The Future of Swiss Hydropower: Regulatory and Policy Challenges

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Introduction

Political, legal and social aspects are important!
WP3: regional impact and sustainability assessment
WP4: the effects of different water fee reform options

Outline:
1. The regional and sustainability context
2. Water fee reform options (financial aspects and feedbacks)
   a) The corporate perspective
   b) The cantonal perspective
   c) The local perspectives
3. Sustainability assessment and the role of stakeholders
4. Conclusion and discussion
The role of hydropower (HP) and water fees for regional development
Insights from a literature review and interviews in Grisons

For municipalities (in Grisons) …

… HP provides
- revenues from water fees, levies (& taxes)
- free and preferential energy
- other services provided by HP companies
- an export good
- an essential input for tourism
- employment

… water fees and other HP related are used
- to maintain local infrastructure (roads, trails)
- in community-owned enterprises (sawmills …)
- to improve the attractiveness of the municipality through low tax rates or other bonuses (health care insurance)
- to subsidize touristic facilities (spas, ski lifts)
- to realize investment projects

In many places
- HP was a key to economic development
- HP has played a role in creating a local identity
- HP is an integral part of the history of many peripheral regions (“areas with low potential”)
Water fees from 3 different, but complementary perspectives

- Water fees and resource rents
- Corporate social responsibility (CSR) = the commitment of firms to sustainable development
- The total value of hydropower

**Contributions of HP to sustainable development and CSR**

<table>
<thead>
<tr>
<th>Change of reputation capital</th>
<th>Resource rent (net revenue)</th>
<th>(Reg.) economy, incl. wages</th>
<th>Social capital</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Profits</td>
<td>Taxes</td>
<td>Water fees</td>
<td></td>
</tr>
<tr>
<td>Internal value</td>
<td>Retained, Distributed</td>
<td></td>
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<td></td>
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</tbody>
</table>

**External value**

**Total value of hydropower**

*(net present value)*
Water fee reform

Political situation
- Water fees fixed at 110 CHF/KW until 2024
- Maybe a new regime starting in 2025: Flexible water fees – depending on revenue options for HP

Who are the winners?
Who are the losers?
The situation in 2015 and beyond…

### Scenario

**Fuel and carbon prices**

- **Base**: as in 2015
- **C--F++**: Linear decrease
- **C++F++**: Linear increase
- **EU**: EU Reference Scenario

### Graph

- **2015 to 2030**
- **Cost/Revenues [CHF/MWh]**
- **X-axis**: Years
- **Y-axis**: Cost/Revenues [CHF/MWh]
Market dominates water fees...
Market dominates water fees…

…but water fees can make a difference
Situation “Base in 2025” (comparable to 2018)

Flexible water fee
- Water fee ~8CHF/MWh lower

Comparable to “Marktprämie”:
- Max. 10 CHF/MWh
- Avg. 7.4 CHF/MWh
Larger variability between companies than between water fee regimes
Net profits of individual firms
Net profits of individual firms

Introduction

Water fees and corporate revenues / profitability

Water fee-induced financial flows and feedback effects

Conclusion

* million CHF

WF0  WF1  WF2  WF3  WFC
Large impact on payments for cantons and municipalities
Water fee payments

The cantons’ perspective:
- Up to 80% more revenues in “good times”
- Up to 60% less revenues in “bad times”

So far…
- Risk shift from…
  …hydropower producers (companies) to
  …resource owners (cantons)
- But also from…
  …lowland cantons (company owners) to
  …mountain regions (resource owners)

Next…
What is the impact of alternative reference market price definitions?
Differentiated reference market price reduces distributional impacts between mountain and lowland regions
Differentiated water fee – compared to uniform

Storage/Pump-storage pay more
- Higher income for mountain regions

Run-of-river pay less
- Lower income for lowland regions

Policy implications
- Winners? Companies (or lowland regions)
- Losers? Cantons (specifically mountain regions)
- Differentiated water fees can (partially) compensate the adverse impacts for mountain regions

⇒ More detailed analysis needed!
Distribution of water fee revenues per canton, 2016 [million CHF]

Estimation based on:
- WASTA data (BFE, 2017)
- Cost factor estimations
  - a) 0.0145 CHF/kWh (BFE, 2018)
  - b) 0.0124 CHF/kWh (Betz et al., 2019)

Next step:
- Attribution of water fee payments according to shareholdings
Attributed water fee payments per shareholder (GR)

Financial flows corresponding to % of shares of the following utilites and/or public entities:

a = EKZ
b = Canton ZH
b1 = Canton ZH through EKZ
b2 = Canton ZH through Axpo

Axpo b1.1 = Canton ZH through EKZ through Repower
b2.1 = Canton ZH through Axpo through Repower

c = Canton GR
c1 = Canton GR through Repower
d = City ZH
e = Municipalities GR
Attributed water fee payments per shareholder (GR)

Attribution of water fee payments to GR:
19.0% Canton ZH
15.5% City of Zurich
10.4% Canton GR
9.7% Canton AG
6.9% Municipalities GR
Rest: others

Financial flows corresponding to % of shares of the following utilities and/or public entities:

a = EKZ
b = Canton ZH
b1 = Canton ZH through EKZ
b2 = Canton ZH through Axpo
b1.1 = Canton ZH through EKZ through Repower
b2.1 = Canton ZH through Axpo through Repower
c = Canton GR
c1 = Canton GR through Repower
d = City ZH
e = Municipalities GR

Direction of financial flows of water fees in CHF

% of shareholding
120'000

12.6%
Attributed water fee payments per shareholder, total 2016 [million CHF]
Importance of water fee revenues for cantonal finance, 2016

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<tbody>
<tr>
<td>UR</td>
<td>91.4</td>
<td>391.5</td>
<td>24.3</td>
<td>26.6%</td>
<td>6.2%</td>
<td>reported*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16.9</td>
<td>18.4%</td>
<td>4.3%</td>
<td>estimated**</td>
</tr>
<tr>
<td>GR</td>
<td>751.8</td>
<td>2'393.7</td>
<td>113.0</td>
<td>15.0%</td>
<td>4.7%</td>
<td>reported*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>95.7</td>
<td>12.7%</td>
<td>4.0%</td>
<td>estimated**</td>
</tr>
<tr>
<td>VS</td>
<td>1'260.1</td>
<td>3'810.6</td>
<td>102.7</td>
<td>8.2%</td>
<td>2.9%</td>
<td>reported*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>109.8</td>
<td>8.7%</td>
<td>2.7%</td>
<td>estimated**</td>
</tr>
<tr>
<td>GL</td>
<td>108.0</td>
<td>373.2</td>
<td>6.1</td>
<td>5.6%</td>
<td>1.6%</td>
<td>reported*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9.8</td>
<td>5.6%</td>
<td>2.6%</td>
<td>estimated**</td>
</tr>
</tbody>
</table>

*) Source: Annual reports for the fiscal year 2016

**) Source: Own calculations based on WASTA data and cost factors estimated by Betz et al. (2019)

Note: Only cantonal revenues, excluding municipalities within cantons.
Importance of water fees for municipal finance in GR, 2018

Water fees in GR are …
• equally shared between the canton and conceding municipalities
• partly important for municipal finance
• one source of disparities
• included in fiscal equalization
Fiscal equalization in GR: Resource potentials 2018

Resource potential:
Revenues from taxes + water fees (2 & 3 years ahead)

Resource equalization:
- Resource-strong municipalities pay into the equalization fund
- Resource-weak municipalities receive from the fund
- The canton balances the fund
  ➢ mitigate disparities

What are the impacts of different water fee options on municipal finance and resource equalization in GR?
Impact of different water fee levels on municipal finance and resource equalization

<table>
<thead>
<tr>
<th>Typology</th>
<th>Effects of changes in water fee level on resource equalization (RE)</th>
<th>Number of municipalities (fiscal year 2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>with water fees</td>
</tr>
<tr>
<td><strong>Type A</strong></td>
<td>Resource-strong municipalities that pay more into RE in case of lower water fees, and less in case of higher water fees</td>
<td>11</td>
</tr>
<tr>
<td><strong>Type B</strong></td>
<td>... pay less into RE in case of lower water fees, and more in case of higher water fees</td>
<td>19</td>
</tr>
<tr>
<td><strong>Type C</strong></td>
<td>Resource-weak municipalities that receive more from RE in case of lower water fees, and less in case of higher water fees</td>
<td>25</td>
</tr>
<tr>
<td><strong>Type D</strong></td>
<td>... receive less from RE in case of lower water fees, and more in case of higher water fees</td>
<td>30</td>
</tr>
<tr>
<td>not classified</td>
<td>(excluded from RE)</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>All municipalities are directly or indirectly affected from changes in water fee levels: lower water fees =&gt; lower revenues, higher water fees =&gt; higher revenues.</td>
<td>86</td>
</tr>
</tbody>
</table>

Some resource-weak municipalities might become resource-strong.
Impact of different water fee levels on resource equalization, 2018
Integrated sustainability assessment and stakeholder dialogue

Key learnings from our case studies in GR & TI:

✓ The involvement of stakeholders can help to «optimize» a project in an early phase

✓ Integrated sustainability assessment provides a useful tool
  o To identify gaps of information/knowledge
  o To identify critical impacts on criteria and indicator level
  o To improve transparency and foster communication
  o To evaluate trade-offs in a stakeholder-based approach

✓ It can provide useful information to support a stakeholder process and decision making

Results of sustainability assessment Lagobianco
(sub-domain level, with equal weights)

<table>
<thead>
<tr>
<th>TOTAL</th>
<th>Net Present Value</th>
</tr>
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<tbody>
<tr>
<td>-20.0</td>
<td>0.0</td>
</tr>
<tr>
<td>20.0</td>
<td>40.0</td>
</tr>
<tr>
<td>60.0</td>
<td>80.0</td>
</tr>
</tbody>
</table>

- Water
- Soil
- Habitats and biodiversity
- Human living space
- Atmosphere
- Raw material consumption
- Energy consumption
- Income
- Investments
- Regional economy
- Public sector
- Community
Water fee reforms must therefore be designed carefully and account for the various effects they can have:

- Markets dominate water fees.
- Uniform water fee favours (pump-)storage power plants.
- Differentiated water fee favours run-of-river power plants.
- HP and water fees are important for public finance and regional development in many mountain areas.
- Water fees are an issue of distribution (equity), but might affect resource allocation (efficiency).
- Water fees are a part of the resource rent.

HP projects and water fee reforms must be evaluated from a comprehensive perspective:

- The total value of hydropower encompasses the resource rents, additional effects on society at large, and feedbacks on reputation capital.
- Accountability, responsiveness and transparency must be improved in the HP industry, as they are musts for CSR and governance (corporate and public).
- An integrated sustainability assessment with stakeholder involvement (evaluation of trade-offs) is highly recommended / a “must”.
- A stakeholder dialogue can improve mutual trust, and help to find solutions.
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Thank you for your attention.