



Evaluating Economic Policy Instruments for Sustainable Water Management in Europe

Subsidies for ecologically friendly hydropower plants through favourable electricity remuneration in Germany

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Berlin, 27 January 2011



The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) / grant agreement n° 265213 – project EPI-WATER "Evaluating Economic Policy Instrument for Sustainable Water Management in Europe".

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Anderer et al. 2011,
in print



1. Presentation of the EPI



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1. Presentation of the EPI

Background

- Promoting renewable energy sources in Germany (incl. hydropower)
- Main instrument: German Renewable Energy Sources Act (EEG 2000)
 - Guaranteed tariffs paid for electricity produced with renewable energy sources
- **But:** Hydromorphological deficits are a major cause for failing to reach the good ecological status of river water bodies in Germany (Water Framework Directive)
 - How to reconcile the two conflicting objectives?



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1. Presentation of the EPI

EPI design

- EEG amendment in 2004: Increased tariffs for hydropower plants linked to ecological conditions
- Voluntary
- Remuneration guaranteed for 20/30 years
- Tariff level depending on plant size
- Further amendments in 2009 and 2012

Objective

→ Improving the ecological status of water bodies next to hydropower plants by improving the hydromorphological situation



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1. Presentation of the EPI

New EEG requirements

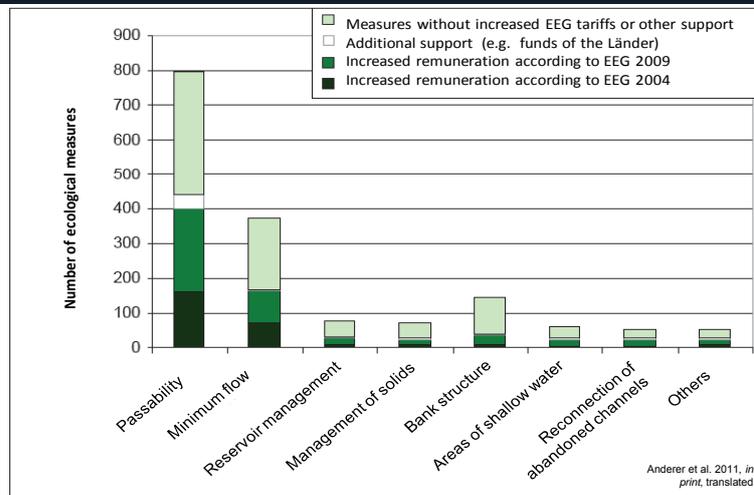
Substantial improvement of ecological status, referring to the following criteria (EEG 2009):

- storage capacity and management,
- biological passability,
- minimum water flow,
- solids management,
- bank structure,
- or shallow water zones have to be established or abandoned channels or branches have to be connected.



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2.1 Environmental outcomes



Estimated that 10 % of the existing hydropower plants have an equipment which assists upstream migration of fishes and / or provide minimum flow conditions

→ Corresponds basically to the most needed improvements



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2.2 Economic assessment criteria

- No specific selection process – EPI choice largely facilitated by the already existing EEG
- EPI designed to internalise external effects – higher tariffs apportioned to electricity consumers

Incentive effect

- Increase from 7.67 ct/kWh (EEG 2000) to 9.67 ct/kWh (EEG 2004)

→ 2 cents to finance environmental measures



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2.2 Economic assessment criteria

Incentive effect

- EEG remuneration sufficient for bigger plants (> 150 kW), but often not for small hydropower plants

Installed capacity	Specific measure costs ct/kWh	Average increase in remuneration ct/kWh
100 kW	3.94 - 5.73	4.00
500 kW	2.06 - 2.57	4.00
1 MW	1.59 - 2.23	3.75 - 4.00
2 MW	1.15 - 1.58	2.83 - 3.02
5 MW	0.83 - 1.13	2.32 - 2.39

Dumont and Keuneke 2011, translated

Comparison of specific costs for the modernisation of hydropower plants versus the average increase in the remuneration (EEG 2000 vs. EEG 2009)



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2.3 Distributional effects and social equity

- EEG surplus only a minor part of the electricity bill → no disproportionately high burden for consumers
 - No significant distributional or social effects (education, employment, health etc.) for the hydropower sector
- Voluntary character of the EPI



Naumann & Igel, 2005



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2.4 Institutions

- Well established hydropower sector (7500 plants)
 - Very long concession periods (up to 100 years or unlimited)
 - Renewal of concessions: Hydropower plants must comply with the new German water law (WHG 2009) – application of measures to reach good ecological status
- EPI: comply with requirements earlier in time!
- Legal security: no further control once the ecological measures approved

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2.5 Policy implementability

- Flexibility foreseen at two levels:
 - a) Evaluation leeway of the water authority: consideration of local conditions for judging status improvement and cost-benefit-ratio of the measures
 - b) Regular report of experiences of the EEG - basis for amendments
- Elaboration of an operational guideline with several stakeholder groups to support implementation



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2.6 Transaction costs

- Introduced as an amendment of an existing law (the EEG) (tariff system already existing) → low transaction costs
- Approval of the measures on site through the water agency (or environmental verifiers) – partly part of the mandatory approval procedure for hydropower plants
- No monitoring and enforcement costs (as no follow-up once the measures have been accepted)
- Transaction costs mainly exist through accompanying research activities



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2.7 Uncertainty

- A major issue!
- Persisting uncertainty concerning
 - the type of measures applied,
 - their environmental effectiveness,
 - the incentive effect of the EPI, and
 - the evaluation of the measures by water authorities or environmental verifiers



→ More investigations necessary



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3. Conclusions



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3. Conclusions

A successful instrument

- Targeting a major reason for not reaching good status, while promoting the use of renewable energy sources
- Well adapted to existing institutions, low transaction costs
- Widely accepted by the hydropower sector
- Correct steering effect – most important measure types implemented



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3. Conclusions

Room for improvement

- Controls and monitoring needed to ensure actual improvement of ecological status
 - Ecological measures applied where economically feasible and not where ecologically most effective
- In particular with a view to small hydropower plants, situated often on less modified rivers

What about transferability?

- Facilitated in countries with comparable remuneration systems – in all other cases probably high transaction costs



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Thanks!

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