E-FLOWS AS A MAJOR TOOL TO ACHIEVE THE OBJECTIVES OF THE EUROPEAN WATER FRAMEWORK DIRECTIVE

POSSIBILITIES FROM A HYDROPOWER PERSPECTIVE

Martin Honsberg, Statkraft
November 2013
Ankara
Statkraft and the Water Framework Directive (WFD)

- Statkraft’s plants are affected by the implementation of the WFD in:
  - Norway (through EEA agreement)
  - Sweden
  - Germany
  - Finland
  - UK
Statkraft and the Water Framework Directive (WFD)

- Statkraft’s Power Generation department has a special working group which is follows up implementation strategies of the WFD and assess it’s impact on our hydropower plants in the respective regions.
- Not directly represented in the CIS Working group on e-flows of the European Commission, but the possibility to give input via other representatives (Eurelectric, Fortum).
- Sponsor of research activities dealing with the WFD and related issues (e.g. CEDREN/GOVREP at Sintef/NTNU/NINA).
- Statkraft’s follows up legislative developments in other European countries we have activities in and wants to be prepared for future implementation if appreciable.*
- We want to share the experience from our EU regions to support implementation activities.

*A decision on making Albania a candidate is expected to be made at the European Council in December 2013.
The Water Framework Directive in Turkey

- Within the scope of Turkey’s negotiations with the EU on the environment chapter, ongoing since December 2009, Turkey is required to integrate the WFD into its water-related policies, regulations and laws due to its candidate status.

- New Water Law: Draft work has been completed and opened for discussion, the new water law, which was reviewed before being presented to Parliament, will further reinforce the implementation of the EU Water Framework Directive.

- Within the scope of harmonization, the EU and the General Directorate of Water Management have been carrying out projects for many years, e.g. MATRA project, “Implementation of the Water Framework Directive,” was prepared and launched in Turkey in 2001.
“Good progress was reported in the area of water quality, with the adoption of the new water law and legislation on river basin management and groundwater and drinking water. Preparations are continuing to convert river basin protection action plans into river basin management plans. The institutional framework for water management is still not organized at river basin level and, following the separation of the water sector from the Ministry of Environment and Urbanisation, institutional coordination has become problematic.”
In the area of water quality, legislation was adopted on river basin management and surface water management. The contracting procedures for technical assistance to convert the river basin protection action plans into river basin management plans are ongoing. The Ministry of Forestry and Water Affairs defined the roles and responsibilities of Basin Management Commissions. Following the transfer of the water sector from the Ministry of Environment and Urbanisation to the MoFWA, institutional coordination has become problematic due to the lack of a clear division of responsibilities. Wastewater treatment capacity has increased due to recent investments.”
The Water Framework Directive and Environmental Flows

- The WFD requires surface water classification through the assessment of ecological status or ecological potential, and surface water chemical status.

- Annex V defines the quality elements that must be used for the assessment of ecological status/potential. The lists of quality elements are subdivided into 3 groups:
  - biological elements,
  - hydromorphological elements supporting the biological elements
  - chemical and physical-chemical elements supporting the biological elements.

- The hydrological regime is part of the hydromorphological quality elements.
The Water Framework Directive and Environmental Flows (2)

- All categories of water bodies include the hydrological regime as a relevant variable that affects the ecological status (target: good ecological status)

- The values of the hydromorphological quality elements just have to be necessarily used when assigning water bodies to the High Ecological Status class (High / Good / Moderate / Poor / Bad)

  - For the good status/potential classes, the hydromorphological elements are required to have “conditions consistent with the achievement of the values specified for the biological quality elements”.
The Water Framework Directive and Environmental Flows (3)

- The WFD doesn’t specify a flow regime required to achieve Good Status, but requires that the flow regime should provide conditions ‘consistent with the achievement of the values specified for the Biological Quality Elements’.
  → Definition of e-flows for the GES in accordance with the WFD

- GES is unlikely to be reached in a water body with significantly altered flows, as this will result in changes to the river ecosystem through modification of physical habitat and alterations in erosion and sediment supply rates

  → The hydrological regime must include the most relevant components of the hydrological regime to active the ecosystem dynamic, must be based on the natural hydrological regime of the water body and must reflect a large proportion of such natural regime.
The Water Framework Directive and Environmental Flows (4)

- Heavily Modified Water Bodies and Artificial Water Bodies (target: good ecological potential and good chemical status):
  “Member States may designate a body of surface water as artificial or heavily modified, when the changes to the hydromorphological characteristics of that body which would be necessary for achieving good ecological status would have significant adverse effects on activities for the purposes of which water is stored, such as drinking-water supply, power generation or irrigation.” (Article 4, 3(a)(iii))

- The concept of HMWB was created to allow for the continuation of these specified uses which provide valuable social and economic benefits but at the same time allow mitigation measures to achieve an appropriate ecological objective.

- A heavily modified water body means a body of surface water which as a result of physical alterations by human activity is substantially changed in character.
The Water Framework Directive and Environmental Flows (5)

- Substantially changed: both morphology and hydrology are subject to substantial changes, especially when morphological changes are likely to be long-term.
- A different approach could be taken for limited stretches like downstream of dams: Under these circumstances, substantial hydrological changes that are accompanied by subsequent non-substantial morphological changes would be sufficient to consider the water body for a provisional identification as HMWB.
The Water Framework Directive and Environmental Flows (6)

---

- **Relevant environmental objective: GES**
  - **Art. 4(1)** or less stringent [Art. 4(5)]

- **Step 4**: Description of significant changes in hydromorphology. [Annex II No. 1(4)]
  - **No**
    - **Step 5**: Is it likely that water body will fail good ecological status due to changes in hydromorphology? [Annex II No. 1(5)]
      - **Yes**
        - **Step 6**: Is the water body substantially changed in character due to physical alterations by human activity? [Art. 2(9)]
          - **Yes**
            - Identify provisionally as HMWB [Art. 5(1) and Annex II No. 1(1)(i)]
          - **No**
            - **Step 7**: “Designation test 4(3)(a)”: Identify restoration measures necessary to achieve GES. Do these measures have significant adverse effects on the wider environment or the “specified uses”? [Art. 4(3)(a)]
              - **Yes**
                - **Step 8**: “Designation test 4(3)(b)”: Can the beneficial objectives served by the modifications of the HMWB be achieved by other means, which are a significantly better environmental option, technically feasible and not disproportionately costly? [Article 4(3)(b)]
              - **No**
                - **Step 9**: Designate as HMWB [Art. 4(3)]
            - **Designate as AWB [Art. 4(3)]**

- **Step 10**: Establishment of Maximum Ecological Potential. Comparison with closest comparable surface water body [Annex V No. 1(2)(5)], considering all mitigation measures which do not have a significant adverse effect on specified uses or the wider environment.
Proper hydrological regimes (thus environmental flows) are always necessary, but primarily to achieve the values specified for biological quality elements.

The values of the relevant biological quality elements reflect, as far as possible, those associated with the closest comparable surface water body type (MEP, “slight changes” for GEP).

The designation of water bodies as heavily modified is likely in many cases, but still requires mitigations.

E-flows are the first restoration measure to consider when there is a significant change in the hydrological regime (CIS).

As defined previously e-flows are specifically designed to achieve GES.
What Environmental Flows can not achieve

- Issues which are of great importance in the WFD but cannot only be addressed by a well assessed and implemented e-flow:
  - Water quality (general conditions, specific synthetic pollutants, specific non-synthetic pollutants)
  - Morphological pressure
  - Biological elements (phytoplankton, benthos, invertebrates, fish)
  - River continuity
Environmental Flows – Not always the solution

Example from South Germany: Weir of Krün
Environmental Flows – Not always the solution (2)

- First barrage in the Isar river
- Diverts water via the Isar transition to the natural Walchensee lake, which functions as the upper basin for the Walchensee Hydropower plant (E.ON)
- Retained large amount of gravel and had no release of environmental flow until 1990
- Imposed environmental flow release (between 3 and 4.8 m³/s, depending on season) led to unwanted excessive spread of willows downstream
- Without sediment management (gravel), the natural environment didn’t only profit from the implemented mitigation
THANK YOU

For more information please contact:
Martin.honsberg@statkraft.com