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

Key Tasks and Preliminary Findings

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Project Synopsis

**Client:** European Commission, DG NEAR

**Contractor:** WBIF-IPF3 Consortium

**Expert team:** 30 experts (EU and WB6) and 2 subcontractors

**Duration:** Scoping Phase (May-June 2016) + **Study Phase** (Oct. 2016 – June/August 2017)

**Deliverables:** 9 technical Background Reports, Final Report, 1 conference, 2 workshops, results-dissemination tour, inputs to the next MC-WB6 meeting (Trieste, 12.7.2017)

**Objective:** Contribute to fostering the harnessing of environmentally and climate change sustainable hydropower generation in the WB6 region in line with strategic objectives of the European Union and the ECT obligations of its Contracting Parties.

**Purpose:** Development of a study determining a list of hydro power project (HPP) development priorities by (i) river basin, (ii) type of planned HPP facilities (storage, run-of-river, reversible), through which the remaining hydro-power potential in the region will be evaluated. Aiming at utilising the “entire” hydropower potential, the following priorities shall apply:

1. Repair, refurbishment, upgrade and rehabilitation of existing HPPs
2. Sustainable greenfield HPPs
Key Activities and Preliminary Findings (1 of 9)

1. **Status of 31.12.2016**: 442 HPPs in WB6 (82 HPPs or 19% in BiH), 55 HPPs of more than 10 MW represent 12% in terms of the number. These large HPPs represent 93% in the overall capacity of 8,585 MW (BiH: 2,081 MW or 25%) and generated 97.5% of electricity (24 TWh/a) on average (BiH: 23% or 5.6 TWh/a) in the last 15 years in WB6.

2. **Historic commissioning of HPPs (1955-2016)**: Average HPP-capacity addition achieved during 1955-1990 was 202 MW per annum while in the period 1990-2015 it dropped to mere 32 MW per annum.

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<tr>
<th>Period</th>
<th>MW</th>
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<td>Before 1955</td>
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<td>During 1955-1990</td>
<td>7,081</td>
<td>82.5</td>
<td>202.3</td>
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<td>During 1991-2016</td>
<td>825</td>
<td>9.6</td>
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<td>Total</td>
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Reasons can be attributed to:
- “Best” HPPs already implemented,
- Disintegration of former SFRJ followed by wars in the ’90s,
- End of central planning and coordinated water management, lack of cooperation between newly established states,
- Lack of financial capacity of power utilities / states for investment intensive projects,
- Growing investment risks in emerging market conditions, and
- Continued unresolved transboundary issues
Key Activities and Preliminary Findings (2 of 9)

3. Electricity demand development to 2050: in all WB6 countries, electricity consumption will grow during 2020-2050, in total for WB6, from 67.4 TWh in 2020 to 104.3 TWh in 2050. Average annual growth from 2020-2025 (1.69%) will however gradually decrease to 1.17% (2045-2050).

4. Gaps in institutional-organisations and legal – regulatory (IOLR) framework:

7 detailed IOLR flow diagrams for 6 WB6 countries (2 for FBIH and RS in BiH) developed, analysed and conclusions / recommendations drawn:

- WB6: IOLR framework reasonably developed and functional but insufficiently tested in practice

- WB6: Severe lack of formal cross-sectoral (energy, flooding, irrigation, fishery, tourism etc.) integrated coordination (except in Kosovo)

- BiH: Streamline the process and limit / shorten the duration of the permitting procedures.

- BiH: Ensure consistency over application of relevant regulations and permitting procedures across different government levels in each entity (particularly in FBIH).

- BiH: Improve standard contracts and legislation enabling project financing

- BiH: Simplify HPP development process by reconsidering some of the requirements arising out of the applicable legislation (FBIH: Electricity Law, Law on Expropriation).
### Key Activities and Preliminary Findings (3 of 9)

**Unique classification of hydrographic elements in WB6 – basis for GIS and river basin – based approach (WFD) applied in the Study**

**BiH example**

<table>
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<tr>
<th>DRAINAGE BASIN (DB)</th>
<th>WATERSHED (WS)</th>
<th>River Basin (RB)</th>
<th>(Sub) River Basin (SRB)</th>
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**Affiliation to WB6-countries**

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**WB6:**

- (4) drainage basins,
- (13) watersheds,
- (17) river basins,
- (10) (sub)river basins,
- (26) rivers,
- (77) tributaries 1, and
- (25) tributaries 2.
Key Activities and Preliminary Findings (4 of 9)

9 Specific Transboundary Cases identified, analysed and discussed in the Background Report (BR-4)

1. Drini i Bardhe/White Drin/Beli Drim River System - HPP Zhur (KOS-ALB)
2. Trebišnjica Hydropower Scheme – HPP Dubrovnik 2 (CRO-BIH-MNE)
3. Vardar River System - HPP Lukovo Pole (ALB-MKD-GRE)
4. HPP Buk Bijela (BIH-MNE-SER)
5. Drina River Basin - HPP Koštanica (MNE-BIH-SER)
6. Čehotina River Basin - HPP Chain on the Čehotina River (MNE-BIH)
7. Drina River System - HPPs along Middle Drina River (SER-BIH)
8. Drini River System - HPP Skavica (ALB-KMD)
9. Vjosa River Basin - HPP Chain on Vjosa River (GRE-ALB)
6. Platforms for assisting WB6 in resolving transboundary issues:

Transboundary issues in hydropower have two potential resolution platforms:

1) Legal act which provides regulation in a planning phase – i.e. EU Water Framework Directive (WFD); and

2) Legal platform for resolving transboundary issues within Energy Community action, administered by the Energy Community Secretariat.

European Commission should join forces with the Energy Community Secretariat and make a compelling offer to the WB6 countries and territories involved.

7. Changed focus in transboundary issues in WB6:

- Until present, transboundary issues predominately dealt with water quality aspects and to some extent biodiversity;
- The greatest omission noted is in sharing hydropower potential, so transboundary cases remained as they were or at best went to worse by sizing down of best reservoir locations (like Buk Bijela or Skavica) that could enable regulation of floods on Drina and Drini Rivers.
8. Transmission network: Transmission network capacities and facilities will never be a constraint for HPP projects. All new HPP projects connected to the transmission network:

- increase overall stability of the regional power system operations,
- improve power system control capacities, and
- increase opportunities for integration of other RES generation facilities, such as wind and solar PV generation.

9. Distribution network: Capacity of the distribution networks in the region is insufficient to facilitate growing demand for connection of small HPPs. Distribution networks require significant reinforcements in:

- Network facilities
- Control facilities,
- Human resources

Distribution Codes are getting improved, but still underdeveloped
10. HMP-DB developed supported by web-GIS application: on greenfield HPP projects over 10MW, on the following:

- general,
- technical,
- environmental & social,
- hydrology & water management,
- economic & financial,
- maturity

- Total 480 projects (total =100%) over 10 MW identified. 154 (32%) projects eliminated due to:
  i) insufficient data, ii) alternative projects.

- Total 326 projects (75% from total) selected for further analysis (“Screening”), of which in ALB (232), BIH (37) MNE (16), MKD (17), KOS (3) and SER (21). 118 (33%) projects passed.

- Total 118 projects (25% from total) passed MCA Level 1
11. Environment (conducted activities):

- Analysis of national SEA/EIA legal procedures / practices in WB6 countries,
- Description of protected areas,
- Baseline description of important features of chosen (25) river basins,
- GIS data collected for environmental analysis: protected areas, Corine land cover, settlements, river basins,
- Fish fauna inventory and residual flow legislation analysis, GIS layers with species distribution.

12. Ichtyology: List of threatened species was prepared (41 species) – key species for the Study.

By drainage basins:

- Black Sea (10 species),
- Adriatic Sea (29 species),
- Ionian Sea (2 species),
- Aegean Sea (6 species).

WB6 region is ichtyologically insufficiently investigated.
**Key Activities and Preliminary Findings (9 of 9)**

**Multi-Criteria Assessment (MCA) of greenfield HPP projects**

**Assessment Approach and Methodology (3-step, each next step more detailed and data intensive)**

**Step 1: Screening**
- 1 indicator: Maturity
- HPP candidates identified in Task 6

**Step 2: MCA Level 1**
- 4 key indicators: Mat, Env, Tech, Econ
- “Short listed” HPP candidates
- HPP candidates for further development

**Step 3: MCA Level 2**
- 50+ indicators: Tech, Env, Soc, Econ, Mat
- Outstanding HPP candidates
- Less recommended HPP candidates
- Highly recommended HPP candidates
- Recommended HPP candidates

**Outcome:** HPP candidates ranked into groups
WBIF-IPF 3 Consortium

Thank you for your attention!

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