

Centre for Economic Policy Research





Energy Turnaround National Research Programme



### The Future of Swiss Hydropower: Regulatory and Policy Challenges

Regina Betz, Mirjam Kosch, Christoph Schuler, ZHAW Winterthur Werner Hediger, Marc Herter, HTW Chur Moritz Schillinger, Hannes Weigt, University of Basel

**Final Workshop** Bern, March 29, 2019

#### 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



Conclusion

#### The role of hydropower (HP) and water fees for regional development Insights from a literature review and interviews in Grisons

For municipalities (in Grisons) ...

 $\ldots$  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")

The assessment of the regional economic importance of HP and water fees must be carried out against this background.

| Introduction | Water fees and corporate revenues / | Water fee-induced financial flows and | Conclusion |
|--------------|-------------------------------------|---------------------------------------|------------|
| Introduction | profitability                       | feedback effects                      | Conclusion |

#### 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

Sustainability assessment

| Ce   | ontributions                | of HP to susta | inable develo | opment and CS                 | SR                              |
|--|-----------------------------|----------------|---------------|-------------------------------|---------------------------------|
|  | Resource rent (net revenue) |                |               | $\rightarrow$ (Reg.) economy, |                                 |
| Change of reputation capital                     | Pro                         | Profits        |               | Water fees                    | incl. wages<br>→ Social capital |
|  | Retained                    | Distributed    | Талеб         | Water 1000                    | $\rightarrow$ Environment       |
| Internal value                                   |                             |                |               | External v                    | alue                            |
| Total value of hydropower<br>(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



Flexible Water Fees

| Introduction | Water fees and corporate revenues / | Water fee-induced financial flows and | Conclusion |
|--------------|-------------------------------------|---------------------------------------|------------|
|              | profitability                       | feedback effects                      | Conclusion |

#### The situation in 2015 and beyond...



## Market dominates water fees...

## Market dominates water fees...

## ...but water fees can make a difference

| Introduction | Water fees and corporate revenues / | Water fee-induced financial flows and | Capaluaian |
|--------------|-------------------------------------|---------------------------------------|------------|
|              | profitability                       | feedback effects                      | Conclusion |

#### Net profits of hydropower



## 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

| Introduction | Water fees and corporate revenues / | Water fee-induced financial flows and | Conclusion |
|--------------|-------------------------------------|---------------------------------------|------------|
|              | profitability                       | feedback effects                      | Conclusion |

#### Net profits of individual firms



| Introduction | Water fees and corporate revenues / | Water fee-induced financial flows and | Conclusion |
|--------------|-------------------------------------|---------------------------------------|------------|
| Introduction | profitability                       | feedback effects                      | Conclusion |

#### Net profits of individual firms



11

# 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

| Introduction Water fees and o profitability | orporate revenues / Water fee-induced finar<br>feedback effects | ncial flows and Conclusion |
|---|---|----------------------------|
|---|---|----------------------------|

#### **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!

| Introduction | Water fees and corporate revenues / | Water fee-induced financial flows and | Conclusion |
|--------------|-------------------------------------|---------------------------------------|------------|
| Introduction | profitability                       | feedback effects                      | Conclusion |

#### Distribution of water fee revenues per canton, 2016 [million CHF]



#### Attributed water fee payments per shareholder (GR)

**Financial flows** corresponding to % of shares of the following utiliteis and/or public entities: <sup>a</sup>=EKZ <sup>b</sup>=Canton ZH <sup>b1</sup>=Canton ZH through EKZ <sup>b2</sup>=Canton ZH through Axpo <sup>b1.1</sup>=Canton ZH through **EKZ through Repower** <sup>b2.1</sup>=Canton ZH through Axpo through Repower <sup>c</sup>=Canton GR <sup>c1</sup>=Canton GR through Repower <sup>d</sup>=City ZH <sup>e</sup>=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



#### Attributed water fee payments per shareholder, total 2016 [million CHF]



| Introduction | Water fees and corporate revenues / | Water fee-induced financial flows and | Conclusion |
|--------------|-------------------------------------|---------------------------------------|------------|
|              | profitability                       | feedback effects                      | Conclusion |

#### Importance of water fee revenues for cantonal finance, 2016

| Canton | Tax revenue   | Total revenue |               | Water fee revenue  |                      |             |  |
|--------|---------------|---------------|---------------|--------------------|----------------------|-------------|--|
|        | [million CHF] | [million CHF] | [million CHF] | [% of tax revenue] | [% of total revenue] |             |  |
| UR     | 91.4          | 391.5         | 24.3          | 26.6%              | 6.2%                 | reported*   |  |
|        |               |               | 16.9          | 18.4%              | 4.3%                 | estimated** |  |
| GR     | 751,8         | 2'393.7       | 113.0         | 15.0%              | 4.7%                 | reported*   |  |
|        |               |               | 95.7          | 12.7%              | 4.0%                 | estimated** |  |
| VS     | 1'260.1       | 3'810.6       | 102.7         | 8.2%               | 2.9%                 | reported*   |  |
|        |               |               | 109.8         | 8.7%               | 2.7%                 | estimated** |  |
| GL     | 108.0         | 373.2         | 6.1           | 5.6%               | 1.6%                 | reported*   |  |
|        |               |               | 9.8           | 5.6%               | 2.6%                 | estimated** |  |

\*) 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.



Water fees and corporate revenues / Water fee-induced financial flows and Introduction Conclusion feedback effects profitability **Fiscal Relative Resource Strength of** Municipalities in Grisons 2018 equalization Landquar Resource-strong municipality [WF = 110] Resource-weak municipality [WF = 110] in GR: Resource Municipality w/ special arrangements Klosters potentials 2018 Water Fee Revenues /// Municipalities without Water Fee Revenues Scuol Davos Municipalities as of Arosa ----Ilant **Resource potential:** 01.01.2018 (n = 108) **Revenues** from Zernez Disentis/Mustér taxes + water fees (2 & 3 years ahead) **Resource equalization:** St. Moritz Resource-strong municipalities pay into Canton of Grisons the equalization fund Major settlement Hydropower plants Resource-weak Maximum output capacity [in MW] Poschiavo municipalities receive 300 100 from the fund 50 25 The canton balances Run-of-river plant What are the impacts of different water fee options on the fund Storage plant Pumped-storage plant municipal finance and resource equalization in GR? mitigate disparities 10 20 40 km Date: 28.03.19 | Data: SFOE (WASTA), AfG GR, swisstopo (VECTOR200) | Only hydropower plants with a maximum power output higher than 300 KW Created with QGIS 3.6.0 | Author: Marc Herter (HTW Chur) are shown. Icons designate the location of the powerhouse.

| Introduction | Water fees and corporate revenues / | Water fee-induced financial flows and | Conducion  |
|--------------|-------------------------------------|---------------------------------------|------------|
| Introduction | profitability                       | feedback effects                      | Conclusion |

#### Impact of different water fee levels on municipal finance and resource equalization

|                |  | r of municipa             | nicipalities          |                        |
|----------------|--|---------------------------|-----------------------|------------------------|
| Туроlоду       | Effects of changes in water fee level  | (fiscal year 2018)        |                       |                        |
|                | on resource equalization (RE)  | with<br>water fees        | without<br>water fees | TOTAL                  |
|                | Resource-strong municipalities that  | 11                        | 8                     | 19                     |
| iype A         | pay more into RE in case of lower water fees,  |                           | 0                     | 10                     |
|                | and less in case of higher water fees  |                           |                       |                        |
| Туре В         | pay less into RE in case of lower water fees,  | 19                        | -                     | 19                     |
|                | and more in case of higher water fees  |                           |                       |                        |
| Туре С         | Resource-weak municipalities that  | 25                        | -                     | 25                     |
|                | receive more from RE in case of lower water fees, and  |                           |                       |                        |
|                | less in case of higher water fees  |                           |                       |                        |
| Type D         | receive less from RE in case of lower water fees,  | 30                        | 13                    | 43                     |
|                | and more in case of higher water fees  |                           |                       |                        |
| not classified | (excluded from RE)   | 1                         | 1                     | 2                      |
| TOTAL          | All municipalities are directly or indirectly affected from  | 86                        | 22                    | 108                    |
|                | changes in water fee levels: lower water fees => lower revenues, higher water fees => higher revenues. | Some resou<br>might becom | rce-weak mur          | nicipalities<br>trong. |



#### 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
  - $\circ~$  To identify gaps of information/knowledge
  - To identify critical impacts on criteria and indicator level
  - To improve transparency and foster communication
  - To evaluate trade-offs in a stakeholderbased 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)



| Introduction | Water fees and corporate revenues / profitability | Water fee-induced financial flows and<br>feedback effects | Conclusion |
|--------------|---|---|------------|
|--------------|---|---|------------|

#### Conclusion

- 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 effect resource allocation (efficiency).
  - $\checkmark\,$  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 tradeoffs) is highly recommended / a "must".
  - ✓ A stakeholder dialogue can improve mutual trust, and help to find solutions.







Energy Turnaround National Research Programme

Contact:

## Werner Hediger, Zentrum für wirtschaftspolitische Forschung ZWF, HTW Chur werner.hediger@htwchur.ch

**Mirjam Kosch**, Zentrum für Energie und Umwelt, ZHAW Winterthur <u>mirjam.kosch@zhaw.ch</u>

### Thank you for your attention.