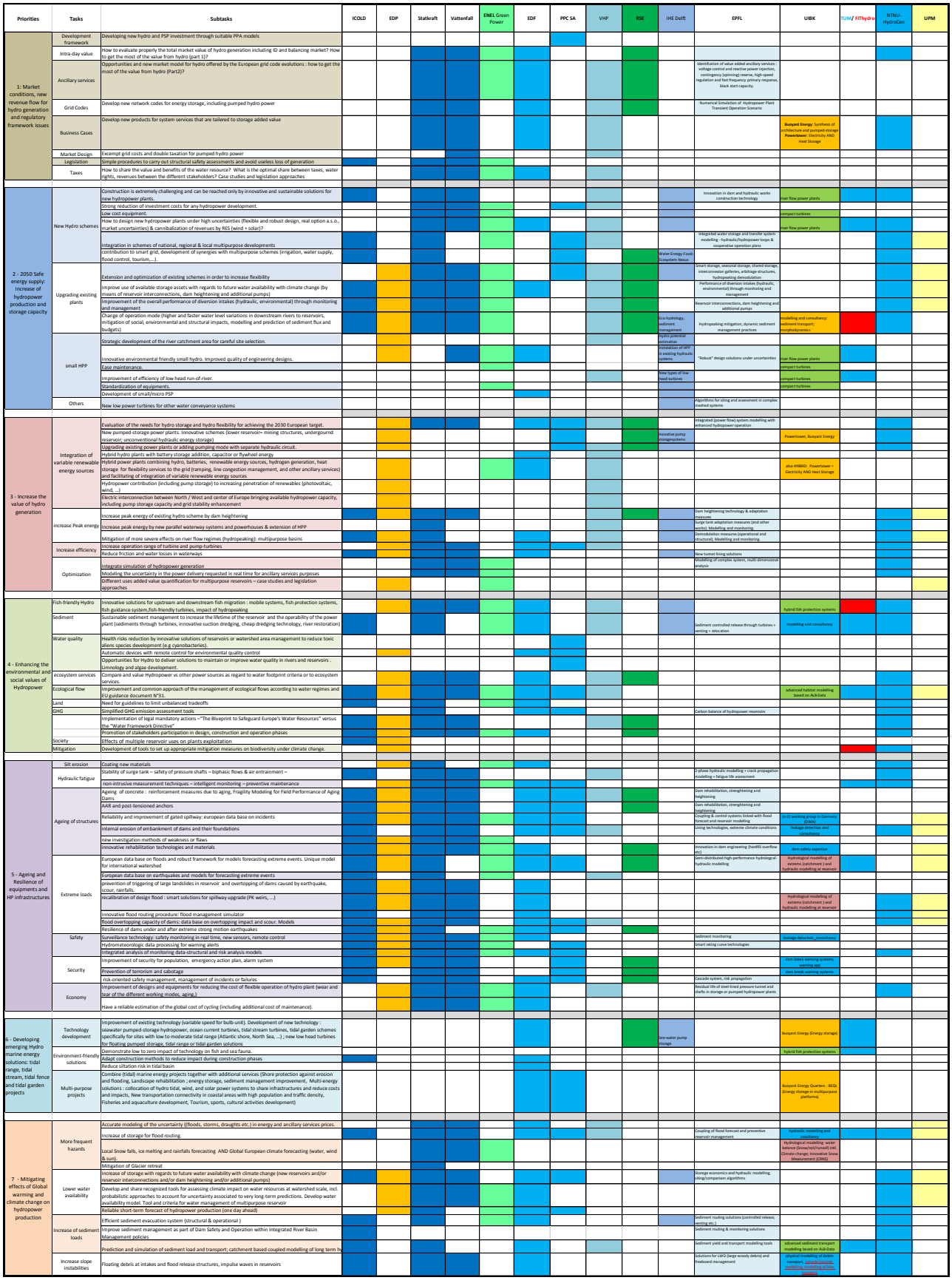



Figure 3-7 : Overview of initial mapping of research priorities against organizational expertise

## 3.4 Resources to be committed

The consortium consists of **8 partners** combined with a further **10 linked third party organisations (LTPs).** The LTPs play a critical role in providing specific expertise relating to different issues and priorities that form the Research and Innovation Agenda.

A total contribution of **€993,570** to the budget is sought. This cost builds from €624,156 direct personnel costs and €170,700 other direct costs. The percentage share of budget between partners ranges from 4% to 24%, the largest being for ICOLD, who is the coordinating partner, and who also incorporates the most LTPs (4 No.). Five partners share budgets of between 12-16% and two of ~4%. The two partners with lower budgets have no LTPs and do not manage WPs or deliverables.

A total of **77.10 person months** is foreseen spread proportionally across five work packages. The percentage distribution of budget by WP is WP1(8%), WP2(28%), WP3(19%), WP4(21%), WP5(24%).

The total requested for other direct costs is €170,700, which is 21.5% of the combined direct personnel and other direct cost total. This reflects the nature of the work under this Coordination & Support Action project, where many of the consultation and analysis activities are performed through 1 or 2-day technical workshops. A full breakdown of all other direct costs is given below. To ensure consistency and to avoid duplication of costs, the T&S costs for all partners (and LTPs and any invitees) for each of the project events have been coordinated centrally. Cost calculations are based upon the following commonly agreed values:

| | |
|---|---|
| Flights: Inter European | €500 |
| Daily T&S (hotel, food etc) | €150 |
| Support hosting a main workshop | €5,000 |

Table 3.4a: Person months required.

| | WP1 | WP2 | WP3 | WP4 | WP5 | Total |
|---|---|---|---|---|---|---|
| **P01 ICOLD** | 3.50 | 3.10 | 2.60 | 4.65 | 2.05 | 15.90 |
| **P02 SAMUI** | 3.50 | 4.70 | 0.40 | 0.40 | 5.30 | 14.30 |
| **P03 EASE** | - | 5.80 | 2.05 | 2.45 | 1.05 | 11.35 |
| **P04 EUREC** | - | 1.50 | 1.50 | 6.00 | 1.45 | 10.45 |
| **P05 VGB** | - | 1.60 | 3.35 | 2.15 | 1.15 | 8.25 |
| **P06 ZABALA** | - | 1.20 | 0.40 | 0.40 | 9.55 | 11.55 |
| **P07 EREF** | - | 1.00 | 0.40 | 0.65 | 0.60 | 2.65 |
| **P08 IHA** | - | 1.00 | 0.40 | 0.65 | 0.60 | 2.65 |
| **Total Person/Month** | 7.00 | 19.90 | 11.10 | 17.35 | 21.75 | 77.10 |

Table 3.4b: Other direct costs – Partner by Partner.

[LTPs = Linked Third Parties, the costs for which are included within Partner costs]

| **P01 ICOLD** | **Cost(€)** | **Justification** |
|---|---|---|
| **Travel** | 2400 | WP1: T&S costs for 3x2-day meetings as part of coordination activities |
| | 650 | WP2: T&S for attending PMgT-1 in Brussels |
| | 800 | WP2: T&S attending regional workshop #1 |
| | 800 | WP2: T&S attending regional workshop #3 |
| | 800 | WP2: T&S attending 2nd wider consultation workshop Brussels |
| | 800 | WP2: T&S attending kick off workshop |
| | 4x800 | WP2: T&S LTPs UIBK/EPFL/UPM/TUM kick off workshop |
| | 150 | WP3: T&S for extra day to attend external expert 1-day workshop Brussels |
| | 4x150 | WP3: T&S LTPs UIBK/EPFL/UPM/TUM external expert 1-day workshop Brx. |
| | 150 | WP3: T&S for extra day to attend external expert 1-day workshop Bourget |
| | 4x150 | WP3: T&S LTPs UIBK/EPFL/UPM/TUM external expert 1-day workshop Brgt |
| | 650 | WP3: T&S for 1-day external expert prep workshop, Brussels |
| | 4x650 | WP3: T&S LTPs UIBK/EPFL/UPM/TUM external expert 1-day workshop Brx. |

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|---|---|---|
| | 800 | WP3: T&S for attending Year 1 project workshop |
| | 4x800 | WP3: T&S LTPs UIBK/EPFL/UPM/TUM Year 1 project workshop |
| | 650 | WP4: T&S for attending PMgT-6 in Brussels |
| | 800 | WP4: T&S for attending Year 2 project workshop |
| | 4x800 | WP4: T&S LTPs UIBK/EPFL/UPM/TUM Year 2 project workshop |
| | 800 | WP5: T&S for attending final promotion event in Brussels |
| | 650 | WP5: T&S for attending PMgT-13 in Brussels |
| **Equipment** | 0 | |
| **Other G&S** | 5000 | WP2: Budget for hosting regional workshop #1 |
| | 5000 | WP2: Budget for hosting regional workshop #2 |
| | 5000 | WP2: Budget for hosting regional workshop #3 |
| | 5000 | WP2: Budget for hosting 2nd wider consultation workshop Brussels |
| | 5000 | WP2: Budget for hosting kick off workshop |
| **Total** | **49300** | |

| **P02 SAMUI** | **Cost(€)** | **Justification** |
|---|---|---|
| **Travel** | 2400 | WP1: T&S costs for 3x2-day meetings as part of coordination activities |
| | 650 | WP2: T&S for attending PMgT-1 in Brussels |
| | 800 | WP2: T&S attending 2nd wider consultation workshop Brussels |
| | 800 | WP2: T&S attending kick off workshop |
| | 150 | WP3: T&S for extra day to attend external expert 1-day workshop Brussels |
| | 150 | WP3: T&S for extra day to attend external expert 1-day workshop Bourget |
| | 650 | WP3: T&S for 1-day external expert prep workshop, Brussels |
| | 800 | WP3: T&S for attending Year 1 project workshop |
| | 650 | WP4: T&S for attending PMgT-6 in Brussels |
| | 800 | WP4: T&S for attending Year 2 project workshop |
| | 800 | WP5: T&S for attending final promotion event in Brussels |
| | 650 | WP5: T&S for attending PMgT-13 in Brussels |
| **Equipment** | 0 | |
| **Other G&S** | 4000 | Live streaming / recording of 2nd wider consultation event |
| | 5000 | Printing costs for publishing 2 documents, ~50 pgs, 2000 copies |
| **Total** | **18300** | |

| **P03 EASE** | **Cost(€)** | **Justification** |
|---|---|---|
| **Travel** | 800 | WP2: T&S attending regional workshop #1 |
| | 800 | WP2: T&S attending regional workshop #2 |
| | 800 | WP2: T&S attending regional workshop #3 |
| | 800 | WP2: T&S attending kick off workshop |
| | 3x800 | WP2: T&S LTPs IBERDROLA/CENER/GE-HYDRO kick off workshop |
| | 150 | WP3: T&S for extra day to attend external expert 1 day workshop Bourget |
| | 3x150 | WP3: T&S LTPs IBERDROLA/CENER/GE-HYDRO external expert 1-day workshop Brx. |
| | 3x150 | WP3: T&S LTPs IBERDROLA/CENER/GE-HYDRO external expert 1-day workshop Brgt |
| | 3x650 | WP3: T&S LTPs IBERDROLA/CENER/GE-HYDRO external expert 1-day workshop Brx. |
| | 800 | WP3: T&S for attending Year 1 project workshop |
| | 3x800 | WP3: T&S LTPs IBERDROLA/CENER/GE-HYDRO Year 1 project workshop |
| | 800 | WP4: T&S for attending Year 2 project workshop |
| | 3x800 | WP4: T&S LTPs IBERDROLA/CENER/GE-HYDRO Year 2 project workshop |
| **Equipment** | 0 | |
| **Other G&S** | 0 | |
| **Total** | **15000** | |

| **P04 EUREC** | **Cost(€)** | **Justification** |
|---|---|---|
| **Travel** | 800 | WP2: T&S attending kick off workshop |
| | 2x800 | WP2: T&S LTPs WIP/CRES kick off workshop |
| | 150 | WP3: T&S for extra day to attend external expert 1-day workshop Bourget |
| | 2x150 | WP3: T&S LTPs WIP/CRES external expert 1-day workshop Brx. |
| | 2x150 | WP3: T&S LTPs WIP/CRES external expert 1-day workshop Brgt. |
| | 2x650 | WP3: T&S LTPs WIP/CRES external expert 1-day workshop Brx. |
| | 800 | WP3: T&S for attending Year 1 project workshop |
| | 2x800 | WP3: T&S LTPs WIP/CRES Year 1 project workshop |
| | 800 | WP4: T&S for attending Year 2 project workshop |
| | 2x800 | WP4: T&S LTPs WIP/CRES Year 2 project workshop |
| **Equipment** | 0 | |
| **Other G&S** | 5000 | WP4: Budget for hosting Year 2 project workshop |
| **Total** | **14250** | |

| **P05 VGB** | **Cost(€)** | **Justification** |
|---|---|---|
| **Travel** | 650 | WP2: T&S for attending PMgT-1 in Brussels |
| | 800 | WP2: T&S attending regional workshop #1 |
| | 800 | WP2: T&S attending regional workshop #2 |
| | 800 | WP2: T&S attending regional workshop #3 |
| | 800 | WP2: T&S attending 2nd wider consultation workshop Brussels |
| | 800 | WP2: T&S attending kick off workshop |
| | 150 | WP3: T&S for extra day to attend external expert 1-day workshop Brussels |
| | 7800 | WP3: T&S for participation of 12 external experts to 1-day workshop Brussels |
| | 150 | WP3: T&S for extra day to attend external expert 1-day workshop Bourget |
| | 7800 | WP3: T&S for participation of 12 external experts to 1-day workshop Bourget |
| | 650 | WP3: T&S for 1-day external expert prep workshop, Brussels |
| | 7800 | WP3: T&S for participation of 12 external experts to 1-day workshop Brussels |
| | 800 | WP3: T&S for attending Year 1 project workshop |
| | 650 | WP4: T&S for attending PMgT-6 in Brussels |
| | 800 | WP4: T&S for attending Year 2 project workshop |
| | 800 | WP5: T&S for attending final promotion event in Brussels |
| | 650 | WP5: T&S for attending PMgT-13 in Brussels |
| **Equipment** | 0 | |
| **Other G&S** | 1500 | WP3: Room / catering 25 people 1-day workshop Brussels |
| | 1500 | WP3: Room / catering 25 people 1-day workshop Bourget |
| | 1500 | WP3: Room / catering 25 people 1-day workshop Brussels |
| | 5000 | WP3: Hosting Year 1 project workshop |
| **Total** | **42200** | |

| **P06 ZABALA** | **Cost(€)** | **Justification** |
|---|---|---|
| **Travel** | 800 | WP2: T&S attending kick off workshop |
| | 150 | WP3: T&S for extra day to attend external expert 1-day workshop Bourget |
| | 800 | WP3: T&S for attending Year 1 project workshop |
| | 800 | WP4: T&S for attending Year 2 project workshop |
| **Equipment** | 0 | |
| **Other G&S** | 1000 | Printing project brochure / leaflets |
| | 1000 | Printing roll up posters for project events / promotion |
| | 8000 | Project Video |
| | 5000 | Hosting final project promotion event, Brussels |
| **Total** | **17550** | |

| **P07 EREF** | **Cost(€)** | **Justification** |
|---|---|---|
| **Travel** | 650 | WP2: T&S for attending PMgT-1 in Brussels |
| | 800 | WP2: T&S attending regional workshop #2 |
| | 800 | WP2: T&S attending 2nd wider consultation workshop Brussels |
| | 800 | WP2: T&S attending kick off workshop |
| | 150 | WP3: T&S for extra day to attend external expert 1-day workshop Brussels |
| | 150 | WP3: T&S for extra day to attend external expert 1-day workshop Bourget |
| | 800 | WP3: T&S for attending Year 1 project workshop |
| | 650 | WP4: T&S for attending PMgT-6 in Brussels |
| | 800 | WP4: T&S for attending Year 2 project workshop |
| | 800 | WP5: T&S for attending final promotion event in Brussels |
| | 650 | WP5: T&S for attending PMgT-13 in Brussels |
| **Equipment** | 0 | |
| **Other G&S** | 0 | |
| **Total** | **7050** | |

| **P08 IHA** | **Cost(€)** | **Justification** |
|---|---|---|
| **Travel** | 650 | WP2: T&S for attending PMgT-1 in Brussels |
| | 800 | WP2: T&S attending regional workshop #2 |
| | 800 | WP2: T&S attending 2nd wider consultation workshop Brussels |
| | 800 | WP2: T&S attending kick off workshop |
| | 150 | WP3: T&S for extra day to attend external expert 1-day workshop Brussels |
| | 150 | WP3: T&S for extra day to attend external expert 1-day workshop Bourget |
| | 800 | WP3: T&S for attending Year 1 project workshop |
| | 650 | WP4: T&S for attending PMgT-6 in Brussels |
| | 800 | WP4: T&S for attending Year 2 project workshop |
| | 800 | WP5: T&S for attending final promotion event in Brussels |
| | 650 | WP5: T&S for attending PMgT-13 in Brussels |
| **Equipment** | 0 | |
| **Other G&S** | 0 | |
| **Total** | **7050** | |