



**MINISTERIUM
FÜR EIN
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ÖSTERREICH**

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SUSTAINABLE HYDROPOWER DEVELOPMENT IN AUSTRIA

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HYDROPOWER IN AUSTRIA

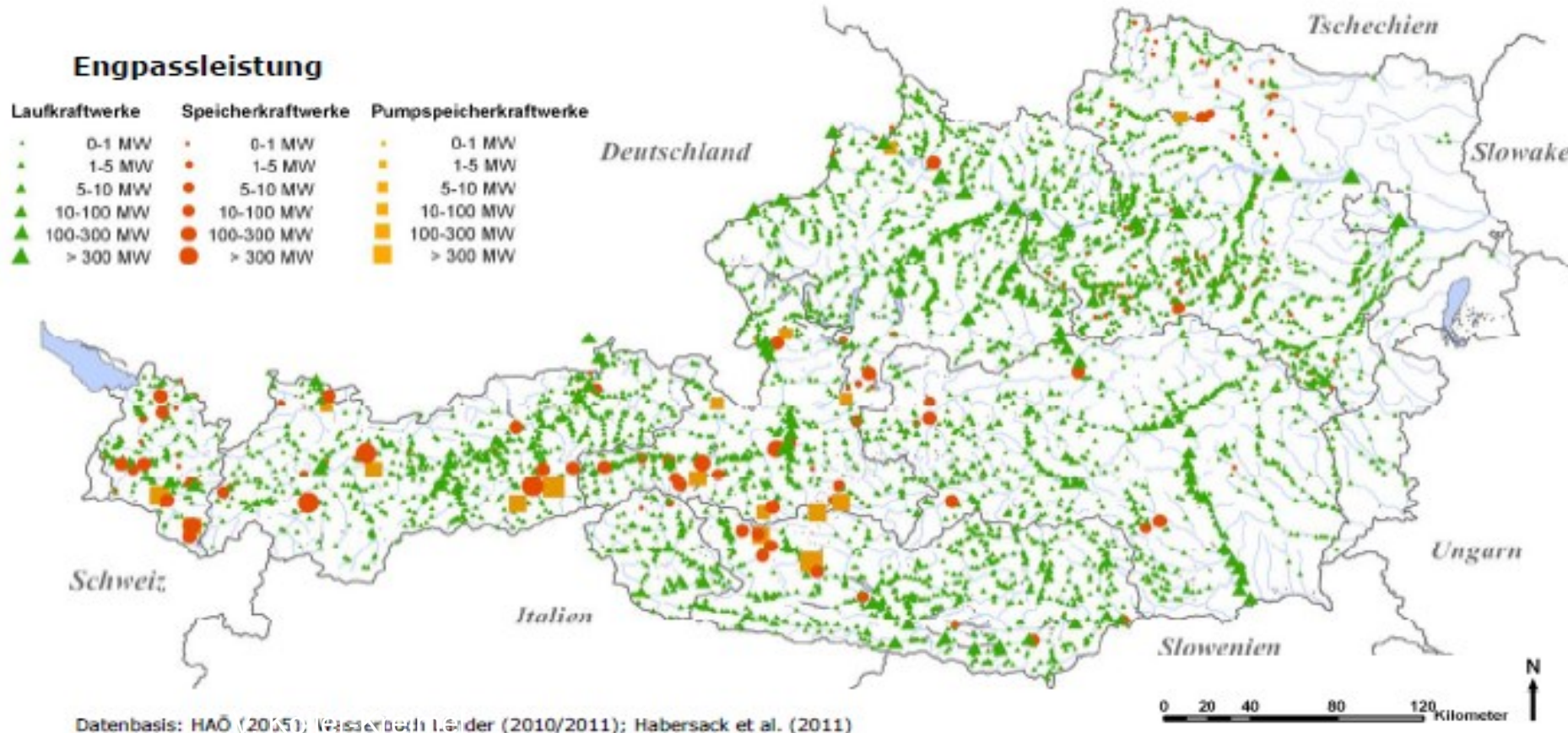
- 40 TWh/a 2/3 of total electricity production
- ¾ of hp potential already exploited
- **additional 3.5 TWh till 2020 (NREAP)**
→ many new projects expected

5 200 hp Plants

> 10 MW: 156

1-10 MW: 225

< 1 MW: 4 800



1ST RBMP: HYDROPOWER DEVELOPMENT – **AUSTRIAN STRATEGY**



- 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

Ecological standards

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

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



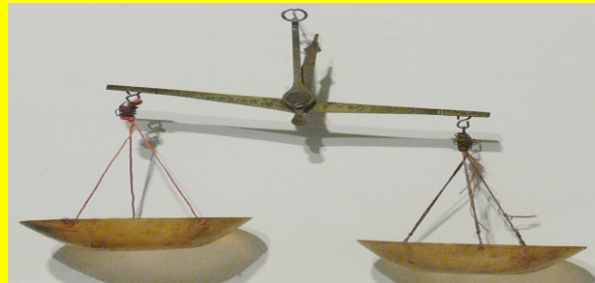
- assist water authorities in **weighing diverse public interests**
 - to ensure an Austrian wide **common understanding** and application of **Art. 4 (7) test**
 - to assist **transparency** – simple, comprehensible, reproducible
 - **supporting tool** - not forestalling the final decision of the authorization body
-
- **basis for further strategic planning** for hp development on regional level (assisting assessment better environmental option)
-
- will **help hydropower planners to evaluate** at a very early stage the **chances** of a new project to get an approval

NATIONAL CRITERIA CATALOGUE

FOR NEW HYDROPOWER PROJECTS

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**

Public Interests - Criteria

Energy management:

3 levels of importance:

- high
- medium
- low

4 main criteria

- security of supply
- quality of supply
- contribution to climate protection
- technical efficiency

Ecology:

3 levels of importance:

- high
- medium
- low

4 main criteria

- naturalness
- rarity
- specific ecological function for the catchment area
- extent of negative effect of the project

Other water management aspects

5 levels of effects:

- ++ very positive
- + positive
- 0 indifferent
- negative
- very negative

- flood control
- sediment management
- groundwater quantity /quality/ drinking water supply,
- surface water quality
- recreation/tourism/fisheries ...
- effects on WBs already restored

Energy Management: Criteria/ Indicators

For example:

Security of supply:

- Amount of electr.production (GWh/a)

low

medium

high

< 5

5-50

> 50

low

medium

high

Technical efficiency:

allocation

- Distance to grid connection (GWh/km)

< 1,67

1,67 – 2,50

> 2,50

10%

- Exploitation rate of electr.potential

Unefficient; blocking optimal efficiency or no storage despite reasonability

Additional hp plants possible, but no optimal exploitation

Optimal local exploitation

60%

- Degree of expansion

(number of days when the existing flow is exceeding the expansion flow)

> 100

100-60

< 60

30%

Ecology: Criteria/ Indicators

For example:

	Low	medium	high
Naturalness <ul style="list-style-type: none"> Status of ecological integrity – ecol.status 	high	good	less than good
Rarity <ul style="list-style-type: none"> Type (Total length of type) Share of river km left in good or high status 	>1.000 km ➤ 50% high	750-1.000 km 20-50% high	< 750 km with near natural morphology < 20% high status or < 33% in good / better
Specific ecological function for the catchment area <ul style="list-style-type: none"> Essential habitat for sensitive fish species Functionality as ecosystem 	-	-	Migration corridor for medium distance migrators, spawning areas < 50 l
Extent of negative effects of the project <ul style="list-style-type: none"> Length of negative longitudinal effects 	Only one water body (~3/8 km)	some WBs	exceeding direct affected water bodies in the long run

STRATEGIC 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“

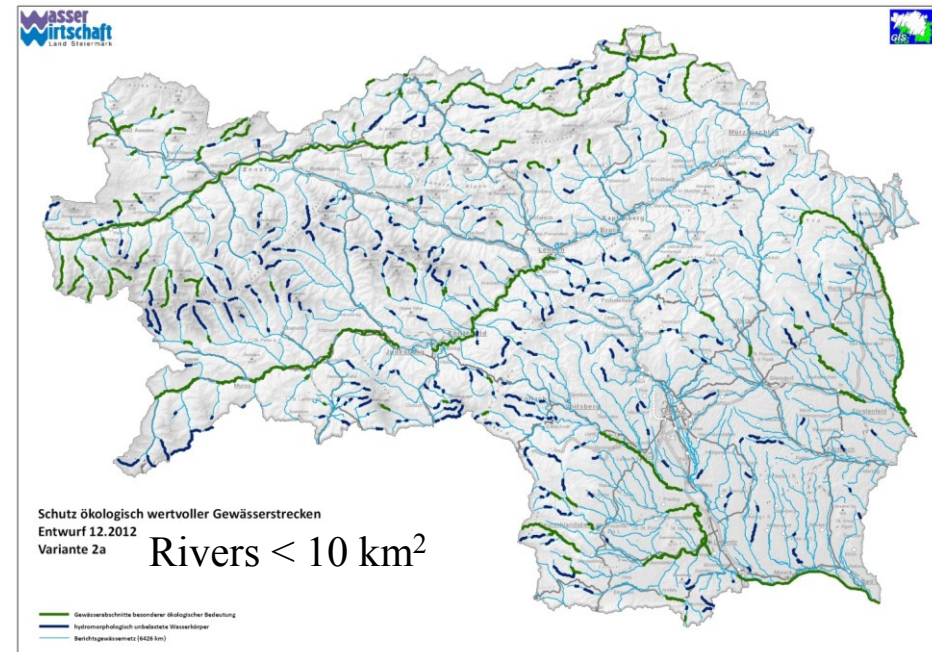


Strategic planning - Province of Styria



Identification of river stretches of high ecological importance“

Criteria mainly based on
National Criteria Catalogue
(ecology, other water managment 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

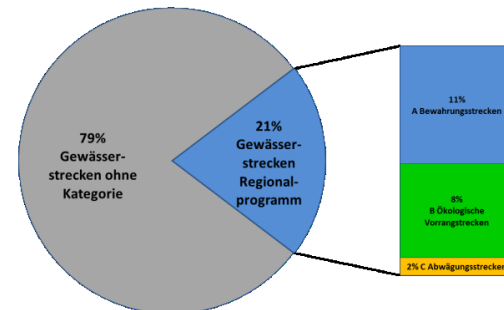
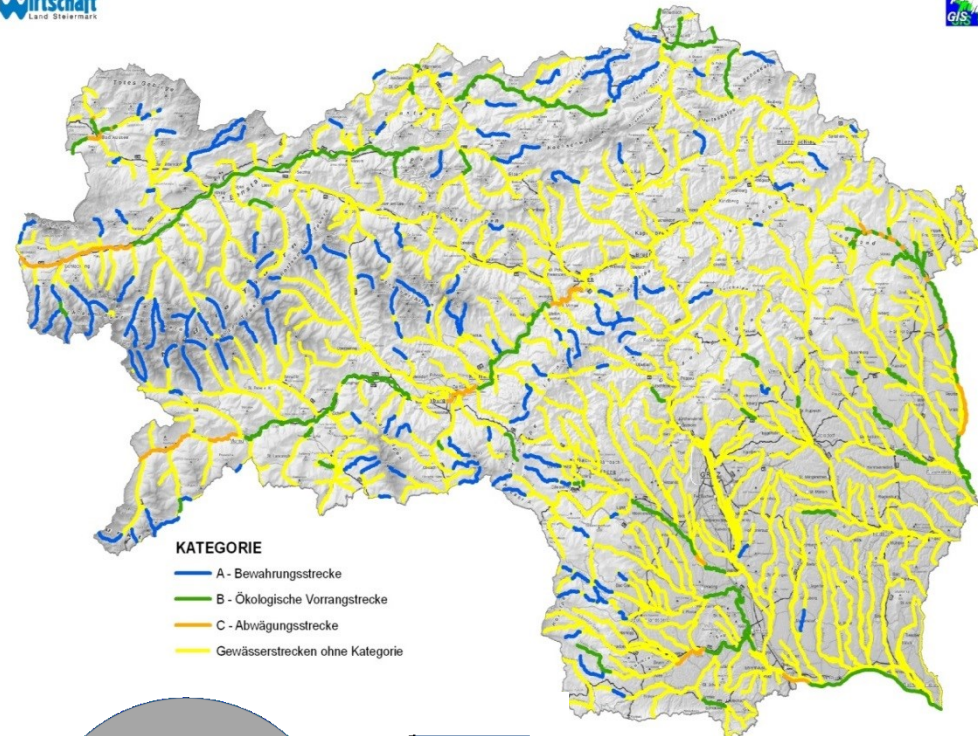
Category C: Weighting sites

(high electricity potential)

Hydropower use possible
but no Art. 4.7 exemption allowed!

Wasser
Wirtschaft
Land Steiermark

gis





Sustainable Hydropower Development

Strategic Planning in Upper Austria

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

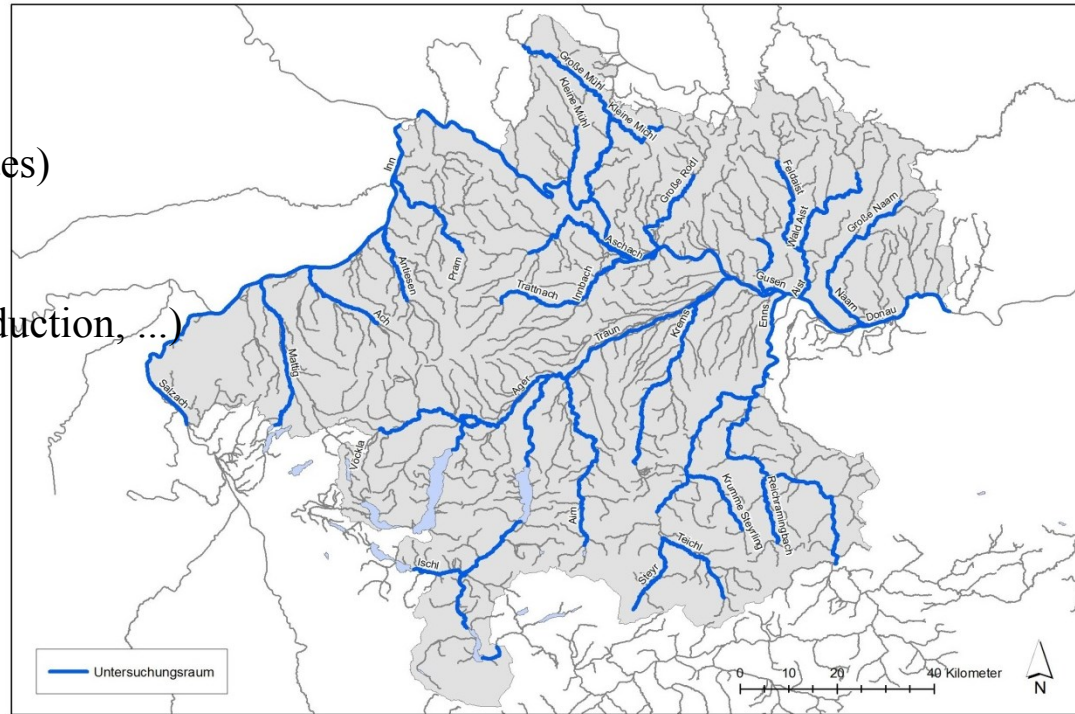
80% of hp potential already exploited





30 rivers assessed: 1.240 river-km

- **Hydroelectric potential**
(incl. upgrade of existing sites)
- + **Economic analysis**
(time frame 2030, CO₂ 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



Classification scheme



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 *

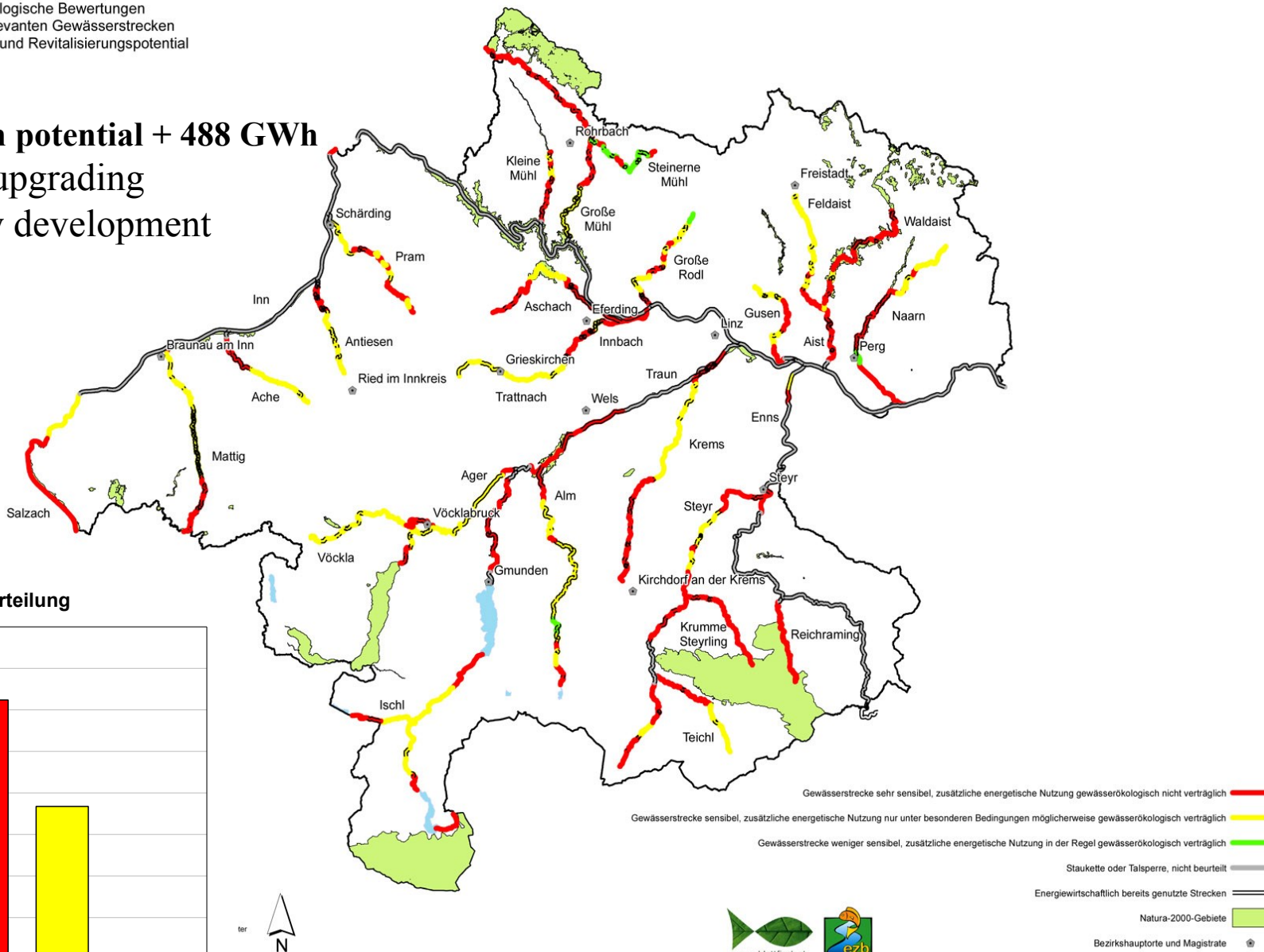


* upgrading / efficiency enhancement of existing plants advisable in any case

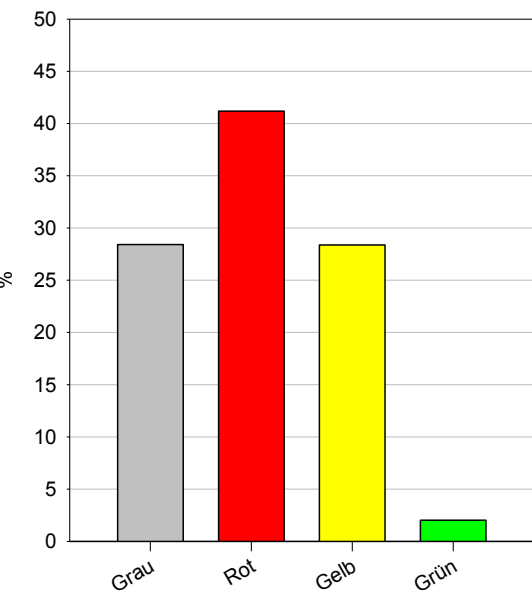
Gewässerökologische Bewertungen
der projektrelevanten Gewässerstrecken
zum Ausbau- und Revitalisierungspotential

Exploitation potential + 488 GWh

- 374 by upgrading
- 114 new development



Verteilung

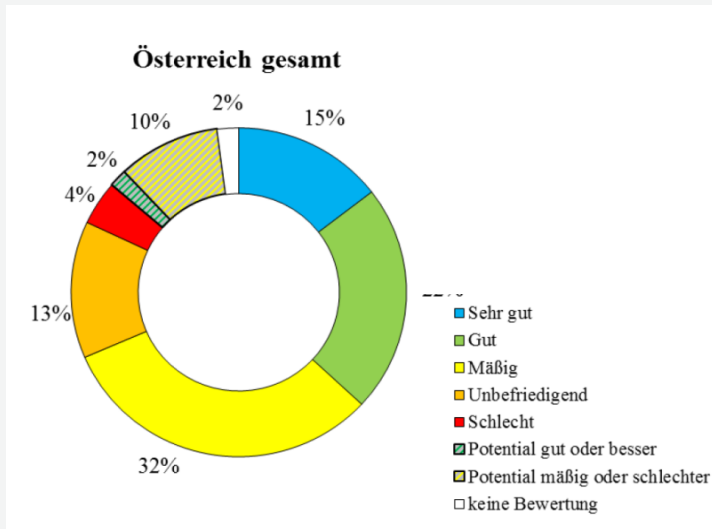


**Thank you
for
your attention!**

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ECOLOGICAL STATUS 2015 - Pressures responsible for failing GES/GEP



Missing Eflow: 10%



Impoundments 4%



Migration barriers: 33.000 (1/km)
ca. 10% due to hydropower



Hydropeaking: 1,6%



Signif. morpholog.-alterations: 30%



For info or further questions on this presentation, please contact:

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