

ANNEX I: TERMS OF REFERENCE

REGIONAL HYDRO MASTER-PLAN (Hydropower Development Study in the Western Balkans)

Study Phase

February 2017

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1. BACKGROUND INFORMATION

1.1 Beneficiary country

The six Western Balkans countries including Albania, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Kosovo^{*}, Montenegro and Serbia.

1.2 Contracting Authority

European Commission, DG NEAR D.5 – the Contracting Authority for the WBIF-IPF3 contract.

1.3 Regional background – general situation in the sector

In the Western Balkans (WB6) region, there is still a large and yet unexploited potential to generate electricity from the well-recognised hydrological resources. Based on various sources, it is initially estimated that, depending on the country, between approximately 60-90% of the theoretical hydro potential remains unexploited at present. There are considerable differences between countries in terms of both the available hydro potential and in the amount of hydro development that has taken place in the past. For example, per initial estimates, there is no more than 57 MW (0.7% of total in WB6) installed in hydropower generation capacity in Kosovo, 610 MW (7.2%) in the former Yugoslav Republic of Macedonia, 676 MW (8.0%) in Montenegro, 1,824 MW (21.6%) MW in Albania, 2,139 MW (25.4%) in Bosnia and Herzegovina, and 3,122 MW (37.0%) in Serbia.

8,427 MW of installed capacity in hydropower generation facilities exist in the WB6 region, of which 8,005 MW (95.0% in terms of installed capacity) in the 54 hydro power plants (20.8% in term of the number) whose installed capacity is greater than 10 MW; whereas the remaining 422 MW (5.0%) of installed capacity is from the 206 hydro power plants (79.2%) of whose installed capacity is less than 10 MW. If all hydro power plants were to operate with the same capacity factor, this leads to the conclusion that that the 54 larger hydro power plants generate approx. 95% of hydropower energy in the WB6 countries and the 206 smaller hydro power plants only contribute to the remaining 5% of hydropower energy generated.

Another important characteristic of the sector is that about 92% of the present capacity of 8,427 MW was constructed / commissioned in the former Social Federal Republic of Yugoslavia up to 1990, while only 8% (665 MW) was developed after its disintegration. The rate of new capacity additions achieved during 1955-1990 was 202 MW per annum, while in the period 1990-2015 this was mere 27 MW of additional installed capacity per annum on average. This demonstrates that development of the sector has been stalled during the last 25 years, despite having significant natural hydro resources, being permanently scheduled for development in most national strategic planning documents (strategies, action plans etc.) and the fact that there is considerable know-how and relevant industrial expertise available in the region.

There were obvious reasons for the lack of continued development of the hydropower generation potential - from political and institutional changes that made hydropower sector planning more complicated, lack of financial resources on the side of developers / investors and the rapidly growing complexity of legal and regulatory regimes applied. There also have been cases, especially in the most recent years, where some development projects have been questioned by NGOs and civil society as proposed hydropower plan locations have impacted National Parks, protected zones, and other designated conservation sites.

When considering the possible sector development in the future, per estimates, there may be approximately 350 greenfield hydro power projects (HPP) of more than 10 MW capacity in the WB6 region that could be considered, being either outside or inside designated protected areas (e.g. National Parks, Ramsar, Emerald zones, Natura 2000, and other protected areas).

^{*} This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence.

As at the end of April 2016, all WB6 countries have developed their national Renewable Energy Action plans (NREAPs) which have been adopted by the respective governments. The NREAPs are thus the official policy documents on how the WB6 countries intend to reach their binding RES targets by 2020.

The first report of the Energy Community Secretariat (ECS) to the Ministerial Council on “the Progress in the Promotion of Renewable Energy in the Energy Community” (October 2015), could not report on NREAP-related developments in Albania, the former Yugoslav Republic of Macedonia and Bosnia and Herzegovina because their action plans were only adopted and submitted in 2016. Bosnia and Herzegovina has adopted its NREAP by combining the two entities’ (Federation of Bosnia and Herzegovina and Republika Srpska) plans adopted in 2014 plus making some assumptions with respect to the Brcko district. The next progress report is at the end of December 2016.

As Contracting Parties (CPs) to the Energy Community Treaty (ECT), all WB6-countries have an obligation to fulfil their mandatory shares of energy from renewable sources in the gross final energy consumption in 2020, which has been adopted at the MC-EnC meeting in 2012.

The main stakeholders in the hydropower sector in the WB6 countries are typically:

- State Energy Policy Authorities responsible for overall energy policy/strategy preparation and implementation – therefore including renewable (hydro) energy – and are typically ministries responsible for energy (e.g. Ministry of Economy) and in some cases specialised agencies, usually subordinated to ministries, overseeing NREAP preparation and monitoring, verification and evaluation of NREAP implementation;
- Other bodies of state administration that have a specific formal role in the development and implementation of HPPs (e.g. ministries responsible for environment and spatial planning, State Water authorities etc.);
- Regulatory authorities that may be charged with granting energy permits, authorisations, operation licenses, keeping registers of guarantee of origin, feed-in tariff (FIT) policies, tendering for RES-E etc.;
- Transmission (and occasionally also distribution) system operators in charge of ensuring prioritised dispatching of power generation from privileged producers, access to the transmission and distribution grids and safeguarding reliable and secure power system operation;
- Electricity market operators that can, in some cases, represent single buyers and re-sellers of RES-E to electricity suppliers based on the national market design model and the applicable rules;
- Power utilities, operators of the existing hydro power plants and other entities entrusted by local governments to undertake the necessary preparatory works to develop planned new hydro power plants;
- Possible project development entities (private or mixed public-private) in charge of development of certain hydro power projects;
- Relevant NGOs, CSOs, specialist advisory panels and the public as relevant.

1.4 Rationale for intervention

Due to considerably slower progress than initially anticipated in all CPs to the ECT including the WB6 ones, a Renewable Energy Coordination Group (RECG) was established by the ECS (1st meeting on 2 March 2016) and it adopted its Work Programme for 2016-2017 in March 2016.

In the conclusions of that meeting, it is noted that some participating parties (UNECE and KfW) *highlighted the need to a more integrated view on hydropower development in order to ensure a regional approach to investments, mitigating the impact on the food-water-transport-ecosystem nexus.*” The Contracting Parties supported the proposal to develop a regional hydro master-plan to assess on individual river basins the ecological potential for hydropower development for the Energy Community.

Following the conclusions of the RECG meeting and based on the meeting of WB6-countries' ministers in Brussels on 1 March 2016, WBIF-IPF3 facility has been tasked by DG NEAR to develop a “Regional Hydropower Master-plan”.

The **rationale** for intervention is the desire of several parties to obtain such a study document that will facilitate their further work in hydropower planning and development. These parties are notably:

1. **WB6 countries** (all are CPs to the ECT, who have accepted their obligations to fulfil the RE-*acquis*, implement RES Directive 2009/28/EC including NREAPs, 2011-2020) to prepare their national master-plans (and accompanying SEAs) in line with EU requirements;
2. **EC** (incl. the ECS), to identify which projects could be eligible for EU co-financing;
3. **IFIs**, who are generally interested in investment opportunities in RES-E generation.

1.5 Stepwise approach to the Master-plan

“Master-plan” is typically understood as a comprehensive multidisciplinary strategic planning document in a certain sector of a national economy, produced on the initiative of a relevant sector state authority to develop a basis for formal planning and decision-making. Despite holding this title, however, this sub-project of WBIF-IPF3 is a “development study” in hydropower generation made on a regional basis, intended to facilitate national Master-planning processes. Therefore, the following title shall be used for this sub-project.

REGIONAL HYDROPOWER MASTER-PLAN (Hydropower Development Study in the Western Balkans) (referred as “the Study” or “Master-plan” in the following).

The Study was designed to be executed in two phases. The first was the **Scoping Phase**, which was conducted over a period of approx. 2 months (May-June 2016). The general purpose of this phase was to provide an overview of the current situation in the hydropower sector, introduce the project to major local stakeholders, collect as much data as possible in this timeframe, and to provide planning for the rest of the Study. In more detail, the Scoping Report reported on:

- A situation analysis in terms of frameworks relevant for hydropower sector development (policy, legal-regulatory, institutional-organisational, market role of hydropower etc.);
- The identification of data sources and (initial) collection of data, study reports, etc.;
- Initial analysis based on collected information based on research of public domain information, country feedback, initial contacts with institutions and desk-based research.

On this basis, Draft Terms of Reference (ToR) for the second, or **Study Phase** have been prepared as Annex 1 of the Scoping Report. The ToR took fully into consideration the results of the Scoping Phase activities as well as conclusions and recommendations of the Scoping Report, thus being a logical continuation of the Scoping Phase.

Scoping Report and Draft ToR were presented and discussed at the Regional Conference on the Regional Hydro Master-Plan for the Western Balkans, Belgrade, 27 September 2016. End-October 2016 was set by DG NEAR as the deadline for collection of additional comments. These ToR in the following consider the received comments to the extent possible that would still safeguard fulfilment of the mandate of the Study as set by the Client.

The Study Phase will be implemented over a period of 9 months. The Study started its activities in October 2016 after the main lines of the Terms of Reference were endorsed at the Belgrade conference.

During July-September 2016 an intensive initial data collection campaign and operational contacts with technical personnel of involved local institutions was established. In this period, additional international and local experts of various profiles were identified and their specific individual ToR prepared. The whole expert team finally consists of 30 experts (5 core project team experts, 7 task-support experts, 18 national experts) and 2 subcontracted firms.

2. OBJECTIVE, PURPOSE AND EXPECTED RESULTS

2.1 Overall objective

The **overall objective** of the project is to contribute to fostering the harnessing of environmentally and

climate change sustainable hydropower generation in the Western Balkans region in line with the strategic objectives of the European Union and the Energy Community Treaty obligations of its Contracting Parties.

2.2 Purpose

The **purpose** of this intervention is the development of a prioritised list HPP development projects, organised by (i) river basins of the region and (ii) type of planned HPP facilities (storage, run-of-river, reversible), through which the remaining hydropower potential in the region will be evaluated.

The list of hydropower investment projects will focus firstly on the opportunities that HPP operators have to repair, refurbish, upgrade and rehabilitate existing hydropower sites. In order to raise the share of RES in gross final energy consumption throughout the WB6 region and to reduce emissions of greenhouse gases, new greenfield sites for HPP development offering rational development of the technical hydro potential will be assessed, evaluated and prioritised.

Note on capacity focus: Due to many existing hydro power plants (around 260) and planned hydro power projects of all capacities (approx. 1,350), the Study must be focused. The HPPs that exceed the threshold of 10 MW of installed capacity (approx. 350) shall be assessed as individual HPPs, while the remaining approx. 75% of HPPs (or approx. 1,000¹ of smaller HPPs), will be analysed, depending on data availability, as aggregated groups at country level and to the extent possible, per river basin. This limit is also in line with the presently prevailing upper level for state-support schemes (e.g. FIT) to hydropower generation in the region, except for Serbia (up to 30 MW) and Albania (up to 15 MW). Apart from making the assessment feasible, the Study shall also focus on HPPs where the implementation is based on market conditions, rather than incentive schemes that can be changed easily by local policy makers.

2.3 Expected results

The principal results to be achieved by the end of the Study include (for detail, see Section 4.3: Summary of Results):

1. The role of hydropower generation in the past, at present and in the future (2020/2030 and beyond by 2050) is assessed both at regional and country level;
2. An inventory of existing hydro power plants and prospective HPPs is prepared and updated after verification with local stakeholders and a list of candidate HPPs (for both rehabilitation and greenfield development) is developed; the inventory is supported by a comprehensive database of HPP project fiches and a GIS application;
3. The present status of planning and preparatory works for each prospective (rehabilitation as well as greenfield) HPP is assessed, including its maturity to enter the required further development stages towards implementation;
4. The nature and reasons for major implementation barriers in the past as well as today are identified / described including recommendations (based on international best practices) on how to overcome such barriers in the future and on next development steps identified;
5. The implementation framework (legal-regulatory, institutional-organisational) relevant for the development and implementation of HPPs is scrutinised, especially from the viewpoint of its effectiveness and complexity of procedures, including recommendations for improvements / streamlining;
6. The unexploited (remaining) hydropower potentials of the WB6 countries and of the WB region with a view to generating electricity is assessed. In particular, technically and sustainably exploitable hydropower potential by river and (sub)river basins is determined;
7. Major environment-related issues related with ecologically acceptable planning of HPPs are assessed at the river basin level. The river basin approach denotes the important regional character of the Study. This will include climate change mitigation and adaption effects and measures;

¹ Note: Database on <http://balkanrivers.net/en/content/studies> envisages construction of 970 HPPs of less than 10 MW in the WB6 region in the future.

8. Environmental issues and lessons learned from previous SEA/EIA/ESIA in the region are analysed and recommendations for future SEA/EIA/ESIA procedures provided;
9. A portfolio of both (i) rehabilitation / reconstruction projects as well as (ii) prospective HPP projects preferably in a form of a list of ranked HPPs is prepared based on multi-criteria assessment of candidate projects. The list is structured by (i) river basin, (ii) country, and (iii) type of facilities (storage, run-off river, reversible);
10. A draft Regional Action Plan is prepared together with proposed measures to be undertaken by various stakeholders, reflecting regional cross-cutting issues, aimed at promoting / stimulating the rehabilitation / reconstruction of existing and the development of new HPPs in the region – all under ecologically acceptable conditions;
11. Local institutions of central administrations in charge of hydropower sector development are trained at regional events in specific technical topics addressed in the Study; the Study results are broadly disseminated to multiple beneficiaries. In these activities, topics related to the environment and possible impacts of HPPs on ecology shall be given priority, especially with respect to gaining public and NGO / CSO understanding and support to hydro development plans.

Extra added value of the Master-plan

The regional character of the Master-plan shall provide added value over the HPP planning on a country basis, both strategically and politically, through:

1. Strengthening connections within the WB6 countries and cooperation with EU countries in the areas of common interest and in addressing common challenges of the WB6 region such as achieving renewable energy production targets;
2. Mobilising a variety of potential financing sources and assisting the Study stakeholders in improved energy policy development and their implementation of differing EU, national and regional policies in relation to environment and energy, both being part of the same sustainability policy agenda;
3. Implementation of EU environmental framework and climate change considerations in hydropower development wherever feasible;
4. Improving existing cooperation mechanisms and networks and promoting the development of new ones between participating countries, leading to greater coordination and efficiency of effort, better investment spending. Multilevel governance will be promoted, especially in water management by encouraging cooperation between national, regional and local bodies and between public and private sectors;
5. Contributing to developing and improving access to financing of new, feasible projects and giving momentum to refurbishment / reconstruction of existing HPPs;
6. Resolving cross-cutting issues such as the quantification and division of water resources on shared rivers between WB6 countries and Member states.

What the Study cannot provide

It is broadly recognised that adequate consideration of the **environment, climate change and integrated water management** are the cornerstones of present and future hydropower development policies. The Study will deliver proposals for hydropower development in the Region bearing in mind that conditions and limitations (typically environment, social, political, etc.) will be dealt with in later stages of planning. Therefore, the Study shall not address any issues from a narrow perspective of possible specific interest. For several reasons (e.g. lack of mandate, prevailing local conditions, time available etc.) the Study shall not address the following issues and cannot provide the following results, for which **national institutions or public or private or mixed entities** are typically responsible in accordance with specific national legislation or regulations in place in the WB6 countries:

- A. **New River Basin Management Plan (RBMP)**. However, the Study will assess the current state of development thereof or even, the current level of transposition of Water Framework Directive (WFD) and its considerations and the likely implications on the hydropower development in the medium-term future. Also, limitations regarding deficiencies of RBMPs for hydropower sector development will be identified, discussed and recommendations provided in the Action Plan.

- B. **SEA** at the river basin level or programme level, **EIA** at the project level and/or **ESIA** typically requested by IFIs because these are clearly within the competence / responsibility of national policy-making authorities, where provisions of relevant EU-directives should be strictly followed, including the demanding public consultation processes. However, recent practices in SEA /EIA / ESIA of HPP projects in the region will be critically assessed and practical guidelines how to improve the applied procedures aiming at bringing them closer to EU best practices will be provided.
- C. **New (pre)feasibility studies (including technical redesign of the currently known HPP schemes)**, because this is within the responsibilities of the developer. However, the Study will identify candidate HPP projects that represent possible points of dispute in design and technical solutions offered especially if they relate to framework conditions (ecological, climate change, economic-social aspects) that may not represent state-of-art in applicable EU practices.
- D. **Consideration of small hydro power plants (sHPPs) at the individual power plant or tributary level** – no new cadastres of sHPPs will be developed. It is worth noting that based on preliminary assessment presented in the Scoping Report (Tables 3.7 and 2.2), as many as 960 sHPPs (1,524 MW, of which approx. 1,300 MW are already part of NREAPs by 2020) could be constructed in the WB6 region. Analysis of different sources suggests that between approx. 12,000-15,000 MW in total could be theoretically constructed in HPPs of more than 10 MW of capacity, which leads to rough conclusion that sHPPs may represent up to approx. 10% of all new installed capacities at the maximum. For practical reasons, it is therefore infeasible to assess and quantify ecological and cumulative impacts of these sHPPs individually within the frame of the Study. Even more, several WB6 countries address sHPPs by selected tributaries, in many cases still requesting the prospective concessioners to carry out hydrological measurements (mainly discharge) first. All consequently leads to the currently prevailing situation when the exact scope of realistically implementable sHPPs, its construction dynamics etc. are quite questionable. Finally, collective experience from implementation by 2020 will impact further development of sHPPs beyond this milestone year, when the current state-support schemes (e.g. FIT) should be reassessed and market driven mechanism introduced. However, the Study will include prospects for sHPPs in its consideration of future electricity supply / demand balance as well as provide discussion and recommendations on possible cumulative impacts of sHPPs. Finally, dynamics of introduction of sHPPs is subject to national policies on support schemes for RES-E generation rather than river basin specific.
- E. **Quantitative assessment of cumulative effects of main rivers** (in terms of selected categories: water discharges, transport of sediments and fishery issues) at cross-border points or at confluences of river (sub)basin with major river basin (e.g. confluence of Drina and Sava). It is obvious that cumulative effects can be assessed in a more precise way by modelling only if: (i) RBMP is available, and (ii) dynamics, number and specific technical designs of proposed individual HPPs in the respective river basin including possible mitigation measures are clearly determined. However, this is far from the reality in the WB6 region. Therefore, cumulative effects will be assessed in the Study to the extent possible, predominantly in qualitative terms, which may differ from one river basin to another. Based on best EU practices, the Study will provide recommendations how the region should address cumulative effects, particularly with respect to ichthyology - fish species and ecologically acceptable flows, based on reassessed hydrology at the level of river basins.
- F. **National hydropower master-plan.** The Study follows a regional and river basin approach in line with WFD and applicable guidelines (e.g. ICPDR). Already for that reason, the Study cannot and shall not provide National Hydropower Master-Plans. The other reason is that master-plans are specific strategic planning documents that must be prepared and adopted strictly by following the national legislative framework. That, among others requires for SEA/EIA procedures and public consultation processes. Finally, such documents as major sectoral policy documents are typically adopted by governments or even parliaments in some cases. However, the Study will provide numerous recommendations that will help national authorities in the development of their own plans followed at a later stage. Therefore, it is evident that the Study results are limited to recommendations rather than any mandatory solutions for the WB6 countries, about which the

countries shall retain their sovereignty in decision-making as long as that is compliant with applicable national and international legislation in force.

- G. **“No-go” zones established.** To develop comprehensive proposals for all approximately 25 river and (sub)river basins addressed in the study in a literal sense of defining “stretches of potential hydropower plants” where such facilities would not be recommended or even prohibited, more comprehensive studies providing details on locally specific environmental situation along the river basins are required, and "Classification of the appropriateness or river stretches for potential hydropower use" as part of a two-level assessment in accordance with ICPDR Guiding Principles on Sustainable Hydropower Development in the Danube River basin (2013) would have to be followed. Furthermore, the Study has no mandate for such decisions or conduct of procedures, based on which “no-go” zones could be formally “established “in the WB6 countries. This competence clearly rests with relevant national authorities responsible for natural resources and spatial planning. However, instead of establishing of "no-go" zones the Study will rather suggest which of the presently identified greenfield HPP projects of more than 10 MW of capacity are "no-go" projects after the multi-criteria assessment (MCA) methodology is applied.
- H. **New comprehensive research / analysis of biodiversity and habitats by (25) River and (Sub)River Basins.** For the first time in work practices, the Study will establish a unique Classification of Hydrography System for the WB6. The available draft deals with 4 Drainage Basins (Black Sea, Adriatic Sea, Ionian and Aegean Sea), 12 Watersheds, 26 River and (Sub)River Basins, 25 Rivers and 87 Tributaries to the main streams of these rivers. And all these in the context of approx. 350 greenfield HPPs of more than 10 MW of capacity. Such scope makes any comprehensive research / analysis of biodiversity and habitats practically infeasible within the scope of the Study.

3. ASSUMPTIONS AND RISKS

3.1 Assumptions underlying the project

- National institutions, entities, enterprises, stakeholders responsible for the institutional/organisational framework governing hydropower generation development, are willing to actively participate in the Study and can adhere to the timelines;
- All necessary information, data and reports are accurate, available to the Consultant’s team on time, without any limitations and on a cost-free basis;
- Project developers/promoters are available and willing to cooperate with the Consultant to provide information and their views, experience and expectations;
- National water authorities are willing to participate; data are available and made available to the Consultant without any limitation and on a cost-free basis;
- TAIEX programme is responsible for the organisation and logistics of all training workshops and of the final event of the Study, thus allowing the Study team to focus on its professional contribution to the events;
- Key national and regional stakeholders demonstrate high interest for participation at TAIEX events and engage with a pro-active attitude;
- Local power utilities, the operators of the existing hydro power plants, have their own and sufficiently developed plans for rehabilitation / reconstruction of their facilities, and are willing to share the necessary information with the Consultant;
- Missions and events in the WB6 countries are efficiently and effectively organised with the full cooperation of NIPACs and EC Delegations;
- National ministries are positively inclined to give preference to the development of best-assessed options for HPPs (i.e. regional approach based on the river basin level) rather than supporting possible national HPP development proposals which may be sub-optimal in the regional context.

3.2 Associated risks

- Insufficient capacity and commitment of national stakeholders to efficiently contribute to the project objectives;
- Unwillingness of project developers/promoters to provide information, views and opinions;
- There may be too many greenfield HPPs for consideration in the Study that makes high-quality assessments of each in the limited Study duration period difficult;
- Some organisations / individuals feeling excluded from the Study may cause a negative atmosphere and challenge the results of the Study;
- Insufficient commitment / cooperation of national authorities and negative attitudes of some highly motivated environmental protection NGOs may seriously hamper Consultant's progress in the Study if not managed correctly;
- Spatial data in analogue formats may make migration to GIS database very difficult;
- Questionable reliability of information / data / support documents provided may question the results of the Multi-Criteria Assessment or cause considerable limitations for the Consultant to apply the methodology to the desired level;
- Participants at TAIEX training and dissemination events may wish to ignore the regional character of the Study, promoting their own agendas and their expectation that the Study should have addressed primarily individual national issues;
- Perception and unrealistic / overambitious expectations that the Study could solve "all hydropower related problems" in the WB6 region that have accumulated in the last decades;
- Aspirations of participating countries that the Study should undertake the work that is the responsibility of national institutions or public, private or mixed entities – HPP developers;
- Local stakeholders may not support the Consultant's results if their recommendations are not supporting their own plans and (political) preferences.

4. SCOPE OF WORK

4.1 General

4.1.2 Geographical area to be covered

The project will be based in the WB6 region. In principle, the Study will be undertaken in the home-offices of involved experts, with missions to different WB6 countries as required during the Study implementation.

4.1.3 Target group

The direct beneficiary – the recipient of project deliverables (i.e. Scoping Report, separate background reports on specific topics and the Final Report) is the client - DG NEAR. Other (indirect) beneficiaries are the line ministries in the WB6 countries responsible for energy, hydropower and water management. In addition, major stakeholders include: Energy Community Secretariat (ECS), its Renewable Energy Coordination Group and its members and observers (CPs to the ECT and participating IFIs), the International Commission for the Protection of the Danube River (ICPDR), the International Sava River Basin Commission (ISRBC), responsible DGs for energy and environment, and NIPAC's, EC Delegations and IFIs active in the WB6 countries.

4.2 Specific work and methodology

4.2.1 Task 0: Project Management and Coordination

Activity 0.1: Coordination, planning, progress reporting, QA on deliverables, liaison with stakeholders

Effective project management and coordination is required throughout the entire Study Phase with an aim to safeguard progress, timely and conceptually coordinated actions, prompt communication between the involved parties, delivery of high-quality outputs etc. to ensure smooth implementation of this professionally demanding and logistically complex project. This includes:

- Coordination between involved parties and personnel (core Project Team Experts - PTEs, WBIF Country Managers and local experts, various local stakeholders, ECS and its RECG (incl. country members and IFIs), DG NEAR etc.);
- Operational planning of Study activities, progress monitoring and reporting to DG NEAR (via established WBIF-IPF3 mechanisms);
- Compilation of and quality assurance (QA) on all project deliverables including separate reports on selected topics prepared by PTEs as well as the Final report on the Study;
- Liaison with the TAIX programme in complementary activities (dissemination of results and the Study related training);
- Information and Data Management System (IDMS) developed / used for the Study.

These activities shall represent core scope of work of the experienced Senior Project Manager (SPM) - Team Leader, who will be responsible for quality assurance and timely delivery of all planned deliverables mentioned in Sections 4.2.2-4.2.13 in the following.

Deliverables (D)

D0.1: Ad-hoc briefing notes, position papers, presentations at meetings and other events based on demand;

D0.2: Assistance in organisation and implementation of the 1st Regional Conference (Belgrade, 27 September 2016);

D0.3: Establishment and maintenance of Sub-project webpage.

Required personnel resources

- Task Leader: SPM - Team Leader (Position 1)
- Other Project Team Experts
- Management and administrative support staff of WBIF-IPF3

4.2.2 Task 1: Hydropower role (past and future) in the regional and national context

Activity 1.1: Establishment of the Database on existing hydro power plants in the WB6 region

Initial data collected and analysis undertaken in the Scoping Phase revealed that certain discrepancies exist with respect to existing hydro power plants in the WB6 countries. Many HPPs have been subject of rehabilitation following to war damage in former Yugoslavia, or their maintenance has been neglected for a significant period. The characteristics of such HPPs have changed after re-commissioning. Particularly contradictory data are for average annual production and net available capacities, while typically missing/lacking data includes information on annual production over their long-term periods of service, the status/plans regarding prospective rehabilitation/reconstruction measures, and their geographic coordinates needed for the HMP-GIS system development (see also Task 8).

During the Scoping Phase, the Consultant developed an Excel model for the establishment of a database (DB) of the existing HPPs by country, which was communicated to the WB6 countries. However, due to short time available for the Scoping Phase, this activity remained only partially accomplished. Therefore, this DB shall be finalised as soon as possible in the Study Phase, in close collaboration with power utilities that operate the existing HPPs, to ensure reliable data in the DB for further use and reference.

Extra attention will be paid to the collection of data, plans and investment requirements aimed at rehabilitating/reconstructing existing HPPs. Contrasted to new HPP projects, these are considerable

and usually “win-win” investment opportunities, resulting in the prolonged lifetime of an already depreciated power generation facilities. Rehabilitation will assure further low cost generation, and will safeguard reliable and highly efficient operation. The rationale for this approach is that most the existing HPPs are old (approx. 4,000 MW or approx. 50% of installed capacity in WB6 is more than 40 years old and an additional 3,800 MW is between 25-40 years old), thus making the rehabilitation / reconstruction potential considerable.

Activity 1.2: Prospective electricity balances with an emphasis on hydropower generation (until 2020/2030 with outlook for 2050)

Due to desk study character of the Scoping Phase and relatively slow progress achieved at the country level in this phase, the Consultant has not yet been able to directly address the local stakeholders (ministries, regulators, TSO/DSOs and power utilities), to obtain their latest information on power sector strategies/policies and action plans, to supplement the publicly-available materials on the websites of the respective organisations. There are strategic planning documents (strategies, action plans, e.g. NREAPs, 10-year Development Plans of TSOs) prepared in most WB6 countries. However, these plans address the medium-term time horizon only, in the best case for the next 10-15 years or to 2030, while the economic lifetime of HPPs is typically 40+ years, and which is typically extended to several more decades in practice.

The European Commission's “Energy Roadmap 2050” (2011) sets out four main routes to a more sustainable, competitive and secure energy system by 2050: energy efficiency, renewable energy, nuclear energy and carbon capture and storage. Decarbonising the energy system is technically and economically feasible and the contribution of RES-E sector in this respect is considerable. In this context, hydropower generation in the WB6 region seems to be a promising opportunity, due to the considerable untapped hydro-potential in the region. However, “*investments for a period of several decades have to be made soon, and policies that promote a stable business climate which encourages low-carbon investments must begin to be made today.*” (<https://ec.europa.eu/energy/en/topics/energy-strategy/2050-energy-strategy>).

Based on a review of strategic planning documents at the national level and in direct discussion/consultation with relevant local institutions, the Consultant will assess the hypothetical development of the hydropower sector in the future for individual WB6-countries. Based on best expert judgement, electricity demand forecast by 2020/2030 will be developed, with an outlook for 2050 (note, this will be the first attempt in the region that such a long-term estimate is made). On this basis, the possible or required/desired HPP production shall be estimated with respect to (i) safeguarding the security of electricity supply, and (ii) the achievement of various national policy targets (RES share in GFEC², CO₂ reduction etc.), even though no mandatory targets are presently set for the period beyond 2020.

Hydropower generation will be assessed as part of electricity generation mix, together with possible complementary production in thermal power plants, the production volume of which is likely to become gradually limited due to (i) decommissioning, (ii) reduced power generation regimes after implementation of Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants (after general implementation deadline of 31.12.2017), (iii) growing reservations of key investors to continue with unpredictable coal-for-power business associated with possible CO₂-coupons price recovery in ETS in the EU. Further electricity market development and improved implementation conditions could stimulate interest in investing in new HPPs and provide new “win-win” opportunities.

Due to a very unpredictable long-term future and obvious huge uncertainties, the Consultant shall apply a robust approach in his assessments, likely to be based on a simplified and pragmatic Excel modelling rather than deploying any sophisticated power-generation expansion / electricity market development models that require extensive data, resources, time, but still do not guarantee reliable results due to these large future uncertainties. The estimated possible hydropower generation development in Task 10 in conjunction with electricity demand growth scenario in this task will represent the electricity demand-supply balance and the magnitude of HPP sector development till 2050, and consequently, will

² GFEC – Gross Final Energy Consumption.

provide the first attempt in the region of an estimate of the possible level of utilisation of the regional hydropower potential until 2050 (note: the present level is estimated at approx. 25%).

Deliverables

D1.1: Excel-based database of existing HPPs

D1.2: Separate background report (BR1) 'On HPP Contribution and Role in Prospective Electricity Balances (2020/2030 and Outlook for 2050)'

Required personnel resources

- Task Leader: SPM - Team Leader (Position 1)
- Subcontractor 2

4.2.3 Task 2: Assessment of the current situation in the institutional-organizational (I&O) framework relevant for hydropower development

The main stakeholders in the electricity sectors of individual WB6 countries, acting in various areas (energy, spatial planning, water use and management, environment, construction, etc.) with the common role of contributing to the hydropower generation development framework, have been identified during the Scoping Phase in respect of their roles as defined by the national legislation. General organisational framework for the hydropower generation projects development have been identified and institutions that play certain roles in this organisational framework have been linked to the relevant processes and activities. This does not necessarily mean that they fulfil all their roles as foreseen by the organisational framework, and even if they do, it also does not mean that the entire framework functions in accordance with the plans and definitions of the policy makers. The Scoping Report indicated that there are certain gaps and inconsistencies in the existing institutional/organisational framework for hydropower generation development. Therefore, in the Study Phase, the identified roles of main stakeholders must be checked from the formal point of view and examined from the actual execution point of view. The entire organisational framework needs to be assessed from the beginning of the hydropower development project to its completion, following a project's path through the various development stages influenced or coordinated by different institutions. It is important to recognise which institutions participate in the organisational chart for the large hydropower generation projects, and which are important for small hydro power plants development projects.

Activities in the Study Phase will focus on identification of the gaps in the organisational / institutional framework and, together with activities on Task 3 dealing with legal/regulatory framework, development of the proposals which should bridge those gaps and improve the existing framework for hydropower generation projects development in the WB6 countries. These activities require to be done at the country level, having in mind the overall efforts for integration of the national electricity market structure into a common regional electricity market framework.

Activity 2.1: Identification of main stakeholders and their roles

Within this activity, the Consultant will undertake a detailed assessment and analysis of the existing institutional/organisational framework for hydropower generation development in the WB6 countries. Starting from the list developed during the Scoping Phase of the project, the Consultant will meet all main stakeholders, actors in the institutional/organisational framework and will discuss their current roles in the hydropower generation development projects. These meetings will help the Consultant to identify the gaps in the existing institutional/organisational framework for hydropower generation development. The main targets of this activity are:

- Identification of all stakeholders,
- Identification of the process steps in the HPP project development starting from the initial idea and ending with the start of the plant construction,
- Recognising stakeholders' roles related to hydropower generation development process,
- Identifying inputs and outputs of the individual stakeholders' activities in the hydropower generation project development,
- Collecting stakeholders' experience in fulfilling their respective tasks,

- Identification of gaps, obstacles and inconsistencies in the institutional and organisational framework.

This activity will be coordinated or combined with the complementary activities under Task 2, since there are a lot of overlaps between these two tasks. In fact, the execution of these two tasks will be synchronised to optimise use of project resources and minimise disturbance of the stakeholders from their regular duties. Public institutions and enterprises, which are part of the institutional/organisational framework for the development of hydropower generation projects, are the same entities that participate in planning, development and implementation of the legal/regulatory framework in the electricity sector, which has major impact on hydropower generation development projects. This project task is also closely interrelated with the Task 4, Grid Connection Issues, and therefore visits to the transmission and distribution network operators, to the national energy/electricity regulatory authorities and ministries in charge for energy/electricity will also be carefully coordinated and combined to achieve best results for all connected tasks within the available time and resources.

Activity 2.2: Gap analysis of the institutional/organisational framework

Using results from the Activity 2.1, primarily the detailed description of the institutional/organisational framework for hydropower generation development together with findings from the meetings with stakeholders, the Consultant will develop the Gap Analysis of the institutional/organisational framework. This Gap Analysis will identify all institutional, organisational and functional gaps that may impact future development of hydro-generation projects. It will be developed at the country level, with an overview at the regional level aiming to present overall impact on the hydropower generation development in the region, with special emphasis on the interstate (trans-boundary) institutional and organisational obstacles. The Gap Analysis report will be thoroughly discussed in an additional dedicated round of meetings with the stakeholders, to check and prove the findings before development of the proposals for improvement. Like the Activity 2.1, these meetings will be combined with the discussions on improvement of legal/regulatory framework, as appropriate.

Activity 2.3: Proposals for improvement of the institutional/organisational framework

The final activity of this task, summarising the previous activities and associated investigations, is the development of a set of proposals for improving the existing institutional/organisational framework for hydropower generation development. These proposals will be developed at the country level, recognising measures that should be applied by individual stakeholders and at different institutional levels, taking into consideration the interactions between them. Regional aspect of the proposals for improving the existing institutional/organisational framework for hydropower generation development will consist of measures that must be applied either at the regional level or among individual countries that share common water basin or hydrogeneration project. These proposals for improvement of the institutional/organisational framework for hydropower generation development will form part of the final Study Report.

Deliverables

- D2.1: Institutional/Organisational part of the common flowcharts for the HPP project development and implementation in all WB6-countries (planned under the Activity 3.2 below)
- D2.2: Contribution to separate background report (BR2) 'On Gap Analysis of the Institutional-Organisational and Legal-Regulatory Frameworks Relevant for Hydropower Development'.

Required personnel resources

- Task Leader: Grid Connection Expert (Position 2)
- Support staff:
 - National Grid Connection / Development Expert, 1x (ALB+KOS, Senior Expert - SE)

4.2.4 Task 3: Assessment of the current situation in the legal-regulatory (L&R) framework relevant for hydropower development

Activity 3.1: Detailed evaluation of L&R status by country

The preliminary assessment of the L&R framework made in the scoping stage will be enhanced by a more detailed assessment in the Study Phase, with respect to HPP development and implementation. Attention will be given to the progress made with respect to the NREAPs submitted to ECS and to the identification of the main barriers and obstacles preventing the development and implementation of HPP projects in foreseeable future. In addition to that set of recommendations, additional recommendations will be provided relating to measures that will help countries accomplish the goals set in their current NREAP (by 2020), as well as in future NREAPs for the period beyond 2020 (as part of the Regional Action Plan).

Activity 3.2: Drafting and analysis of country-specific project development flowcharts

As one of key tools to examine the L&R framework and identify the obstacles and bottlenecks, country specific flowcharts for the development and implementation of HPPs with steps, timelines, institutions involved and milestones/key permits will be developed and optimised. Any gaps and inconsistencies will be identified and solutions recommended, based on best EU and appropriate regional practices.

Activity 3.3: Obtaining investors' perspective and expert position on proposed L&R improvements

The sub-project aims to add value by providing the “developer/investor” perspective to the L&R framework. This assumes that the NREAPs are documents made by the relevant line ministries and naturally reflect the “state” perspective and approach to HPP development. To be able to assess the wider perspectives on the possible obstacles to HPP development, the Study shall also consider individual developer/project promoter positions, and their assessment of the possible improvements required to the L&R framework. The developers' positions will be analysed and complemented by the expert views of PTEs. This will be undertaken through meetings/interviews with a limited number of selected project developers by the PTEs.

Activity 3.4: Drafting report including recommendations for further actions/improvements

Deliverables

- D3.1: Legal/regulatory part of the common flowcharts for the HPP project development and implementation in all WB6-countries;
- D3.2: Contribution to separate background report (BR2) 'On Gap Analysis of the Institutional-Organisational and Legal-Regulatory Frameworks Relevant for Hydropower Development'.

Required personnel resources

- Task Leader: Hydropower Development Expert (Position 4)
- Key support staff:
 - Legal and Regulatory Framework Expert (SE)
 - Hydropower Development Expert (HDE) - Assistant (Junior Expert – JE)
 - National HPP Development Expert, 6x (SE)

4.2.5 Task 4: Assessment of hydrology baseline, water-management on country and river basin and transboundary issues

Activity 4.1: Collection and assessment of hydrological data

Data at two levels, specifically, (1) Water Catchment Area (i.e. river basin) and (2) Country will be collected and assessed by local Hydrologist(s) based on instructions/guidelines provided by Task Leader for Hydrology / Water Management. It is foreseen that a certain number of contacts and country visits will be needed to obtain correct databases and additional insights into the planning processes in individual WB6-countries.

Activity 4.2: Assessment of water flows

Hydrological studies allow for the estimation of the river discharge, based on series of data like flow measurements, rainfall and infiltration studies. These flows, along with the estimation of hydraulic parameters and topography at a high level of detail, are the required input data for the calculation of

energy equivalent of waterpower. Since climate change has an impact on the run-off and consequently river flow, an overview of studies reflecting this subject will be prepared.

As an essential task, the Consultant will collect and analyse all available information relating to the water flows, as well as rainfall data and the measurement systems of these variables for all target countries and river basins with identified planned HPPs of more than 10 MW in the Scoping Phase.

For establishing water flows on a river section which has identified locations of planned HPPs, there can be different approaches applied, depending mainly on the available data and the characteristics of the studied area. The two mostly applied methods are:

- Statistical analysis of water flows that are usually prepared by National Water Agencies; and
- Hydro-meteorological analysis and/or modelling of the precipitation runoff.

It is assumed that for the Study, the first method shall be mainly used, and only for cases where data on water flows does not exist, the modelling of runoff shall be used to compensate the missing data.

Throughout the course of the study, the requirements of the Water Framework Directive, including Integrated Water Management principles, will be adhered to, even in the case that transposition and adoption is not yet formally complete in some accession states within the WB6 group of countries. The project will assume that the WFD is “valid” throughout the WB6 countries.

Activity 4.3: River section analysis for which hydrological modelling of the run-off will be applied

Where data of the river discharge are not reliable for the reasons such as climate change, change in the vegetation cover or uncontrolled water resource use, runoff models will be prepared which will either confirm existing discharge data or provide new values for reliable calculation of hydropower energy output. Detailed hydrologic analysis will provide results for specific catchments and river sections.

Once all available data are collected, a selection of the priority sections for detailed analysis will be made. The criteria used for this selection could possibly be the areas where runoff problems are more serious and the available data is sufficient for this type of analysis.

Once this phase is finished, and the sections to be studied has been determined, an initial estimate of the discharge will be available. This information will be the key to estimate hydropower potential.

All this information gathered will be included in a database, to have orderly and functionally-located information, linking to each section of the river being studied.

Activity 4.4: Integration of the hydrology with the existing and planned HPPs inventory

The integration of hydrology with information systems containing hydropower plant data emerged to facilitate the work of the technical users of the Study, in respect of linking input and output data and to enhance the capabilities for analysis through a graphical interface. To meet this objective, the information system will be composed of alphanumeric data support (SQL database, Access or similar) together with a graphical GIS front end.

Activity 4.5: Identification, analysis and recommendations on transboundary issues

Numerous transboundary issues have been already identified during the Scoping Phase and these include: HPP Zhur, Bileca Lake with Montenegro; Problems of compensation at HPP Dubrovnik (Croatia), Vardar/Axios River (Greece), HPP Buk Bijela; planning problems at Tara River, HPP Zuti Krs, HPP Tepca (within Danube River Convention); transboundary problem on Cehotina River), HPP Bajina Basta; bilateral problems on Drina River locations.

These transboundary issues will be addressed in close collaboration with responsible local stakeholders. The Consultant will establish his own neutral position and advise the parties on pragmatic solutions in line with best EU and regional practices. Best available references like “Guiding Principles for Sustainable Hydropower Development in the Danube River Basin” – the ICPDR shall be consulted for that matter.

Deliverables

- D4.1: List of available hydrology and water-management data, documents: studies, contact persons prepared with support of the Information and Documents Management System (IDMS);
- D4.2: Documented analysis of the most important issues to consider under hydrology: especially water discharge and river sediments transport;
- D4.3: Separate background report (BR3) 'On Baseline Data on Hydrology and Water Management Issues';
- D4.4: Separate background report (BR4) 'On Transboundary Issues in the WB6 Region'.

Required personnel resources

- Task Leader: Hydrology / Water Management Expert (Position 3)
- Key support staff:
 - Legal Advice on Transboundary Issues (SE)
 - Run-Of-River Modelling Engineer (SE)
 - Legal Expert (SE)
 - National Hydrologist and Water-Management Experts, 6x (SE)

4.2.6 Task 5: Grid connection issues in network development context

The objective of this task is to investigate in detail the framework and potential for grid access and grid connection of prospective HPPs in each of the WB6 countries. The Consultant shall include all the stakeholders, starting with line Ministries, Regulators and Network operators and ending with private investors and project developers, in this in-depth analysis of legislation vs. practice in grid connections. Identified malpractices, gaps in legislation and inconsistencies will be identified, discussed and recorded to facilitate the development of improvement proposals. Assessment in this task will be done separately for HPPs exceeding 10 MW of installed capacity and for clusters of smaller HPPs, because the applicable legislative framework is rather different because large and small HPPs are typically connected to different electrical networks with different technical requirements for connection and operation.

Activity 5.1: Analysis of the Grid Access and Grid Connection regulations and practices

The Consultant will undertake a detailed assessment and analysis of the existing national rules and practices governing grid access and grid connection of new hydro power plants in the WB6 countries. Should rehabilitation / reconstruction projects of existing hydro power plants that are likely to use the existing connection points require upgrade / modification thereof, such cases would also be studied under this activity. The Consultant will meet all main institutions responsible for policy making and implementation of grid access and grid connections and will discuss and assess the status of regulations and their implementation. Thorough analysis of the connection requirements will include regulations from the Energy/Electricity Law and relevant secondary legislation (Network Codes) and internal acts of the Network Operators such as various Grid Connection Implementation Rules, Methodologies for determination of the network connection costs, template applications, contracts, etc. The outcome of this activity will be detailed status of the network connection rules and practises from the legal, regulatory, technical and financial point of view.

Using these findings as a base, together with other findings from meetings with stakeholders and investors organised to collect information about implementation of the existing network connection rules, The Consultant will develop an analysis of the rules and prevailing practices for grid access and grid connection of new HPPs. Objective of this analysis is to identify the possible gaps, malfunctions and inconsistencies related to the contents and/or implementation of the existing network connection framework. Additional part of this assessment will be analysis of the operational requirements for the hydro power plants, i.e. technical requirements that hydropower generation units must comply with during their exploitation (once they are constructed, connected to the grid and operational). Analysis of the operational requirements is very important for the investors in hydropower generation projects because of the impact these requirements may have to the selection of main and auxiliary equipment of the plant, and consequently to the overall project costs. Analysis results will be thoroughly discussed with the stakeholders to check and prove findings before developing proposals for improvement at a country level.

The output of this activity will be a working document describing the existing national rules and practices concerning grid access and grid connection of new HPPs, which will be organised separately for large and small HPP projects. This document will be presented to the stakeholders and thoroughly discussed and scrutinised before using it for the development of the proposals for improvement.

Activity 5.2: Review of the existing electrical networks capacity to accommodate connection of planned HPPs

This activity will be conducted together with the relevant network operator in each WB6 country. Counterparts are planning departments of the TSO, i.e. teams of experts producing long-term development plans for the transmission network³. Transmission network, connection points will be identified for each individual HPP project on the list of identified prospective candidate projects (see also Task 6). Since for most the established projects in the pipeline, connection points have already been determined by TSO/DSOs, the role of the Consultant and network operators' experts will be to explore the total effect on the network and on the power system as a whole, if all presently identified HPP projects require to be connected within a certain period. Considering small hydro power plants, which are in most of the regional countries units below 10MW installed capacity, they will be connected to the distribution network and similar exercise will be conducted with the relevant DSOs. Unlike the assessment for the transmission network (usually only one TSO by the country), in the distribution network there may be more operators (usually is the case) and analysis will be done on the cumulative effect of the recognised small hydro power plants projects identified in the network operated by the concerned DSO. Network connection and operation issues in the distribution network are much more complex due to mainly radial networks and numerous interactions with other network users. These assessments will be made from several perspectives:

1. Capacity of the planned connection points and network in the vicinity of the connection point,
2. Overall electricity-transfer capacity of the entire national electricity transmission network including interconnections,
3. Local/areal capability of the transmission network to facilitate planned projects and need for new investments in upgrading and rehabilitation,
4. Capacity of the distribution networks to facilitate connection and integration of small hydropower plants, and
5. Impact of the planned and foreseeable hydropower generation development projects on the overall capability of the national (and regional) electrical networks to provide sufficient ancillary services and power system balancing capability.

The outcome of this activity will be an input to the separate background report on this task that will either prove that network capacity is sufficient, or propose network extensions where necessary, or call for additional network studies that will perform necessary calculations of required network reinforcements.

Activity 5.3: Proposals for improvements and follow-up actions

Summarising the previous activities and associated investigations, proposals for improvements of the existing rules and practice concerning access and connection to the electrical grids will be developed in this activity. These proposals will be developed at the country level, if applicable separately for large and for small HPPs, recognising measures that should be applied by individual stakeholders and at different institutional levels, taking into consideration the interactions between them. These proposals for improvement of the existing rules and practise concerning access and connection to the electrical grids will be part of the background report, an element of the Regional Action Plan and will be summarised in the Final report on the Study (see also Task 11).

Deliverables

- D5.1: Working document on existing national rules and practices concerning network access, network connection and operational requirements for the hydro power plants;
- D5.2: Separate background report (BR5) 'On Grid Connection Issues Related to Prospective HPP Projects'.

³ In ENTSO-E standard is development of the 10-Year Transmission Network Development Plan (TYNDP) which is updated every year or every 2 years.

Required personnel resources

- Task Leader: Grid Connection Expert (Position 2)
- Key support staff:
 - National Grid Connection / Development Expert, 1x (ALB+KOS) (SE)

4.2.7 Task 6: Identification of HPP projects and acquiring relevant information for the HPP inventory and investment planning

In the Scoping phase, a preliminary identification / assessment of prospective HPP projects in the WB6 region was performed, with a focus on Greenfield and Rehabilitation projects over 10 MW of installed capacity. In addition, a template for the HPP project database (HPP-DB) was developed (Annex 2 of the Scoping report). Within this study phase task, a more detailed survey of those projects shall be conducted. The survey will be aimed at: a) evaluating the existing HPP lists for both completeness as and probable obsolescence; and b) collecting the remaining information and data required to complete the HPP-DB. The information / data required will cover the following main areas: basic information, hydrology/water management, technical information, economic/financial, environmental & social and maturity information. By the completion of this task, an Inventory of candidate HPP projects supported by relevant data (Excel) will be established, for further use in several other tasks. Apart from collected information / data for the HPP-DB, also any available relevant supporting documents, reports, design schemes, maps etc. for HPP projects will be collected which will be stored in the Information and Document Management System (IDMS) for any further use (see also Task 12). This task will also provide inputs to the HMP-GIS component of the Study (see Task 8).

These tasks should be accomplished through:

- Meetings with the beneficiaries and HPP project sponsors/developers;
- Questionnaires to the beneficiaries and HPP project sponsors/developers to collect the required information and the documentation
- Evaluation of the received information, data and the documentation.

Activity 6.1: Development of a questionnaire for the beneficiaries to collect HPP information / data and support documentation

Activity 6.2: Holding meetings with beneficiaries and HPP sponsors /developers, discuss the questionnaires, collect information / data / support documentation

Activity 6.3: Analysis of collected information / data / support documentation, establishment of HPP-DB (Inventory of HPP projects) and archived documentation in the IDMS

Deliverables

D6.1: Comprehensive database of HPP projects (HPP-DB) – the Inventory of HPP projects;

D6.2: Archived documentation on HPP projects in the IDMS;

D6.3: Separate background report (BR6) 'On Inventory of Prospective HPP projects (HPP-DB), GIS Application and the Remaining Hydro-Potential in the WB6 Region'.

Required personnel resources

- Task Leader: Hydropower Development Expert (Position 4)
- Key support staff:
 - HPP Development Engineer (JE)
 - GIS Input Data Manager (SE)
 - National HPP Development Experts, 6x (SE)

4.2.8 Task 7: Environmental and Climate Change Analysis on (i) river basin level and (ii) country-level of identified hydropower schemes

The purpose of this task is to develop a sound environmental basis for the classification of hydropower proposals under consideration in the Study and furthermore, to secure the feasibility of HPP development projects from the environmental point of view. Hydropower projects in WB6 are diverse in terms of state and concepts - from large dams to run-of-river plants. Document elaboration varies greatly

from Ideas and Concepts to Detailed Designs. The associated environmental documentation also varies throughout the region, notwithstanding the fact that most of the governing environmental legislation is harmonised to a great extent. However, gaps do seem to exist in regulations and procedures for obtaining environmental consent, and especially the time required to gain an environmental consent could prove to be of utmost importance in hydropower development planning.

In such a situation, it is essential to identify nature-protected areas and to clarify the mechanisms by which environmental protection is assured. Reservoirs are, in many cases, still feasible providing they respect certain conditions, and work with the protection measures being put in place. Significant in the WB6 countries are inventories of water related biota established per Red List of Endangered Species or Habitat Directive. In this context, it would be of great help to identify endangered fish species with special emphasis on migratory fish species and the river segments where they live and the migratory routes that they are using.

Water quality issues in the region are notorious. Hardly any wastewater from urban areas is treated, although in the WB6 some improvements are being made to waste water treatment. Neither is industrial pollution treated before discharge to river systems. Many floating objects are found on tree branches proving unpleasant view on the banks. Key pollution sources must be identified. Pollution and contamination issues will not be dealt with by the developers of hydropower, but as a precondition, the pollution must be managed before construction will start. There is also depletion of biota (some species are extinct) often reported, so this must be compensated in reservoirs, for example, where oxygen deficiency and turbidity changes can occur. Therefore, water quality must reach a good quality status before reservoirs can be allowed to proceed, to assure that other water users are not adversely affected by the impoundment.

As a consequence of hydropower schemes development, there can be significant environmental impacts which are well-known. The change from a flowing river to reservoir still waters (in storage HPPs) represents a crucial change of living environment for a certain number of species. This and similar effects and impacts must be identified as a factor which will be used in the selection of priority HPP development schemes. The clarification of mitigation measures on priority HPP schemes will assist in the evaluation of potential hydropower development from the environmental aspect.

The aim of this task is to harmonise prospective hydropower development with environmental concerns, while achieving development goals, environmental legislation compliance and other strategic objectives. This activity will define appropriate guidelines on mitigation measures for identified impacts with a focus on the mitigation approach to be adopted for identified future HPP development locations/areas.

The reference documents that will be consulted in the Study include:

- Statement by the EU Water Directors on Hydropower Development under the Water Framework Directive, May 2010;
- Issue paper and conclusions from the workshop on WFD and hydropower, (chapter on conclusions and recommendations page 56-60), Brussels, September 2011;
- Conclusions from the CIS workshop on WFD and hydropower 2007;
- Common Implementation Strategy (CIS) for the Water Framework Directive 2006: WFD and Hydro- morphological pressures - Policy Paper. Focus on hydropower, navigation and flood defence activities. Recommendations for better policy integration, December 2006;

Activity 7.1: Environmental data collection, establishment of an appropriate database, analysis and integration with HMP-GIS system

Until now there has been no comprehensive review and update of the data collected after the year 1992. Information exchange and data analysis were performed ad-hoc and separately in each country. Through this Task, all available environmental studies will be collected, reviewed and assessed.

The following data will be needed for finalisation of the task: water pollution, meteorology data, aerial photos of land use, location of wastewater treatment installations, pollution sources and loads, existing EIA/SEA and baseline studies related to hydropower planning.

A geo-referenced database with typical environmentally significant issues shall be developed, containing, for example, protected areas:

1. National Parks based on national and international acts or conventions of protection;
2. Ramsar Sites, Biosphere Reserves and World Heritage Sites (Nature); in most cases, these international categories are transposed under national regulations;
3. Natura 2000 under preparation in the EU candidate countries if available;
4. Strictly protected areas in the non-EU countries; mainly comprised of smaller areas (nature reserves) but also of “nature parks” formerly designated by the Former Republic of Yugoslavia (FRY) in Bosnia and Herzegovina, Republic of Serbia, Montenegro, Kosovo and the former Yugoslav Republic of Macedonia with strict protection. Furthermore, EMERALD zones in non-EU countries;
5. Other protected areas such as landscape protection, natural monuments, official enlargement proposals and other officially designated areas with a lesser level of protection.

Geo referenced database will also include data on the distribution of endangered fish species which sometimes overlaps zones of the protected areas or provides a new environmental information which needs to be considered.

Spatial data shall be acquired through available sources; open source data, through consultations with environmental authorities, all other relevant stakeholders and other interested parties. Collected data shall be used for geospatial analyses to assemble, evaluate and present baseline data on the environmental characteristics of the study area and to analyze possible impacts by overlaying intersecting and extracting relevant data to draw relevant conclusions and recommendations (See also [Task 8: Establishment of central HMP-GIS database](#)).

This activity will provide a feed for GIS; the environmental data will be collected in a database will be uploaded to the main HMP-GIS application to visualize results of the Study (See also [Task 9: Development of web GIS application \(HMP-GIS\)](#)).

If no digital data is available, other sources shall be established. All other relevant data shall be collected in existing forms (plain text, tables, diagrams...) to assess and evaluate present state, draw conclusions and propose recommendations.

Activity 7.2: Analysis of adverse impacts and benefits

This activity shall provide assessment of significant effects of hydropower development on the environment. Impacts analysed may be evaluated from the point of view of: construction and operation phase, direct and indirect effects, long and short-term effects, positive and negative aspects. When assessing impacts, irreversibility should be specified. For unacceptable impacts (most probably rare species and habitats) mitigation measures should be drafted, such as habitat compensation.

The most adverse environmental impacts shall be analysed for priority schemes or by site/river reach, the upstream and downstream river stretch, which will be affected by the project and any other area that can have an impact due to the project. This analysis will also specifically include the environmental assessment and potential mitigation of any new electricity transmission lines for connection of a greenfield hydro-generation site to the appropriate node on the electricity grid.

Analysis of impacts is done on a technical design basis in detail in an Environment Impact Assessment Report. This document is prepared on a completed project documentation basis, thus full content of EIA will not be needed at this stage of Study, neither will full SEA will be needed for same reason. Instead, impacts will be assessed individually for priority projects on a judgmental basis. Impacts that are valued as unacceptable to the level that they would eliminate hydropower schemes from further elaboration will be decided against the whole list of prospective hydropower plants.

To avoid irreversible negative impacts, cumulative effects will be analyzed. Cumulative effects include a variety of impacts at different spatial and temporal scale. In some cases, when several hydroelectric power plants are constructed or planned on the same river or within the same watershed, cumulative impacts may occur. In the other hand, cumulative impacts may occur from the combined impacts of different types of projects, especially considering access roads, transmission lines, and other similar. It is important to emphasise that numerous small-scale activities jointly can have significant impact. For that reason, analysis will be made on river basin/watershed scale.

The Study will neither deal with order of realisation nor with total number of schemes as some kind of

final planning stage. So, the cumulative effect will be eventually assessed for a maximum development potential as a theoretical cumulative effect. Most probably cumulative effects will focus on sediment transport, water balance and migratory fish obstacles.

Cumulative effects are in practice part of SEA study. That is when data baseline is abundant and firm plan has been developed. It is not often that cumulative effects are studied separately, therefore this question must be answered considering study limitations of the Study.

Instead of comprehensive cumulative effect study for the region, an overview of possible consequences regarding cumulative impacts of hydropower without quantification will be identified.

The criteria for prioritising of hydropower development in areas affected will consider different administrative levels. On the candidate to EU level, biodiversity concerning species and habitat issues of ecological importance should be identified, for example via the Natura 2000 designation process, Habitat Directive etc. Other criteria to be reflected upon on an international level are lateral connectivity for wetlands and management of water quantity and sediment flow. On the catchment and regional level, longitudinal continuity for key migrating fish is especially important. On the level of water bodies, lateral connectivity should also be considered, the geographical scale of impact and its severity and means to prevent deterioration. All basic analyses will be based on river basin scale; For this Study, given the lack of Water management plans, the Classification of Watersheds and River Basins in the WB6 region was prepared in simplified version.

Activity 7.3: Environmental directions, mitigation measures, recommendations and legal gaps

This activity will specifically use guidelines that exist regarding good practice of hydropower schemes planning, (e.g. Danube River Basin –ICPDR, ICOLD, etc.), adjusted for the region WB6, like:

- Common Implementation Strategy for the Water Framework Directive; WFD and Hydro-morphological pressures; POLICY PAPER; Focus on hydropower, navigation and flood defense activities; Recommendations for better policy integration, 2006
- Sustainable Hydropower Development in the Danube Basin, Guiding Principles, 2013
- Hydropower Case Studies and Good Practice Examples; ANNEX to “Guiding Principles on Sustainable Hydropower Development in the Danube Basin”, 2013

The work will focus on measures that mitigate impacts analysed previously to acceptable levels. Alternative mitigation shall be discussed and the effectiveness of the proposed measures shall be stated. Mitigation solutions and approach in general shall be discussed in practical terms for future hydropower developments (equally applying for greenfield as well as rehabilitation / reconstruction projects), shall be discussed in practical terms, including the electricity connection;

The term “mitigation measures” used in the report refers to the measures that are applied to eliminate or minimise the identified (existing HPP) or potential negative impacts (planned HPP) of the HPP or HPP project. Mitigation measures, with the emphasis on functional fish pass and ecologically acceptable flow (EAF) will be proposed for existing and planned HPP along with recommendations, considering two documents:

- Measures for ensuring fish migration at transversal structures, Technical paper, ICPDR, 2013
- Ecological flows in the implementation of the Water Framework Directive, Guidance Document No. 31, Technical report – 2015 – 086, European commission, 2015

Considering the refurbishment of existing hydropower facilities; Emphasis will be paid to HPPs without fish structures if applicable and guidelines for ecological flow will be prepared within the scope of the Study. Possible other environmental issues related to existing HPPs subject of rehabilitation will be identified and proposals for ecological rehabilitation will be provided, while the detailed planning to implement such measures will be done by the developer at a later stage in the project development cycle.

Activity 7.4: Residual flow

The residual flow (also reserved or basic minimum flow or ecologically acceptable flow - EAF) of water let out downstream of a reservoir must preserve aquatic biodiversity of species and habitat and at same

time provide rational generation of electricity. Residual flow has been traditionally discussed between developers on one hand and fishermen, environmental agencies and associations for the preservation of the environment on other hand.

Formulas to determine residual flow are many. This is a real problem for the legislator who must set up the regulation, and in concrete cases it makes it difficult to have reference values or formulas to comply with. Within a given group of methods, the differences in the results can vary very significantly from one method to another, therefore a recommendation to estimate reserved flow will be prepared and applied accordingly to the priority schemes.

Hydropower plants might have severe impacts on fish fauna which magnitude depends on fish fauna composition on the specific location and wider (drainage basin, river basin), the sensitivity of present species as well as on the type of HPP and its operational regime.

Threat status will be assigned to fish, based on categories from the IUCN Red list of threatened species, the system for classifying species at high risk of global extinction (IUCN, 2016). River sections with protected, rare and migratory fish species will be defined and corresponding layers in GIS database will be developed.

Sensitivity to the changes in the habitat that result from HPP will be estimated based on species' ecological requirements, mainly requirements for opened migratory corridors, habitat and spawning requirements and sensitivity to invasive species, to propose EAF approach to be used throughout region.

Note on Climate Change: Climate change is a crosscutting theme for this subproject and will not be exclusively addressed in any one section of the report. On climate change, the main impacts of climate change on hydropower are increased variability in precipitation / runoff and hence impact on hydrological yield and the consequent sizing of new reservoirs (or potential re-sizing of existing reservoirs under a HPP refurbishment / repowering project), and to a lesser degree rates of evaporation, increased erosion in rivers and the level of sedimentation or particulates.

Topic of climate change has been widely studied recently. There are references prepared and available for WB like: UNEP, ICPDR, ISRBC. Conclusions, recommendations and guidelines from the references will be contained by specific climate change inputs to REG-HMP, mainly concerning adaptation measures and effect on hydrology.

As most of these effects are hydrology related, they will be covered in background report (BR3), which deals mostly with these aspects of climate change:

BR3 "On Baseline Data on Hydrology and Water Management Issues" - On the state of the play, flow duration curves, cumulative effects of HPP chains, climate change adaptation and mitigation measures.

In addition, result A/2 also deals with how developing hydropower is, in general, a mitigation measure which offsets CO2 emissions from thermal power generation, and which contribute to climate change:

A/2 - Role of hydropower generation in the broader electricity supply/demand contexts (past and long-term future) is assessed together with specific advantages of hydropower generation (e.g. ancillary services), electricity market development opportunities and in the combat against climate change (Task 1)

Finally, any other residual climate change issues, not otherwise addressed will be addressed in activity 7.2 of the environmental section, above.

Deliverables

D7.1: Separate background report (BR7) 'On Environmental Analysis'.

Required personnel resources

- Task Leader: Environmental Expert (references in EIA/SEA of various types of HPP development) (Position 5)
- Key support staff:
 - Hydrologist / Water Management Expert (Position 3)
 - Ichthyologist (SE)

- GIS Input Data Manager (SE)
- National Environmental Experts, 6x (SE)

4.2.9 Task 8: Establishment of central HMP-GIS database

To effectively manage, store and share data about existing hydro power plants and prospective projects, a central GIS database will be built. There are many spatial components which affect hydropower generation in the WB-region, and data about these components will be collected, systematised and stored in a central GIS database.

It is important not only to store spatial data centrally, but to model spatial relationships between data as they are in the real world. GIS databases, unlike regular non-spatial databases, can store spatial data and manage spatial relationships between data. There are many mechanisms in GIS databases that can help effective storage, management and presentation of spatial data.

Centrally stored data will minimise data redundancy, potential data loss and scattering data across individual computers. The central GIS database can also provide access to many users simultaneously, therefore all stakeholders during and after the Study can browse and analyse the data.

Activity 8.1: Data collection, systematization and conversion

During this activity, all available data sources will be checked for relevant data. This will include existing EU-funded studies on similar topics in the WB6 region, which will be done by PTEs, as well as publicly available well-known GIS repositories, which will be loaded and processed by the GIS team. At the same time, alphanumeric data about hydrology / hydro potential, technical data on design characteristics and operations of the existing hydro power plants, techno-economic data on planned HPPs for consideration in the Study and other types of data as deemed necessary by the expert team will be collected in a spreadsheet form.

All data will be converted into GIS-ready formats by GIS-team. The GIS-team should work closely with PTEs, to filter out and select the most suitable data for the Study.

Activity 8.2: Creation of the data model

Creation of the data model will require defining the appropriate format, geometry type, spatial reference and relationships for all collected spatial datasets, as well as column definition for all associated attributive data. It is important to create the data model with respect to normalisation principles, to minimize data redundancy. The spatial reference (coordinate system) for GIS data must be unique and appropriate for WB6 region, to avoid deformations and misalignment of data later in the GIS application.

The GIS-team will create data model using relevant datasets selected during Activity 8.1.

Activity 8.3: Data integration and migration into the data model in central GIS database

Upon the data model creation, all data will be loaded into GIS database. It is important to apply attributive and spatial data validation mechanisms. For attributive data, a predefined list of valid values will be used, as well as predefined default values or valid range of values, where applicable. Spatial data should be checked for topology errors.

The GIS-team will load all data into the central GIS database. Data from other relevant GIS repositories, such as national geoportals, will be directly consumed if possible (if available as OGC services – WMS, WFS etc.), without storing data in the database.

Deliverables

- D8.1: Spatial data collected, relevant attributes associated and all data converted into GIS-ready formats;
- D8.2: Conceptual, logical and physical data model created;
- D8.3: Central GIS database populated with all relevant data.

Required personnel resources

- Task Leader: GIS Application Expert (GIS-team)
- Key support staff:

- GIS Input Data Manager (SE)
- All PTEs (Positions 1-5)

4.2.10 Task 9: Development of web GIS application (HMP-GIS)

The Central GIS database will be used for storing spatial data, but for data presentation, visualization and analysis, a web-based GIS application will be developed.

The Web GIS application provides access to spatial data relevant for the Study in an intuitive and user-friendly interface. Unlike traditional desktop-based professional GIS applications, a web GIS application will have a limited and focused set of tools, appropriate both for GIS and non-GIS users. Users will need only a web browser and Internet connection to access web GIS application from any location in the world.

The focus of the application will be locations of HPPs (existing, under construction and planned), with associated attributive data organized in several groups – general information, hydrology/water management, technical, economic and financial, environmental and social, maturity, other aspects and MCA results. These attributes will pop-up upon clicking on each HPP, thus creating unique HPP fiche. All other spatial data, which were recognized from PTEs in Task 1 as relevant for the Study, will be visible in the application. Examining spatial relationships between objects directly on the map, a user could make important conclusions regarding spatial characteristic of a single HPP, and combining it with collected attributive data, could make creation of more reliable list of candidate HPPs.

The existing web GIS application used for the REG-CON project of the WBIF-IPF3 Consortium will be customised and configured to show all spatial data relevant for the Study.

Activity 9.1: Creation of specific documents and services

Spatial data from central GIS database will be organised in specific map documents and published as map service(s). These services will be used by web GIS application. All datasets in map documents will be shown as layers. The properties of each layer will determine how data will appear in the web GIS application.

It will depend on the final data collection process, but the following layers (but not limited to) will be visible in map services and in the web GIS application:

- Catchments-river basins, including the hydrographical network;
- Watersheds;
- Topographic background map with major towns, administrative borders, road infrastructure;
- Satellite imagery background map;
- Land cover;
- Precipitation;
- Location of hydro power plants – existing, under construction, planned (subject to assessment within the Study) and other identified but not relevant for the Study;
- Protected areas;
- River sections with protected and migratory fish fauna;
- Digital Elevation Model;
- Electrical network data – existing transmission network and planned HPP grid connections.

The GIS-team will work closely with PTEs to define properties for each layer – i.e. which symbology will be used (colours, styles, symbol size and labels), when to turn layers on and off etc. They will also decide together if any additional web map services should appear in the application such as services from other institutions (ideally, relevant institutions which act as data providers for the Study may have their data hosted as web services). The GIS platform used by REG-CON application provides free base-map services – topography, satellite imagery, OpenStreetMap etc. These services are already included in the application.

Activity 9.2: Configuration and customization of existing web GIS application

Existing REG-CON web GIS application will be customized to serve data relevant for the Study. That means all datasets will be added in the application as new layers with its unique style and symbology defined in Activity 8.1. The existing application will be modified so users from REG-CON project and

HPP development Study will access the application using the same entry page, but the application will offer some different interface or options for these two group of users, such as the application title, print templates etc.

All tools in the REG-CON application will be reconfigured or additionally configured to provide the functionality required from PTEs and other stakeholders.

The GIS-team and PTEs will define what must be configured and how – for example, they will define criteria which will be used for HPP searching, or which attributes of HPPs can be edited, if any.

An important part of this activity is to delegate someone from the project team who will administer users of web GIS application. This can be the current administrator of REG-CON application. The main duty of this person will be to create accounts for users which want to get access to the application. The application will have two group of users – readers, with read only permissions, and editors, which can add new HPPs or edit data about existing HPPs.

Deliverables

D9.1: Map service(s) with data from central GIS database published and running;

D9.2: Optionally, available map service(s) from other institutions examined and selected for use in web GIS application;

D9.3: The application configured and customized for the Study.

Required personnel resources

- Task Leader: Subcontractor 1 (GIS team leader) (Position 6)
- Key support staff:
 - GIS Input Data Manager (SE)

4.2.11 Task 10: Multi-Criteria Assessment (MCA) of prospective HPP projects

In parallel with Task 6, a multi-criteria matrix for the evaluation of the HPP projects will be developed.

The Consultant will develop an MCA system which is applicable to all identified HPP candidates, taking into consideration data availability and the relevant guidelines, assessment methods and best practices (such as Guiding Principles for Sustainable Hydropower Development in the Danube Basin, Hydropower Sustainability Assessment Protocol, Environmental and Social Guidance Note for Hydropower Projects of the European Bank for Reconstruction and Development).

In general, the MCA will support the evaluation of new greenfield HPPs for hydropower development and will facilitate identification of the priority new HPPs whose development will contribute to the structured and rational development of the technical hydropower potential throughout the WB6 region. In a parallel process, the priority refurbishment HPP projects will be assessed, based upon the following assessment methodology:

- the necessity of rehabilitation due to deterioration of existing equipment,
- the economic effects of rehabilitation,
- the positive effects of rehabilitation in terms of environmental protection

At the end of the assessment phase, a single investment project pipeline will be synthesised from these two assessment processes. This single pipeline, in the likely sequence of investment priorities, will comprise of:

1. Refurbishment projects aiming at improving operational safety, HPP capacity & availability and the environment
2. Refurbishment projects aiming at prolonging service life time of HPPs including possible improvements of the environment
3. “Highly recommended” greenfield projects as a result of the MCA process

The MCA matrix and the scoring system will be developed in collaboration with all Key Experts. The system shall define the criteria and sub-criteria to be used, their relative weights and scoring system. The scoring system and relative weights of the criteria will follow scientific and technical standards considering objectives of this Study and HPP project development cycle.

The Consultant will document the methodology and assumptions.

The system shall include at least the following criteria:

- (i) Technical adequacy
- (ii) Financial viability
- (iii) Environmental acceptability
- (iv) Realisation readiness (i.e. maturity)

All applied criteria shall include clear definitions of elements, based on which a candidate HPP can pass the criteria or be rejected from further evaluation. Each element of evaluation can be in one of the following forms:

- (i) "Yes/No" (e.g. if an HPP project is located Inside or Outside of a certain protected area);
- (ii) Expressed as a numerical value, (e.g. for checking if an HPP project satisfied a certain threshold level, e.g. generation adequacy > 5%); or
- (iii) Be descriptive, where professional expert judgement remains the only possibility for assessment (e.g. adequacy of technical solutions, progress in undertaking preparatory studies, field investigations, administrative procedures etc.).

Based on the developed system, all identified Greenfield HPP projects from the HPP-DB ("long-list" of candidate HPP projects) will be first screened against the "deal breaking" set of criteria. Only candidate HPP projects from the "long-list" of approximately presently identified 400 projects (note: various sources) which pass the "deal breaking" criteria will be put on the "short-list" and further considered in the next stage (MCA). It is envisaged that the HPP projects will be finally presented in three groups of priorities (for example: strongly recommended, recommended, less recommended – returned to further evaluation). If possible and found sensible, the HPP projects in the first 2 groups may be further ranked. The assessment will be conducted using the data and results obtained in Tasks 3-8.

The results of MCA shall be presented on the regional and national levels. The aim will be to identify any outstanding HPP project(s), possibly of outstanding regional importance, that should be given full attention and support in further development and possibly given allowances like those of PECl projects.

Activity 10.1: Develop a multi-criteria assessment system, identify "deal-breaking" criteria

Activity 10.2: Screen the "long-listed" projects for "deal breaking" elements

Activity 10.3: Evaluate the remaining projects ("short-listed") per the set MCA system

Activity 10.4. Brief indication of project-specific recommendations

It is expected that for the projects in the first priority group, individual recommendations will be provided, while for projects in other two groups, more general recommendations will be provided.

Activity 10.5 Communicate the findings with the WB6 beneficiaries and other relevant parties

The Consultant will present the methodology to the beneficiaries at the 1st workshop (see Task 13) and consider their relevant comments. A second round of discussion will be subject of the 2nd workshop with participation of the beneficiaries and other relevant stakeholders to communicate and discuss the findings of the MCA evaluation as described above. Thereafter, the Consultant will finalise the list and the prioritisation for the respective Background Report no. 8 and the draft Final report.

Deliverables

D10.1: List of HPP projects prioritised in three groups (e.g. highly recommended, conditionally recommended and less recommended);

D10.2: Separate background report (BR8) 'On Multi-Criteria Assessment of HPP Projects – Portfolio of HPP Investments'

Required personnel resources

- Sub-contractor 2 (MCA team leader) Position 7)
- Key support staff:
 - Other PTEs (Positions 1-5)

4.2.12 Task 11: Drafting of Regional Action Plan on Hydropower Development and compilation of Final report on the Study

Activity 11.1: Preparation of Regional Action Plan on Hydropower Development

The PTEs will prepare several (10) separate background reports (BR1-BR9, see Table 7.1 following) in various professional areas that represent Key Issues in the Study. Such reports, which can be read as standalone documents, will provide numerous conclusions and recommendations, of which some will be on a country and some will be at the regional (WB6) level. Recommendations will ask for actions to be undertaken by several national (but also international) stakeholders at a certain point of time.

To ensure a clear overview and to facilitate understanding of these recommendations, another document will be prepared entitled “*Regional Action Plan on Hydropower Development*”. This will be a concise report (probably not exceeding 20 pages) that will summarise the key recommendations from the BR1-BR9 in a structured form and that will ask for concrete actions (to be briefly described) by identified stakeholders, including the proposed deadlines for intervention.

Because of the regional character of the Study, apart from country specific Key Issues, those having a regional denominator shall also be identified. By that mechanism, all involved parties (EC, DG NEAR, ECS, IFIs and responsible country institutions will be able to make an input to decision-making, strategy formulation and the preparation of other action plans (e.g. the next REAP round).

By promoting the Regional Action Plan (e.g. also through TAIEX workshops) the desired follow-up of the Study will be ensured.

Activity 11.2: Drafting of the Final report on the Study

The above-mentioned background reports will contain a lot of specific technical details that will demand high professional knowledge of the reader each of the Key Issue areas. Also, some of them may be quite voluminous due to the extensive amount of collected information and documentation. The BRs will reflect the professional opinions of the mentioned authors rather than (official) positions of the beneficiaries or the client. They will be discussed at various training and results dissemination workshops organised by TAIEX programme (see also task 13).

Apart from background reports, the Study needs a cross-cutting consolidation document, which will present the issues in a properly balanced way. The Final report will be professionally edited and formatted, thus being ready for publishing if so desired by the Client. (Note: publishing is not envisaged in the scope of services of this sub-project.)

Deliverables

- D11.1: Separate background report (BR9) ‘On Regional Action Plan on Hydropower Development’;
D11.2: (Draft) Final report entitled “Hydropower Development Study in the Western Balkans”.

Required personnel resources

- Task Leader: SPM – Team Leader (Position 1)
- Support staff:
 - All other PTEs (Positions 2-6)
 - Publishing Editor (SE)

4.2.13 Task 12: Establishment of IT-supported Information and Document Management System (IDMS)

The preliminary analysis undertaken during scoping suggests that between 150-250 candidate HPP projects will be addressed in the Study. This entails substantial data collection right from the very

beginning of the Study. Information may be numerical, descriptive and/or may contain scanned documents of a quite varying nature (e.g. technical schemes, maps, plans, etc.) that should be made available to the Project Team Experts (PTEs) whenever needed. Sources of information will be various study reports, documents issued by national authorities (e.g. ministries, energy regulators, TSO/DSO and other authorities), power utilities and/or individual HPP project sponsors/developers both in the public as well as in the private sector. Besides other national stakeholders, the HDS involves special support to the national *water management authorities* in the Western Balkans countries. A joint process will help to enhance capacity and knowledge in the WB6 region.

Activity 12.1: Design and kick-off the IDMS

The Information and Document Management System (IDMS) will support activities under all tasks performed in the Study. It will enable archiving and organisation of documents, which are made available to Project Team Experts (PTEs). Documents prepared during the sub-project's implementation will similarly be registered in the system, including procedural matters and key deliverables. A standard software package will run on a centrally based server maintained by qualified personnel.

Regarding hydrology and water-management, for example, knowing the prevailing practices in the target WB6 countries, it is expected that information is made available to the PTE in the different formats which exist with different users in the countries. Attention will be needed to control/verify and harmonise the supplied data. It is proposed that the existing data structures are maintained during Study execution. A smart link to existing databases will help in updating the central database. This way, different authorities in different countries will stay in charge of their own data management and quality checks, finally enabling them to take over the DMS as one of the project outputs. Central website where users like PTEs can view information with several levels of rights for assigned information to be added or changed will be prepared.

Study Implementation Guidelines will be prepared as an internal document which will consist of a compilation of the guidance notes and procedures to be followed by staff working in the Study. As a minimum, the following procedures will be developed at the very beginning of the Study.

The following list of procedures is not final, but represents the list that will be compiled and complemented by procedures during the Study. This is especially important for this Study due to the numerous participants involved in the Study (e.g. PTE, Country Managers, local support experts etc.) and therefore, a need to allow easy knowledge transfer between team members.

- **Project Controls** - A procedure shall be set-up to ensure the Study is effectively managed. Systems will be defined for recording correspondence, recording on both formal meetings and informal discussions with key stakeholders including client organisations, sub-contractors, suppliers, etc. with effective recording procedures that will be easily catalogued within the Information Management System (IMS).
- **Document Management System** - a comprehensive Documents Control and Management System (DMS) will be deployed. A large quantity of data and information will be collected and it is duty of the Team Leader to ensure that systems are in place to manage this process effectively. The DMS will include a comprehensive document filing system with appropriate standard numbering to ensure data can always be retrieved.
- **Verification of Data** - for an information-based project, it is of utmost importance that confidence in data and of information collected is ensured. Therefore, a project-specific procedure for appropriate checks will be applied to data sets as well as to information gathered by the PTEs.

Activity 12.2: Implementation and maintenance of the IDMS

A dedicated IDMS Administrator shall be appointed, who will ensure consistency of data entry, manipulation and usage by PTE and any other users in accordance with their respective authorisations. In his/her day-to-day operations, he will closely work with all PTEs who will be responsible for obtaining data. His assistance will be needed on a part-time basis. He/she will report to the Team Leader.

Deliverables

D12.1: IDMS established and functional;

D12.2: IDMS after finalisation of the Study is made available to authorities in the WB6-countries.

Required personnel resources

- Task Leader: SPM – Team Leader (Position 1)
- Key support staff:
 - IDMS Administrator (JE)
 - Other PTEs (Positions 2-5)

4.2.14 Task 13: Training and dissemination of Study results

Activity 13.1: Knowhow transfer during in-country missions

The Study will provide training to personnel of involved national institutions to the extent possible and appropriate. However, this will be feasible to a limited extent only due to the desk-study character of the sub-project, and will be limited to periods when the PTEs will be in the field - on missions. During gatherings of the PTEs with national personnel, international experience, best practices and methodological aspects applied in the Study will be discussed. In several cases, local institutions will be requested to provide data in a certain form by following templates prepared by the PTEs well in advance. The rationale and follow-up actions in this respect will be discussed, which will provide value added to the existing know-how and knowledge of the personnel.

Activity 13.2: Training and dissemination of results through TAIEX events and other opportunities

Regional “TAIEX events” will provide an opportunity for broader and effective dissemination of regional Study results at one place and discussion at a regional level, however these events will be based on practical individual country issues / cases. Regional aspects can be distinguished from the country-specific issues. Such events will be an excellent opportunity for sharing experience between the similar institutions in the region, especially when being moderated by the “neutral” PTEs. Apart from pure reporting with an aim of disseminating the results at various stages of Study development, additional well-focused training sessions being part of the workshop programme shall be prepared by PTEs, with an emphasis on applied methodologies in the Study and international experience and best practices in the topic areas of the workshops.

The PTEs shall act as core resource personnel for these events and will advise TAIEX on programming (e.g. agenda, target audience, possibly invited speakers etc.) while TAIEX will organize the events and provide all logistical support required. The PTEs will be compensated from the Study, while all other costs of the events shall be covered by the TAIEX Programme. It is recommended that the events are organised in various WB6 countries to properly share the “ownership” between the eligible countries.

Presumably, the invited participants to TAIEX events shall be relevant national institutions involved in the Study, e.g. line ministries, state agencies, water management and other planning authorities, power utilities etc. depending on the agenda / focus of the individual event.

Two 2-day “technical” training workshops on the following topics, which will coincide with the separate background reports planned in the Study, will be organised, together with the final wrap-up event in a form of a conference (for e.g. 50-80 participants) where all involved parties (DG NEAR, ECS/RECG, key local institutions, IFIs, NGOs etc.) should be invited.

Workshop No. 1: ‘On Gap Analysis, Transboundary and Grid Connection issues as well as Applied Methodologies in Other Thematic Areas of the Study’
Venue: Montenegro; tentative date: last week of March 2017
Objective: <ul style="list-style-type: none"> • to present and discuss the applied methodologies in the Study and used assumptions • to report on the status of data collected and progress achieved by Task / Background Report, and • to present and discuss draft BRs completed by that time (specifically BR2, BR4 and BR5)
Addressed topics / scope: <ul style="list-style-type: none"> • Presentation of results of selected draft BRs and achieved progress in the remaining BRs by Task Leaders (PTEs) - authors of the respective BRs:

<ul style="list-style-type: none"> ○ BR1 'On HPP Contribution in the past and Role in Prospective Energy Balances (2020/2030 and outlook for 2050)', progress report ○ BR2 'On Gap Analysis of the Institutional-Organisational and Legal-Regulatory Frameworks Relevant for Hydropower Development', presentation of draft report ○ BR3 'On Baseline Data on Hydrology and Water Management Issues', progress report ○ BR4 'On Transboundary Issues in the WB6 Region', presentation of draft report ○ BR5 'On Grid Connection Issues Related to Prospective HPP Projects, presentation of draft report ○ BR6: 'On Inventory of Prospective HPP Projects (HPP-DB), GIS Application and the Remaining Hydro-Potential in the WB6 Region', progress report ○ BR7 'On Environmental Analysis', progress report ○ BR8 'On Multi-Criteria Assessment of HPP Projects – Portfolio of HPP Investments', introduction of MCA methodology, progress report <ul style="list-style-type: none"> ● Comments of WB6 countries on presented complete draft BRs (2, 4 and 5) and progress made in BRs 1, 3, 6, 7 and 8 ● Comments of international institutions / beneficiaries on presented complete draft BRs (2, 4 and 5) and progress made in BRs 1, 3, 6, 7 and 8 ● Moderated plenary discussion on individual key chapters of the BRs
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<p>Workshop No. 2: 'On Hydrology / Water Management, Environmental Issues and Other Prospects for Greenfield and Rehabilitation HPP Projects in WB6 Region – Draft Results of the Study'</p>
<p>Venue: Albania; tentative date: last week of April 2017</p>
<p>Objective:</p> <ul style="list-style-type: none"> ● to present and discuss draft BRs completed by that time (e.g. BR1, BR3, BR6, BR7, BR8 and BR9)
<p>Addressed topics / scope:</p> <ul style="list-style-type: none"> ● Presentation of results of draft BRs by Task Leaders - authors of the respective BRs: <ul style="list-style-type: none"> ○ BR1 'On HPP Contribution in the past and Role in Prospective Energy Balances (2020/2030 and outlook for 2050)', ○ BR3 'On Baseline Data on Hydrology and Water Management Issues', Part 2 of 2 ○ BR6: 'On Inventory of Prospective HPP Projects (HPP-DB), GIS Application and the Remaining Hydro-Potential in the WB6 Region', Part 2 of 2 ○ BR7 'On Environmental Analysis', Part 2 of 2 ○ BR8 'On Multi-Criteria Assessment of HPP Projects – Portfolio of HPP Investments', draft results, Part 2 of 2 ○ BR9 'On Regional Action Plan on the Hydropower Development' ● Comments of WB6 countries on presented draft BRs (1, 3, 6, 7, 8 and 9) ● Comments of international institutions / beneficiaries on presented draft BRs (1, 3, 6, 7, 8 and 9) ● Moderated plenary discussion on individual key chapters of the BRs

In addition, the Consultant is committed to participate at regular RECG meetings (usually twice a year, in autumn and spring) and provide presentations on the achieved progress and plans by the end of the Study.

Finally, the Consultant shall regularly inform DG NEAR, through progress / coordination meetings, about achieved progress and extra issues where strategic decisions might be required.

Deliverables

D13.1: Presentations / training at (2) TAIEX regional training workshops;

D13.2: WB6 round-tour with presentation meeting of Draft Final Report of the Study;

D13.3: Presentations at regular RECG meetings at ECS (Vienna);

D13.4: Coordination meetings with WBIF-IPF3 and DG NEAR.

Required personnel resources

- Task Leader: SPM – Team Leader (Position 1)
- Support staff:
 - All other PTEs (Positions 2-6)

4.3 Summary of results

By the successful completion of tasks in Sections 4.2.1-4.2.14, the following detailed set of structured results shall be achieved:

A. Hydropower Development – Status and Development Strategies

- A/1 Excel-based Database of Existing HPPs by country is established. The DB consists of all large and small HPPs as per status of end December 2016. Data include among others: GIS coordinates, key technical characteristics and annual power generation in their entire lifetime since their commissioning, together with the status of possible rehabilitation / reconstruction plans. (Task 1)
- A/2 Role of hydropower generation in the broader electricity supply/demand contexts (past and long-term future) is assessed together with specific advantages of hydropower generation (e.g. ancillary services), electricity market development opportunities and combat against climate change. (Task 1)

B. Hydropower Implementation Framework

- B/1 Institutional-organisational (I-O) Framework: detailed structural and functional description of the I-O framework for hydropower generation development by country is provided, together with identification and description of gaps and elaboration of proposals for improvements. (Task 2)
- B/2 Comparative flowcharts for HPP project development and implementation by country are established. (Task 3)
- B/3 Legal-organisational (L-R) framework: current country-specific L-R frameworks are analysed, key obstacles for easier HPP development and implementation are identified, recommendations for improvements provided. (Task 3)

C. Hydrology / Water Management and Transboundary Issues

- C/1 Hydrology and water-management data, documents: studies, contact persons collected and analysed, conclusions and recommendations provided for most important issues to be considered in future works of relevant national authorities. (Task 4)
- C/2 For selected Greenfield HPP projects location specific hydrology is reassessed by employing statistical methods (if possible) or relevant modelling. (Task 4)
- C/3 The remaining hydro-potential for hydropower generation is assessed by country and river basin and the SB6 region as a whole. (Task 4)
- C/4 Transboundary issues in the WB region are identified and analysed, recommendations are provided including practical guidelines aiming at solving the existing problems based on best international practices. (Task 4)

D. Grid Connection Issues in Electric Network / Power System Development Context

- D/1 Detailed structural and functional description of the national grid access regulations with analysis of potential gaps, major malpractices and inconsistencies is provided together with proposals for improvements. (Task 5)
- D/2 Results of the analysis of the existing electrical networks capability to facilitate projects that are currently in the HPP development pipeline and proposals for improvements. (Task 5)

E. Greenfield HPP Projects

- E/1 Comprehensive Excel-based Database of Greenfield HPP projects (HPP-DB or “Inventory of Greenfield HPPs of more than 10 MW of capacity”) by country is established. The HPP-DB consists of identified projects by the Study (indicatively 150-250) including the key technical, economic, environmental and project maturity data established; the pertaining data and documentation in stored either in HMP-GIS system or Information and Document Management System (IDMS) developed under the Study. (Task 6)

E/2 The Remaining Hydro-Potential by WB6 country is assessed. (Task 6, see also C/3)

F. Environmental Analysis

F/1 Assessment of significant impacts and mitigation measures of priority hydropower development schemes per watershed (and country-wise), possible bottlenecks in realisation of schemes, reasoning regarding impacts that eliminate watersheds, river stretches and locations from further development attention, gap analysis and procedural requirements (estimation of time necessary for obtaining environmental consent) relevant issues with conclusions and directions for acting. (Task 7)

F/2 Environmental impact mitigation recommendations on planned hydropower scheme developments and their grid connections, with consideration of watershed characteristics including comments on existing guidelines and recommendations. (Task 7)

F/3 Cumulative effects (water balance, river sediments transport and migratory fish issues): overview of regulations in the WB6 and proposal for application in the Study for priority cases. (Task 7)

G. IT-Systems in Support of Hydropower Development Activities

G/1 Relevant HPP-related central GIS database is established and Hydropower Development Study GIS (HMP-GIS) application is developed, populated with data and operational. The HMP-GIS application includes maps / several layers that facilitate HPP projects planning and presentation. (Task 8-9)

G/2 The Information and Document Management System (IDMS) is established. By that coordinated collection of numerous data, which must be stored and adequately protected in a harmonised and well-organised manner is ensured. (Task 12)

H. Recommendation on Rehabilitation / Reconstruction and Greenfield HPP Project Development

H/1 Results of Multi-Criteria Assessment (MCA) of prospective HPP projects including grouping of candidate HPPS into three priority groups (highly recommended, recommended and less recommended/mature) - Portfolio of HPP Investments. (Task 10)

I. Implementation Support Measures

I/1 Regional Action Plan on Hydropower Development. (Task 11)

J. Training and Dissemination of Study Results (organised by TAIEX Programme)

J/1 Training workshops (3-4) associated with various above mentioned topics based on produced separate background reports by the Study. (Task 13)

J/2 Wrap-up (1-day) conference on Final report of the Study. (Task 13)

5. LOGISTICS AND TIMING

5.1 Location

The project will be managed from the regional office of WBIF-IPF3 (Belgrade, Serbia). The PTEs shall perform their duties mainly in their home-offices as well as through field missions to the WB6 countries.

5.2 Start date & period of implementation

The period for preparation of draft Final Report will be **8 months** (to end-May '17) from the start of the Study Phase in early October 2016, followed by 2-3 months (to end-Jul/Aug '17) for finalisation of the report after the received comments. The commenting period shall be limited to 6 weeks after submission of draft Final report.

6. REQUIREMENTS

6.1 Staff

Required Personnel Resources in the project shall consist of:

- A. **Project Team Experts (PTEs)** that act as Task Leaders. They report to the SPM - Team Leader)
- B. **Task experts** (Senior and Junior) who support the PTEs in the execution of specific tasks based on actual demand. In their day-to-day activities, they report to respective Task Leaders when working on specific tasks and ultimately to the Team Leader; and
- C. **National experts** (all Senior) whose job is to assist the project during the field missions of PTEs, collect data and reports, analyse collected materials per instructions provided by the PTEs, conduct their own survey in agreement with the PTEs, etc. In executing their job, they report to the Task Leaders.

Their detailed job positions, expected qualifications, experience and indicative number of man-days (MD) are listed in the following:

A) Key experts:

Position 1: **SPM - Team Leader**; 190 MD

- Required qualification: At least M.Sc. in electrical / mechanical engineering or economy;
- General experience: 15 years leading role (key expert) in multidisciplinary energy sector planning projects for clients like EU, international donors and/or IFIs, with an emphasis on renewable energy sources / hydropower, environment and/or climate change;
- Specific experience: Team Leader in at least 2 EU-supported projects subject of PRAG rules; projects in energy/electricity/RES-E strategies/policies and action plans (preparation and implementation) in CPs to the ECT including Western Balkans region for at least 10 years.

Position 2: **Grid Connection Expert**; 135 MD

- Required qualification: At least M.Sc. in electrical engineering;
- General experience: 10 years of overall work experience, of which at least 5 last years in energy/power system planning or power utility business operations;
- Specific experience: Leading role in at least 3 power transmission or distribution planning projects supported by international donors; proven knowledge and experience in grid connection issues both from technical as well as legal/regulatory and economic/financial point of view; excellent understanding of T/D electric networks in all targeted WB6 countries; excellent understanding of institutional-organisational framework in the WB6 countries.

Position 3: **Hydrology / Water Management Expert**; 185 MD

- Required qualification: At least M.Sc. in hydraulic or water-management engineering
- General experience: 15 years leading role in hydropower design and planning with emphasis on hydrology, water-management planning, and run-off modelling.
- Specific experience: regional water-management and hydrology related references, hydropower conceptualisation, references in climate change; familiarity with transboundary issues of the WB6 countries and international experience in resolving similar problems.

Position 4: **Hydropower Development Expert**; 150 MD

- Required qualification: At least M.Sc. in mechanical or electrical engineering;

- General experience: 10 years of overall work experience in the energy sector, including the experience in planning and development of power generation projects including hydro power plant projects;
- Specific experience: Leading role in at least 2 hydro power development projects; full familiarity with the planning process and procedures of development of technical documentation for (hydro) power plants; excellent understanding of legal-regulatory organisational framework in the WB6 countries.

Position 5: **Environmental Expert**; 170 MD

- Required qualification: At least M.Sc. in environmental science/engineering, ecology/biology, chemistry or similar;
- General experience: 10 years of overall work experience, of which at least 5 last years in water management projects, reservoirs and applied permitting procedures;
- Specific experience: Leading role in SEA/EIA/ESIA for projects in the hydropower sector; extensive experience in water related infrastructure planning and implementation; full understanding of adaptation and mitigation measures related to climate change; familiarity with EU and transposed legislation related to environment and climate change; excellent understanding of issues related to “protected areas” in the WB6 countries (Ramsar, Natura 2000, Emerald etc.); international experience and knowledge of best practices.

Position 6: **Subcontractor 1 (GIS)** (Note: professional GIS company to be sub-contracted)

Position 7: **Subcontractor 2 (MCA)** (Note: a well reputed / credible institution with high professional calibre and strong regional references in power system demand/supply planning/modelling, socio-economic and financial/economic analysis, and multi-criteria selection of investment projects in the energy sector to be sub-contracted)

PTEs (Positions 1-5) will have 830 MD in total in the project.

Long-term experience in providing consultancy services to the energy sector in the WB6 countries and ability to communicate in national languages spoken in the WB6 countries would be an extra advantage for all PTEs.

Apart from PTEs and the mentioned subcontractors, additional regional experts in support of Task Leaders (PTEs) as well as national support experts will be required as follows:

B) Task experts to support PTEs (310 MD in total):

- Legal and Regulatory Framework Expert (SE); 30 MD
- Legal Advice on Transboundary Issues (SE); 35 MD
- Run-Of-River (RoR) Modelling Engineer (SE); 45 MD
- Ichthyologist (SE); 30 MD
- GIS Input Data Manager (SE); 35 MD
- HPP Development Engineer (JE); 80 MD
- IDMS Administrator (JE); 60 MD
- Publishing Editor (SE); (services)

C) National support experts who will support the PTEs in their home countries only (565 MD in total):

- National I Grid Connection/Development Expert, 2 countries (Albania and Kosovo) (SE); 40 MD in total
- National HPP Development Expert, 6 countries (SE); 155 MD in total
- National Hydrologist and Water-Management Expert, 6 countries (SE); 155 MD in total
- National Environmental Expert – several professional profiles, 6 countries (SE); 210 MD in total

In summary, 1,705 MD are required in the Study Phase apart from the (2) subcontractor assignments.

6.2 Office accommodation

Due to the desk study character of the Study, the Consultant is not expected to provide or maintain any extra office accommodation for the PTEs in the WB6 countries. The project base will be, however, the WBIF-IPF3 office in Belgrade.

6.3 Facilities to be provided by the Contractor

The Contractor will ensure that experts are adequately supported and equipped. It shall ensure via the WBIF-IPF3 contract that there is full time administrative, secretarial and interpreting/translation provisions to enable experts to concentrate on their primary responsibilities.

The Contractor will provide all required supplies, services, documentation, logistical support, etc. for the implementation of the contract, and all these costs should be included in the fee rates of its experts, unless explicitly stated otherwise in the provisions for incidental expenditure.

6.4 Incidental expenditure

There is a provision included within the budget for incidental expenditure in the Study Phase. This amount shall be used for subcontracting of specialist services that will not be provided by PTEs, for example, establishment of the HMP-GIS system (Subcontractor 1), energy system modelling and MCA (Subcontractor 2), translation and editing/publishing of final reports.

7. REPORTS

7.1 Reporting requirements

A complete list of planned reports to be delivered in both Scoping as well as Study phase are listed in Table 7.1. The list includes both administrative and cross-cutting reports, and (ii) background reports (BR1-BR9) on specific subject areas. The table also provides the indicative contents of the reports, together with the envisaged time of submission (see also Time-schedule in Annex A) and the core responsible PTEs for the preparation thereof.

Table 7.1: Summary of administrative and background reports (Scoping and Study phases)

Name of report	Indicative content / comments	Time of submission (core responsibility)
Administrative and Cross-cutting Reports		
Inception Report	Content established on Consultant's self-initiative and agreed upon with WBIF-IPF3.	Submitted on 08 May 2016 (within 2 weeks after kick-off the Scoping Phase) (Core responsibility: Senior Project Manager - SPM)
Scoping Report	Content established on Consultant's self-initiative and agreed upon with WBIF-IPF3.	Draft submitted on 22 June 2016, final by October 2016 (Core responsibility: SPM supported by all PTEs and CMs))
(Draft) Final REGIONAL HYDRO MASTER-PLAN (Hydropower)	A compendium of 6 country-specific findings in one volume. As per template to be prepared by the Consultant within 2 months after kick-off the Study Phase and agreed upon with WBIF-IPF3	Draft no later than by the end of May 2017 . Final report by the end of July/August 2017 (assuming comments are

Name of report	Indicative content / comments	Time of submission (core responsibility)
Development Study in the Western Balkans)	(DG NEAR). This is the main report of the Study.	received by mid July 2017). (Core responsibility: Team Leader supported by all PTEs and Subcontractors)
Separate Background reports (BR)		
BR1 'On HPP Contribution and Role in Prospective Energy Balances (2020/2030 and outlook for 2050)'	On past generation and prospects for hydropower generation – long-term role in electricity balances under different supply/demand scenarios based on various assumptions (thermal generation development, supply shortfalls, market development, etc.)	(Core responsibility: Team Leader based on inputs of Subcontractor 2)
BR2 'On Gap Analysis of the Institutional-Organisational and Legal-Regulatory Frameworks Relevant for Hydropower Development'	On gaps and imperfections in the current I&O set up in the WB6 countries, possible establishment of “one-stop shop” offices, recommendations for improvements to increase efficiency of planning and operations in the hydropower sector, etc. and on gaps and imperfections in the current L&R set up in the WB6 countries, possible deficiencies in the transposition of the EU acquis as relevant for the hydropower sector, concessions and power purchase agreements, recommendations for improvements, etc.	(Core responsibility: Grid Connection Expert) and Legal Expert supported by Hydro Development Expert and Grid Connection Expert)
BR3 'On Baseline Data on Hydrology and Water Management Issues'	On state of the play, flow duration curves, cumulative effects of HPP chains, climate change adaptation and mitigation measures,	(Core responsibility: Hydrologist / Water Management Expert)
BR4 'On Transboundary Issues in the WB6 Region'	On analysis of transboundary water management issues that may be a result of legal-regulatory / institutional issues, and recommendations for solving the current barriers, etc.	(Core responsibility: Hydrologist / Water Management Expert)
BR5 'On Grid Connection Issues Related to Prospective HPP Projects'	On assessment of existing national rules and practices concerning grid access and grid connection of new large and small HPPs, inventory of gaps, omissions and inconsistencies related to implementation, including environmental factors, proposals for improvements and additional network reinforcement studies (at country and transmission/distribution level), etc.	(Core responsibility: Grid Connection Expert)
BR6: 'On Inventory of Prospective HPP Projects (HPP-DB), GIS Application and the Remaining Hydro-Potential in the WB6 Region'	Indicatively, it shall include results of the HPP-DB, and conjunction with the GIS application, classification of hydro potentials and assessment of the remaining (unexploited) hydropower potential by WB6-countries and river basins.	(Core responsibility: HPP Development Expert supported by GIS PTE)
BR7 'On Environmental Analysis'	Indicatively, it shall include impacts and mitigation measures of hydropower development schemes per watershed/country, bottlenecks in realisation of schemes with an emphasis on the impact that eliminate from further attention, gap analysis and procedural requirements (estimation	(Core responsibility: Environmental Expert supported by Hydrologist / Water Management Expert))

Name of report	Indicative content / comments	Time of submission (core responsibility)
	of time necessary for obtaining environmental consent) relevant issues with conclusions and recommendations including.	
BR8 'On Multi-Criteria Assessment of HPP Projects – Portfolio of HPP Investments'	Indicatively, it shall describe the applied methodology and results of the multi-criteria assessment (MCA) of HPP projects – Portfolio of HPP investments).	(Core responsibility: Subcontractor 2 supported by all other PTEs)
BR9 'On Regional Action Plan on the Hydropower Development'	Indicatively, a well-structured / concise document of not more than 20 pages (tabular form) on proposed actions and measures to foster implementation of the HPP investment projects in the WB6 region.	(Core responsibility: Team Leader based on inputs of all PTEs)

7.2 Submission & approval of reports

The purpose of separate (9) background reports is to document the results of the study on key issues. These reports shall be prepared by the Task Leaders and will follow a standard template. They will be quite technical and will provide all necessary details in annexes. They represent the background and insight into the selected elements that will become part of the Final Report. They will be presented and submitted to WBIF-IPF3 in accordance with the finally adopted operational time-plan in the project. They will remain as “living” documents by the end of the Study.

All administrative and cross-cutting reports in Table 10.1 should be submitted in hard and electronic copy to DG NEAR through WBIF-IPF3 management. The reports will be written in English, and all communication relating to the subproject will take place in the English language.

All reports in Table 10.1 shall be approved by following the standard procedure established under the WBIF-IPF3 contract. Any background report should be submitted in hard and electronic copy to DG NEAR on specific request to WBIF-IPF3.

No report or document shall be distributed to third parties without the prior approval of DG NEAR. The Contractor shall pay attention to the confidentiality of data. Reports, as well as press statements, etc., made by the Contractor will make clear that any opinions expressed therein remain those of the Contractor and do not represent the opinion of the Contracting Authority.

Copyright on all reports and other material prepared under this contract shall reside with the European Commission.

7.3 Time-schedule

The roadmap which reflects the envisaged steps in project implementation is shown as a time-table of Study implementation in Annex of this TOR.

Annex: Roadmap / Time-plan of Study Implementation

Annex: Roadmap / Time-Plan of Study Implementation

SN	Task of Work Programme	SCOPING PHASE						STUDY PHASE		
		M-3	M-2	M-1	M1	M2	M3	M4	M5	M6
		A'16	May'16	Jun'16	Jul'16	Aug'16	Sep'16	Oct'16	Nov'16	Dec'16
1	Start-up the Scoping Phase (25.4.2016)	◆								
2	Kick-off of the Scoping Phase - 1st Project Coordination Meeting in Zagreb (3.5.2016)	◆								
3	Preparation of Inception Report (submission to DG NEAR on 13.5.2016)	■	◆							
4	Preparation of Draft Scoping Report incl. Draft TOR (submission to DG NEAR on 15.6.2016)	■	■	◆						
5	Obtaining comments on Draft Scoping Report (incl. Draft TOR) by DG NEAR (from mid-June to end-Sep. 2016)			■	■	◆				
6	Preparation of Draft Final Scoping Report (incl. Draft Final TOR) (submission to DG NEAR on 20.9.2016)					■	◆			
7	DG NEAR event ("Regional Conference on the Regional Hydro Master-Plan for the Western Balkans", Belgrade, 27.9.2016)							◆		
8	Preparation of detailed operational Work Plan (WP) and Time-schedule (TS) (within 2 weeks after the DG NEAR conference)							■	◆	
9	Extended period for obtaining comments on Draft Scoping Report and Draft TOR by stakeholders (by end-Oct. 2016)							■	■	
10	Consultations on Draft TOR conducted by DG NEAR (mid July - end-Oct. 2016)				■	■	■	■	■	■
11	Development of WBEC-REG-ENE-01 webpage under the WBIF-IPF3 website									■
12	Publishing of Final TOR on Project webpage (03.02.2017)									■
13	Multi-step data collection campaign (initial, basic, detailed) in all areas (Jul.'16-Jan.'17)				■	■	■	■	■	■
14	Amendment / update of DB on existing HPPs, HPP-DB, HDS-GIS and establishment of IDMS				■	■	■	■	■	■
15	Country missions to collect data and discuss issues in all areas (Jul.'16-Feb.'17)				■	■	■	■	■	■
16	Execution of the Study Phase - approx. 8+(2-3)=10-11 months (based on endorsed Draft TOR of 27.9.2016 and final of 30.1.2017)							■	■	■
17	Activities of PTEs, Task experts and National support experts based on the WP&TP							■	■	■
18	Preparation and submission of (9) Background Reports (Feb. - end-Mar.'17) to internal QA									■
19	Internal QA on individual Background Reports and submission to TAEX Workshop participants (at least 2w in advance)									■
20	Deadlines for dissemination of Draft BRs to workshop participants (2 weeks in advance)									■
21	(2)TAEX training and result dissemination workshops, end-March - end-April 2017									■
22	Preparation of Draft Final report on the Master-Plan (6W) + submission to IPF3 (QA) by mid-May'17									■
23	Editing and QA by IPF3 (2W) + submission to DG NEAR by end-May'17									■
24	Draft FINAL REPORT on the Study (for submission to DG NEAR by end-May'17)									■
25	Comments on Draft FINAL REPORT (max. 6 weeks)									■
26	(6) WB-country visits with presentation and discussion on the draft Final Report (3 weeks, 10-28.4.2017)									■
27	Preparation of (3) strategy-type documents for the MC / Trieste Summit (outline by end-Feb., final by end-May'17)									■
28	MC / Trieste Summit (12 July 2017)									■
29	Completion of FINAL REPORT (for submission to DG NEAR by end-Jul.-Aug.'17)									■