SUSTAINABLE HYDROPOWER DEVELOPMENT IN AUSTRIA

Veronika Koller-Kreimel
Ministry of Agriculture, Forestry, Environment and Water Management - Division National and International Water Management
HYDROPOWER IN AUSTRIA

• 40 TWh/a …. 2/3 of total electricity production

• ¾ of hp potential already exploited

• additional 3.5 TWh till 2020 (NREAP)
  → many new projects expected
• Legal specification of obligatory mitigation measures

• Optimisation of existing plants to minimise impacts by new projects
  – Boosting hidden potentials and improve ecology at the same time by advisory services

• Planning tools to minimise deterioration in case of new projects (…supporting Art. 4.7. application)
  – National criteria catalogue for balancing interest in case of expected deterioration
  – Strategic planning on regional level
LEGAL SPECIFICATION OF
OBLIGATORY MITIGATION MEASURES -

Ecological standards

- **River continuity at every obstacle** (natural fish areas)
- **Ecological flow** (water abstraction)

---

National Ordinance on Ecological Quality Standards

- **base flow:**
  must be available all the time to ensure typespecific habitats and connectivity (velocity, depth)

- **dynamic rate**
  reflecting the natural dynamics over year to ensure specific functions
  ... mostly 20% of natural daily discharge
OPTIMISATION OF EXISTING PLANTS TO MINIMISE IMPACTS BY NEW PROJECTS

ADVISORY SERVICES

… to boost hidden HP potential and ecological restoration at the same time

Win-win-solutions!

Free technical and economic advise for small hydro owners

- to increase production efficiency (i.e. technical upgrading/refurbishment, site optimisation, …)
- and to improve ecology

Upper Austria:

338 consultations – 243 plants technically and ecologically upgraded

4,8 million Euro funds ….. 37,2 million Euro investments

investments 7,7 higher than funds (funding lever 7,7)

… Average increase of electricity generation + 30%
Planning tools to minimise deterioration in case of new projects
(support for Art. 4.7 application)

- National criteria catalogue
- Strategic planning on regional level
Austrian Catalogue for Water Protection and Use -
Criteria Catalogue for new hydropower projects
2012

http://www.bmlfuw.gv.at/wasser/wasser-oesterreich/wasserrecht_national/planung/Kriterienkatalog.html

Elaborated by the Ministry for Water Management
- in co-operation with the 9 regional governments
- involvement of the stakeholders (Ministry for Economic Affairs, energy sector, NGOs)
CRITERIA CATALOGUE - HYDROPOWER
MAIN GOALS

- assist water authorities in **weighing diverse public interests**
- to ensure an Austrian wide **common understanding** and application of **Art. 4 (7) test**
- to assist **transparency** – simple, comprehensible, reproducible
- **supporting tool** - not forestalling the final decision of the authorization body

- **basis for further strategic planning** for hp development on regional level (assisting assessment better enviromental option)

- will **help hydropower planners to evaluate** at a very early stage the **chances** of a new project to get an approval
1st RBMP:
Clear principle when weighing public interests:

The higher the ecological value of a river stretch
the higher the energy output has to be
| Energy management: | 4 main criteria |
|-------------------|-----------------
| 3 levels of importance: | security of supply |
| - high | quality of supply |
| - medium | contribution to climate protection |
| - low | technical efficiency |

<table>
<thead>
<tr>
<th>Ecology:</th>
<th>4 main criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 levels of importance:</td>
<td>naturalness</td>
</tr>
<tr>
<td>- high</td>
<td>rarity</td>
</tr>
<tr>
<td>- medium</td>
<td>specific ecological function for the catchment area</td>
</tr>
<tr>
<td>- low</td>
<td>extent of negative effect of the project</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other water management aspects</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5 levels of effects:</td>
<td></td>
</tr>
<tr>
<td>++ very positive</td>
<td></td>
</tr>
<tr>
<td>+ positive</td>
<td></td>
</tr>
<tr>
<td>0 indifferent</td>
<td></td>
</tr>
<tr>
<td>- negative</td>
<td></td>
</tr>
<tr>
<td>-- very negative</td>
<td></td>
</tr>
</tbody>
</table>

- flood control
- sediment management
- groundwater quantity/quality/drinking water supply,
- surface water quality
- recreation/tourism/fisheries …
- effects on WBs already restored
Criteria Catalogue for new hydropower projects

Energy Management: Criteria/Indicators

For example:

### Security of supply:
- **Amount of electr.production** *(GWh/a)*
  - Low: < 5
  - Medium: 5-50
  - High: > 50

### Technical efficiency:
- **Distance to grid connection** *(GWh/km)*
  - Low: < 1.67
  - Medium: 1.67 – 2.50
  - High: > 2.50

- **Exploitation rate of electr.potential**
  - Unefficient; blocking optimal efficiency or no storage despite reasonability
  - Additonal hp plants possible, but no optimal exploitation
  - Optimal local exploitation

- **Degree of expansion** *(number of days when the existing flow is exceeding the expansion flow)*
  - Low: > 100
  - Medium: 100-60
  - High: < 60

*allocation:*
- 10%
- 60%
- 30%
Criteria Catalogue for new hydropower projects

Ecology: Criteria/ Indicators

For example:

<table>
<thead>
<tr>
<th>Naturalness</th>
<th>Low</th>
<th>medium</th>
<th>high</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status of ecological integrity – ecol.status</td>
<td>high</td>
<td>good</td>
<td>less than good</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rarity</th>
<th>&gt;1.000 km</th>
<th>750-1.000 km</th>
<th>&lt; 750 km with near natural morphology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type (Total length of type)</td>
<td>50% high</td>
<td>20-50% high</td>
<td>&lt; 20% high status or &lt; 33% in good / better</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific ecological function for the catchment area</th>
<th>MJNQt &gt; 100 l</th>
<th>50-100 l</th>
<th>&lt; 50 l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essential habitat for sensitive fish species</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functionality as ecosystem</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Extent of negative effects of the project</th>
<th>Only one water body (~3/8 km)</th>
<th>some WBs</th>
<th>exceeding direct affected water bodies in the long run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of negative longitudinal effects</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STATEGIC PLANNING
ON REGIONAL LEVEL

- to ensure achievement of environmental and renewable energy goals in time
- tool to assist assessment of better environmental option in Art. 4-7 test
- to facilitate administration
- supporting cost-effective planning - „planning reliability“
Identification of river stretches of high ecological importance“

Criteria mainly based on National Criteria Catalogue (ecology, other water management aspects)

Evaluation of hydropower potential in Styria (2012)

- Unexploited hydropower potential (technically feasible): 1.300 GWh
- Styrian Renewables Objective for Hydropower: + 764 GWh till 2020
- Already realised in the meantime: 480 GWh (June 2013)
Ordinance on the Protection of Rivers (June 2015)

**Category A: Protection**
(high status stretches)
No impoundment, no barrier, only very slight flow alterations

**Category B: Priority for ecology**
(hymo slight altered, ecologically important)
No impoundments, no barriers, Only slight flow alterations

**Category C: Weighting sites**
(high electricity potential)
Hydropower use possible but no Art. 4.7 exemption allowed!
Sustainable Hydropower Development

Strategic Planning in Upper Austria

Assessment of the ecologically sound hydropower potential in medium/large sized rivers

80% of hp potential already exploited
30 rivers assessed: 1.240 river-km

- **Hydroelectric potential**
  (incl. upgrade of existing sites)
  
  + **Economic analysis**
    (time frame 2030, CO$_2$ reduction, ...)

- **Ecological sensitivity**
  - Less sensitive
  - Sensitiv
  - High sensitive
  - Not assessed (hp chains)

Criteria based on National Criteria Catalogue, Nature 2000/conservation status

- **Ecological Utilization Coefficient** *(48% of rivers assessed are already exploited!)*

Complex decision tree
Sustainable hydropower development and ecological restoration measures (Upper Austria) Franz Überwimmer

JASPERS - Workshop 26/27 Jan. 2015

**favourable** for new hydropower development:
- new plants usually ecologically sound
- "ecological utilization coefficient" has to be considered

**less-favourable** for new hydropower development:
- new plants ecologically sound only under particular requirements and restrictions;
- "ecological utilization coefficient“ has to be considered

**non-favourable** for new hydropower development:
- new plants not ecologically sound
- no potential for hydropower development

Reservoirs, not classified *

* upgrading / efficiency enhancement of existing plants advisable in any case
Exploitation potential + 488 GWh
- 374 by upgrading
- 114 new development
Thank you for your attention!

veronika.koller-kreimel@bmlfuw.gv.at
ECOLOGICAL STATUS 2015 - Pressures responsible for failing GES/GEP

- Migration barriers: **33,000** (1/km) ca. 10% due to hydropower
- Impoundments: **4%**
- Missing Eflow: **10%**
- Signif. morpholog.-alterations: **30%**
- Hydropeaking: **1.6%**
For info or further questions on this presentation, please contact:

Massimo Marra
JASPERS Networking and Competence Center
Senior Officer
ph: +352 4379 85007
m.marra@eib.org

www.jaspersnetwork.org
jaspersnetwork@eib.org