

Guiding Principles on Sustainable Hydropower Development in the Danube River Basin

*Lead Countries : Austria, Romania, Slovenia in the frame of the
International Commission for the Danube River Protection*

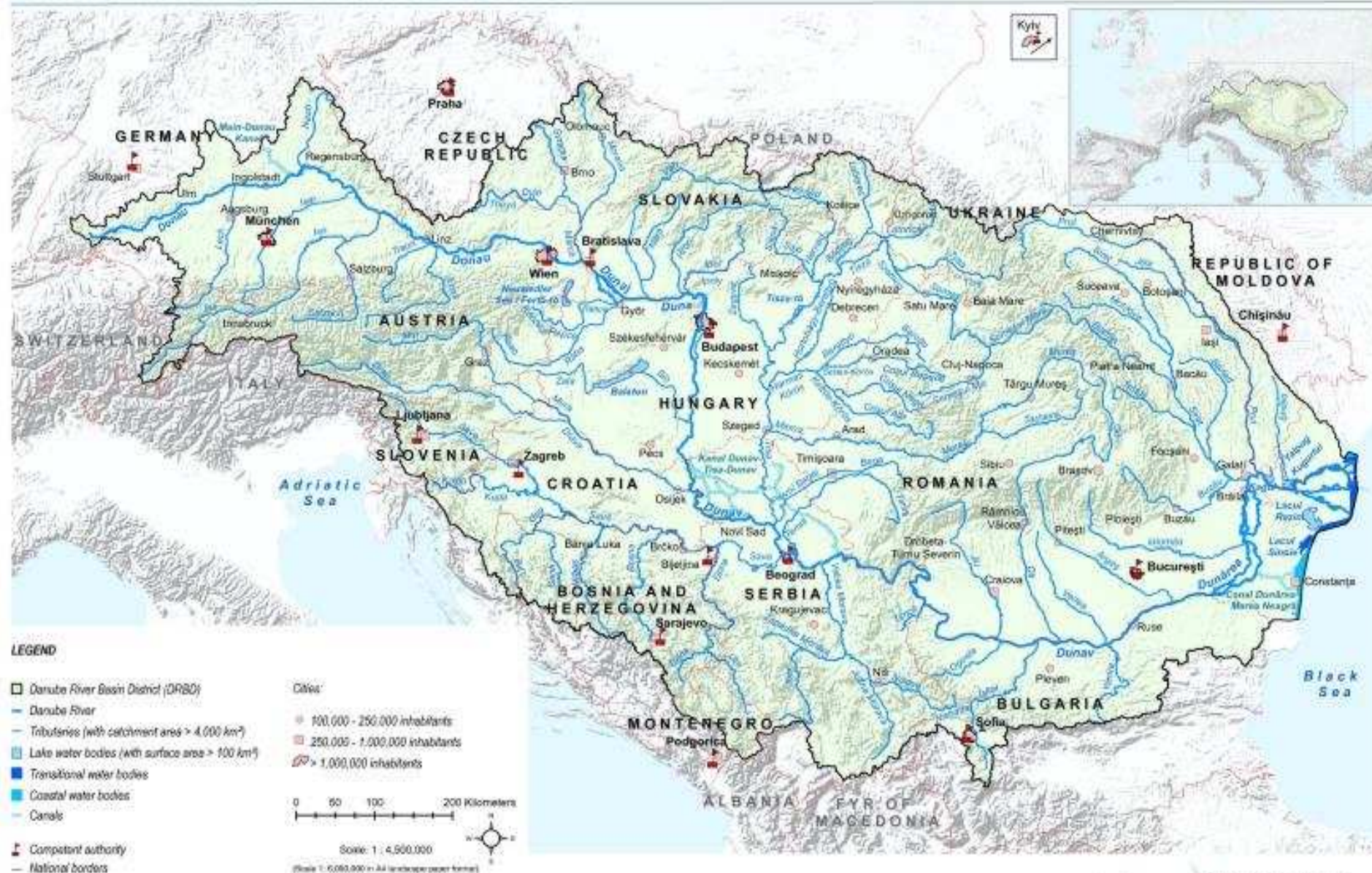
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Danube River Basin District: Overview

MAP 1



This ICPRD project is based on national information provided by the Contracting Parties to the ICPRD (AT, BA, BG, CZ, DE, FR, HU, MD, RO, RS, SI, SK, UK) and DRC project for the following: EuroGeographics v2.1 from EuroGeographics was used for national borders of AT, CZ, DE, FR, HU, MD, RO, SI, SK and UK. ESRD data was used for national borders of AL, ME, MK. British Radar Topography Mission (BRTM) from USGS Seamless Data Distribution System was used as topographic layer data from the European Commission Joint Research Centre was used for the river border of the DRBD of AL, IT, ME and PL.

Vienna, December 2009

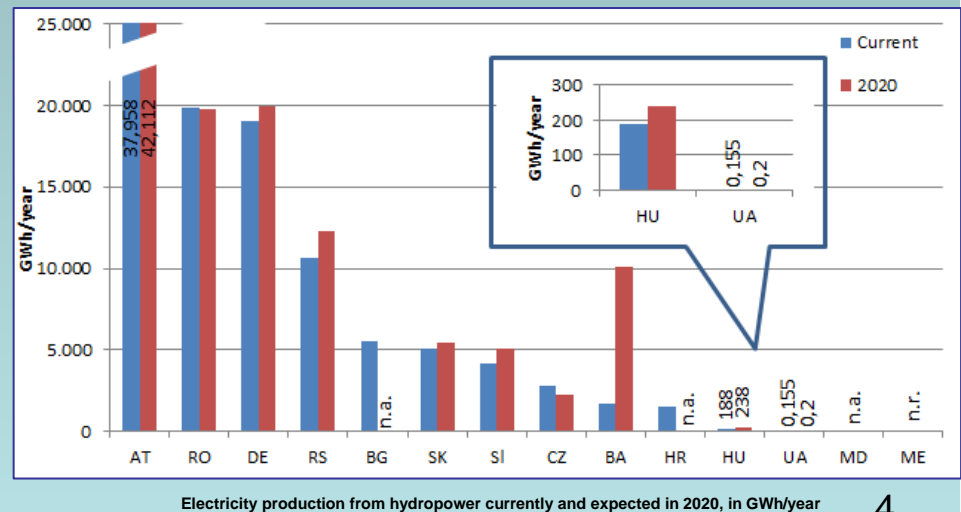
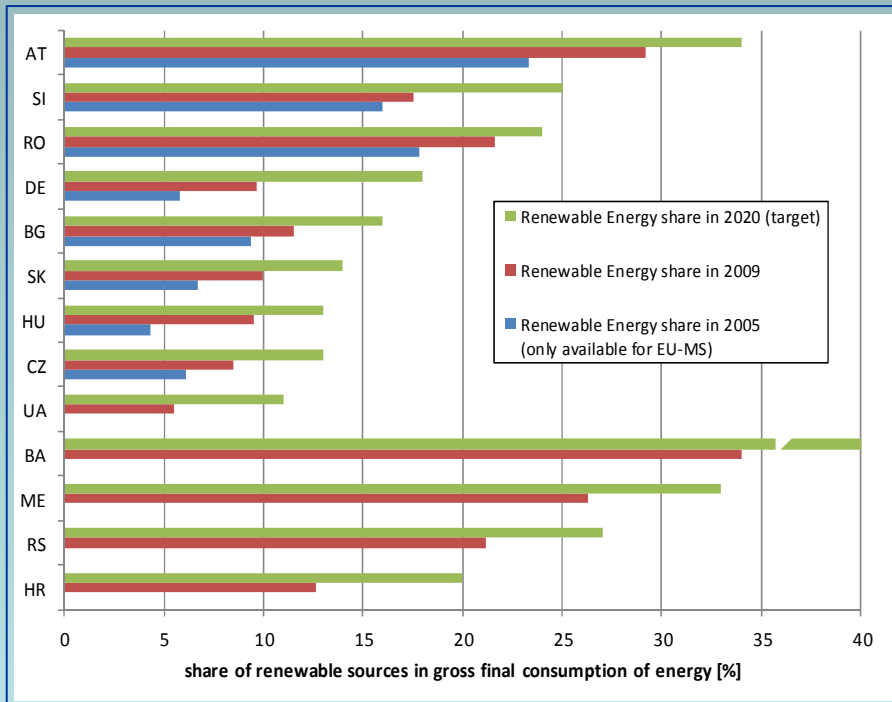
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General Overview. Energy and Water

- Danube countries are committed to the implementation of water, nature and other environmental legislation, the EU Water Framework Directive being the key tool for water policy in the Danube River Basin .
- *Danube countries are committed in reaching the objectives of EU Directive regarding the promotion of the use of energy from renewable sources (Directive 2009/28/EC) till 2020.*
- The production of hydro energy will increase in most Danube countries till 2020.
- National and regional planning processes and strategies as regards renewable energy development are in place in all Danube countries, with hydropower as a source of contribution.



Source: Assessment Report on Hydropower Generation in the Danube Basin, 2012

General overview Energy and Water

Conclusion of WFD and Hydropower Workshop

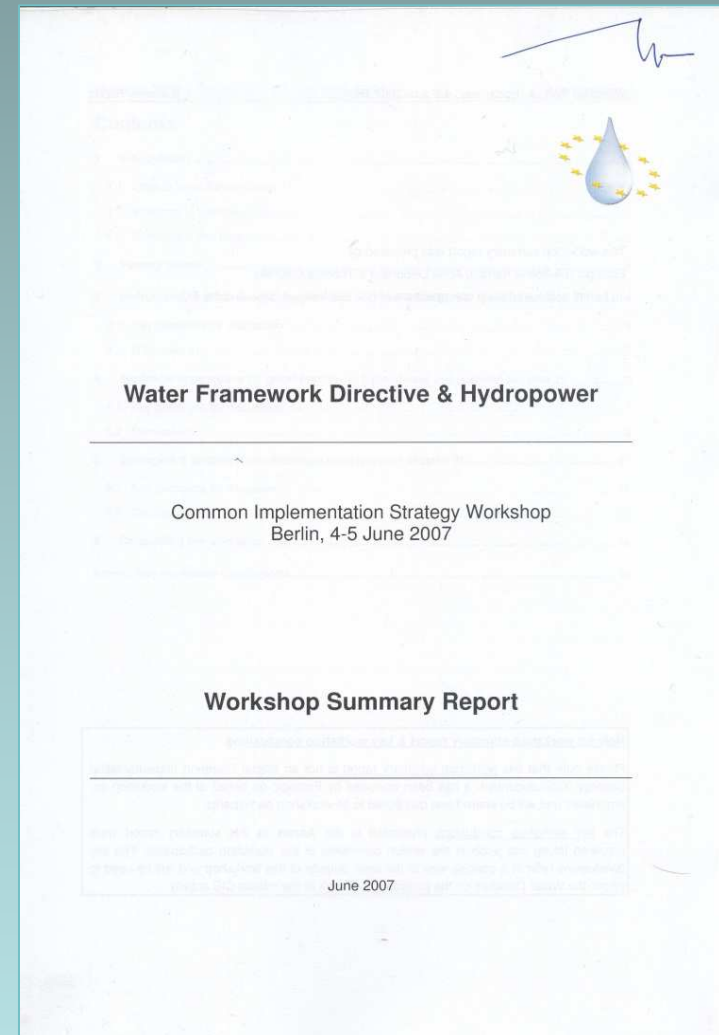
3. (...) The discussion has shown that more holistic approaches for hydropower use are needed.

The focus should be on catchment level and not only site-specific or on water body level.

10. The workshop participants recognized the advantages of pre-planning mechanisms to facilitate the (proper location) identification of suitable areas for new hydropower projects.

These pre-planning mechanisms should take into account WFD and other environmental criteria as well as socioeconomic aspects, including other water uses. The use of such preplanning systems could assist the authorization process to be reduced and implemented faster, provided that the criteria of WFD Art. 4.7 are met.

11. At least 3 categories of areas could be distinguished for pre-planning: suitable, less favorable and non-favourable areas. These categories should be identified with the involvement of all stakeholders based on transparent criteria, they should be monitored and revised within a period of time.



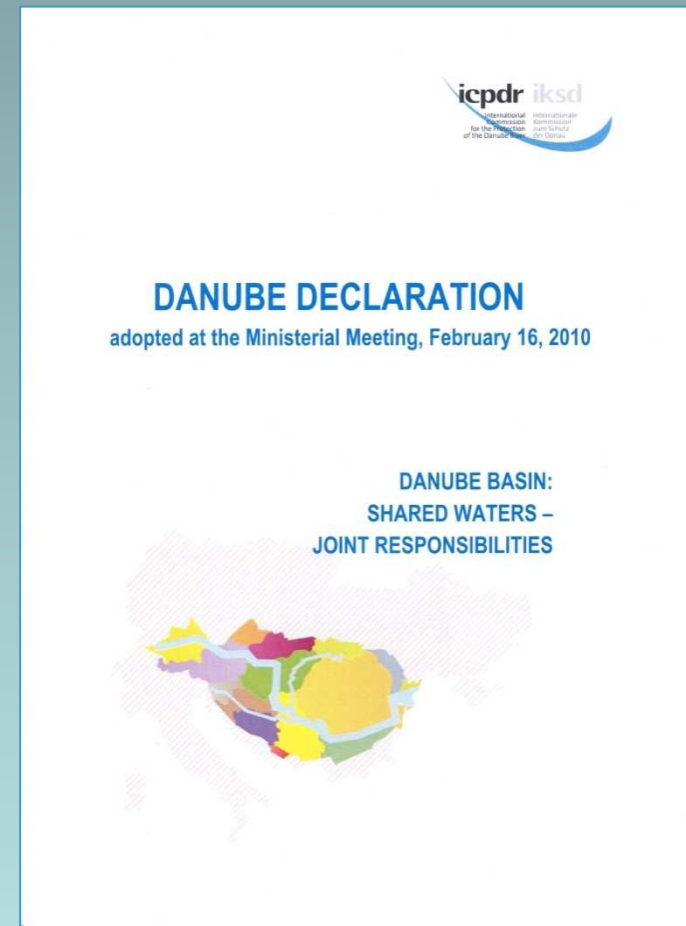
General overview. Energy and Water. ICPDR Role Hydro energy Expert Group

• Danube Declaration 2010:

•“(...) request ICPDR to organize in close cooperation with the hydropower sector and all relevant stakeholders a broad discussion process with the aim of developing guiding principles on integrating environmental aspects in the use of existing hydropower plants, including a possible increase of their efficiency, as well as in the planning and construction of new hydropower plants”.

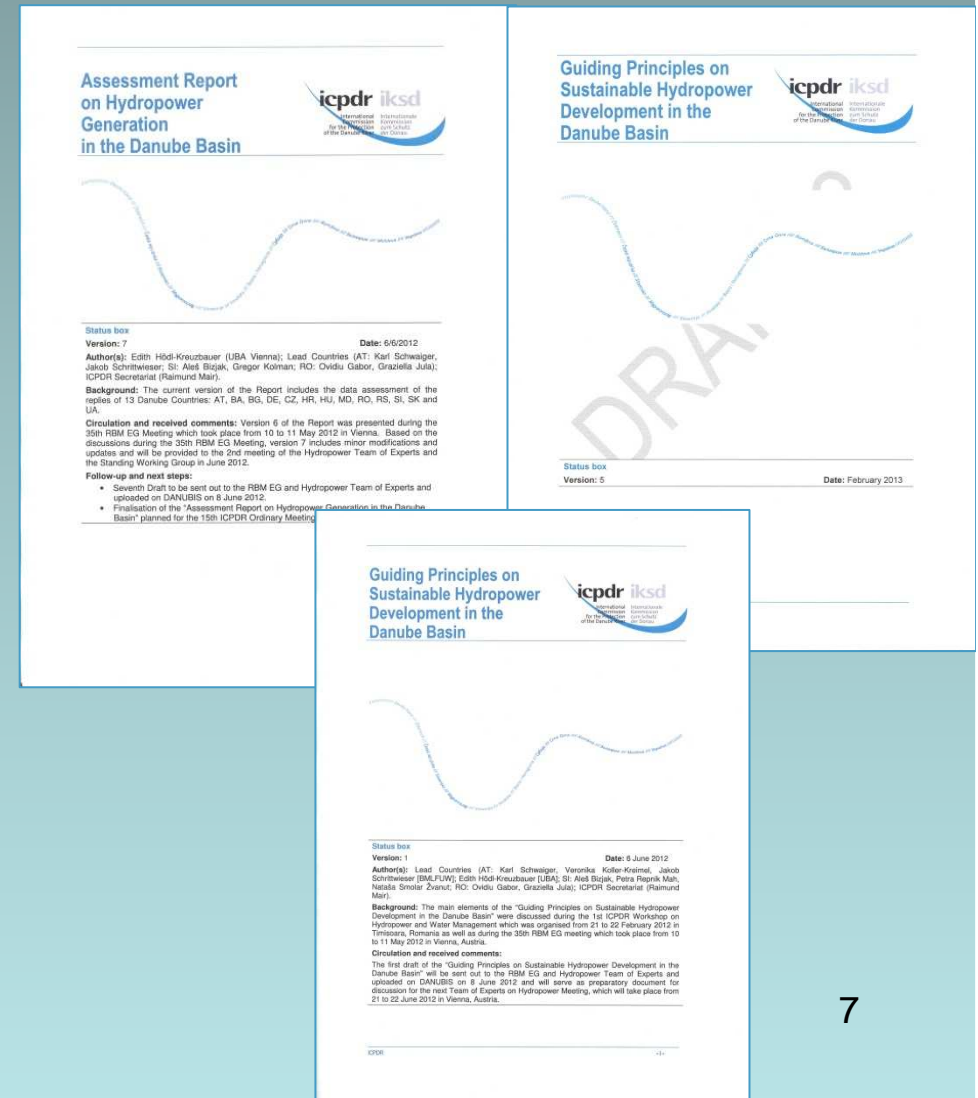
• EU Danube Strategy (PA 2 Energy):

•“to develop and set up pre-planning mechanisms for the allocation of suitable areas for new hydro power projects.”



General overview. Energy and Water. ICPDR Role Hydro energy Expert Group

1. Assessment Report on Hydropower Generation in the Danube Basin.
2. Guiding Principles on Sustainable Hydropower Development in the Danube Basin.
3. Case studies and Good practice examples regarding hydro energy



Danube River Basin District: Hydropower Plants (HPP)



This ICPDR product is based on national information provided by Contracting Parties to the ICPDR (AT, BA, BG, CZ, DE, HR, HU, MD, RO, RS, SI, SK, UA). National borders data provided by the Contracting Parties to the ICPDR and CH was used; ESRI data was used for national borders of AL, ME, MK. Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as topographic layer. Data from the European Commission (Joint Research Center) was used for the outer border of the DRBD of AL, IT, ME and PL. Data on HPP < 1 MW for DE (Bavaria) was derived from Energie-Atlas Bayern 2.0: <http://www.energieatlas.bayern.de>

AT data provided by: IWHW BOKU Habersack et al. (2012)
Input data: HAO (2007), Federal states of Austria (2010/2011)
Hydropower operators (2010-2012)

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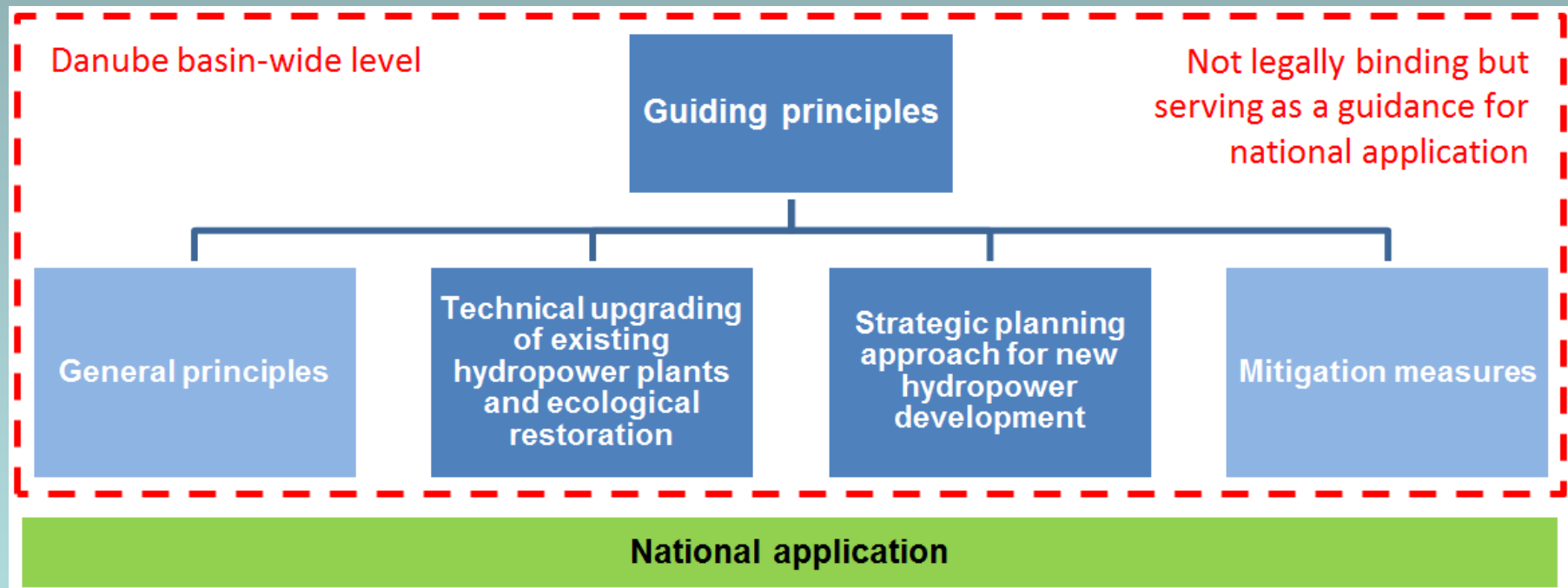
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International Commission for the Protection of the Danube River

Produced by: ICPDR, Vienna, May 2013

Guiding principles for sustainable hydropower development

Main elements of the report



To whom the Guidelines is addressed

1. Primarily addressed to public bodies and competent authorities responsible for the planning and authorization of hydropower
2. Potential investors in the hydropower sector
3. NGOs and the interested public

General principles (1)

- **Sustainability**

Focusing solely on hydropower production and the conservation of the aquatic ecosystems and directly depending terrestrial ecosystems as well as landscapes is not sufficient to achieve sustainable solutions.

In addition the following aspects have to be considered:

- flood protection and water uses (e.g. water supply, irrigation, navigation, recreation, etc.) for people and communities,
- other national or regional objectives and constraints (social, legal, economic, financial, human health),
- general environmental aspects including changes in freshwater ecosystems on surrounding ecosystems (e.g. forests) and objectives regarding climate protection or adaptation to climate change (e.g. ecosystem services),
- socio-economic aspects – allocation of revenues, decentralized approaches, employment, paradigm of society (sufficiency instead of efficiency and economic growth), and
- regional development.

The hydropower sector contributes towards the achievement of sustainable energy development in case this is carried out in an integrative manner, properly assessing environmental, social and economic benefits and costs.

General principles (2)

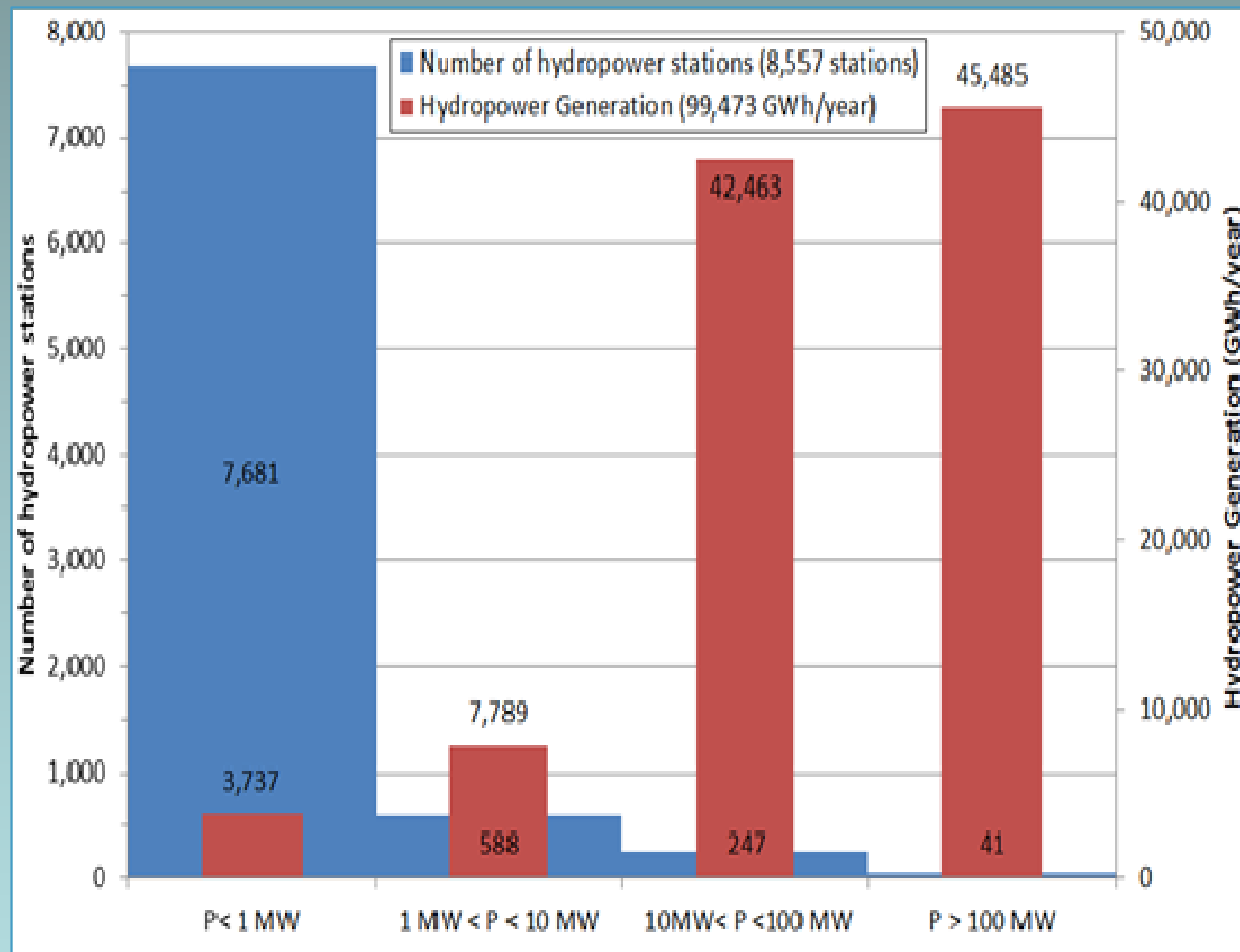
Holistic approach in the field of energy policies

(Renewable Energy Directive + Energy Efficiency Directive)

- Energy saving, increase of energy efficiency and untapped renewable energy potential should be part of a holistic approach of energy policies;
- Reduced consumption leads to a reduction of pressures for the provision of energy;
- Energy management policies and goals on national and international level have to be taken into account in the context of renewable energy generation, including sustainable hydropower development.

General principles (3)

Contribution of different plant capacity categories to electricity generation from hydropower



Present situation

- almost 90% of electricity is generated by large facilities (> 10 MW) (representing around 3.5% of the total number of hydropower stations;
- Small hydropower plants with an installed capacity under 1 MW currently contribute less than 4% to the electricity generation but representing almost 90% of hydropower stations in place.

Objectives 2020

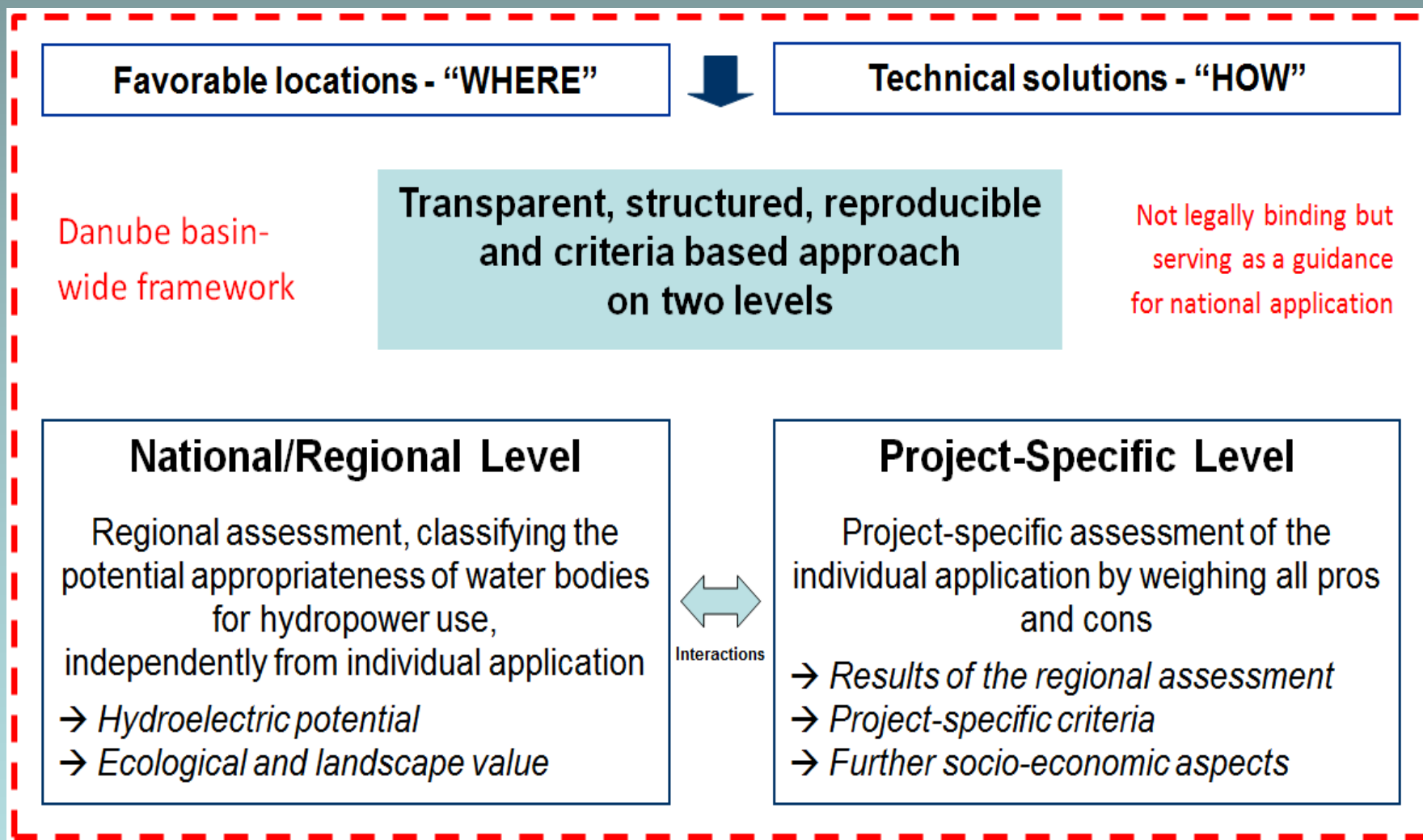
The predicted ratio between the contribution of new large and new small hydropower plants to the 2020 objectives set for the overall hydropower production varies in Danube countries¹³

General principles (4)

Consideration of hydropower types and plant capacities

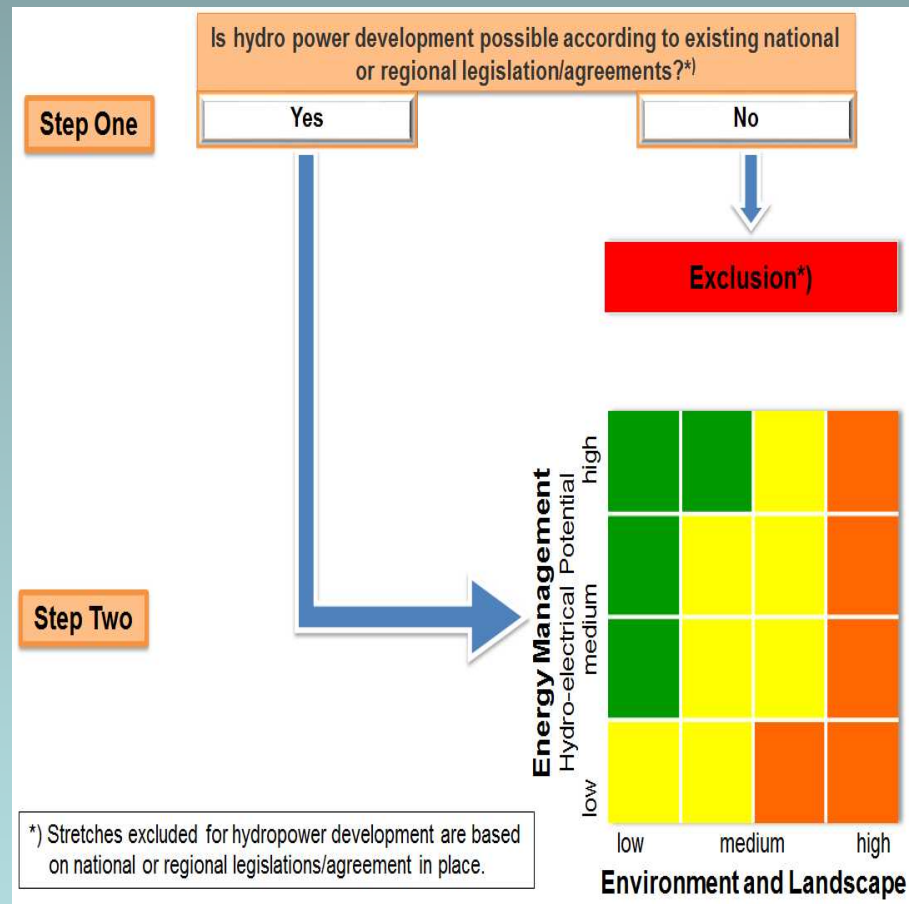
- In some cases hydropower plants of different sizes (including small) can be compatible with good status in case the required mitigation measures are applied (e.g. fish migration aids, ecological flow);
- In case of existing hydropower plants if foreseen by national legislation losses of hydropower generation due to the implementation of mitigation measures may be compensated
- Deterioration from high to good status requires an exemption from the no-deterioration principle according to WFD Article 4.7.
- In order to balance electricity generation and river ecology, the type, electricity contribution and the individual and cumulative actual benefits and impacts of various hydropower plants should be considered when elaborating strategies for hydropower development

Strategic planning approach – national/regional and project-specific assessments



National/Regional assessment

Assessment matrix



Classification scheme

FAVOURABLE for hydropower development	LESS-FAVOURABLE for hydropower development	NON-FAVOURABLE for hydropower development
Generally considered as possible	Possible under specific circumstances	Possible in exceptional cases**)

**) e.g. Natura 2000 sites due to exemptions according to Article 6.3 and 6.4

Recommended list for national/regional criteria

National/Regional criteria	Description
Energy Management	
Hydro-electrical potential (theoretical or line Potential)	Product between quantity of flow and head [GWh/TWh]
Environment	
Naturalness	Status of river stretches/water body in relation to the deviation from type-specific natural conditions regarding hydrology, morphological, biological and sediment continuity as well as biological communities
Status of water body with regard to rarity and ecological value	Rarity of the river type, ecological status of river stretch and sensitivity
Specific ecological structure and function of the river stretch also with regard to the whole catchment/sub-basin and in relation to ecosystem services	e.g. Particular habitats for sensitive / valuable fish species or other biological quality elements in the riverine ecology (e.g. red list species)
Conservation areas and protected sites	e.g. Natura 2000 areas (Birds and Ramsar sites (Ramsar Convention), UNESCO Biosphere Reserves, National, Regional and Natur Parks
Landscape	
Naturalness	no significant anthropogenic impacts
Diversity	Intact terrestrial ecology with extensive use (e.g. small agriculture with low fertilizer sustainable forestry); diverse patterns of land use
Landscape scenery	e.g. aesthetic values, high architectonic and historical quality
Recreation value	Use for soft tourism and recreation, such as organized camping sites, canoeing,
Cultural heritage	Historical buildings and villages or towns Traditional practice such as handicrafts and culturing,
Spatial planning obligations	Legal regulation for different areas and uses

Recommended list for project-specific criteria

Project-specific criteria	Description
Energy Management	
Hydropower plant size	Installed capacity
Hydropower plant size	e.g. run-of-river, diversion, storage, pumped storage
Security of supply	Production and supply of energy (Auto supply),
Quality of supply	Production characteristics – base load/ peak load (storage option, pumping storage)
Contribution to climate protection	lower CO2 emissions of the energy mix
Technical efficiency	Grid connection, potential use, size of plants
Environment and water management	
Ecological impacts of the project	Longitudinal/lateral/vertical connectivity; impacts on habitats and biota taking into account already existing impacts
Flood control	Protection of sites at flood risk; alteration of flow regime
Irrigation	Positive or negative effects on water availability for irrigation
Sediment management	Reservoir siltation, bedload transport, sediment contamination, plant design
Surface and groundwater quantity	Infiltration and exfiltration, minimum ecological flow
Surface and groundwater quality	Nutrients, persistent organic substances, hazardous substances, thermal effects
Drinking water supply	Positive or negative effects on quality and service security
Bank protection and restoration	Foster erosive banks
Fisheries	Ensuring natural reproduction and fish migration across dams and residual water stretches
Effects of climate change	Changes in flow regime and impacts on economic feasibility of project
Effects on water bodies already restored	water bodies restored by public money should not be affected again
Socio-economic criteria	
Conformity with local spatial planning	Compliance with the local regulations
Necessity of further infrastructure for construction and operation	Access, energy grids, etc
Regional economic effects	Taxes, income for the public; investments in local economy, induced employment
Recreation, tourism	Potential positive and negative effects on tourism
Other socio-political considerations	Depending on the local situation

Development of hydropower projects

- General principles -

1. Hydropower should be part of a holistic approach of energy policies
2. National/regional hydropower strategies should be elaborated based on these basin-wide Guiding Principles
3. The public interests on national/regional level has to be done in a transparent, structured and reproducible way based on criteria and relevant information, involving public participation in an early stage of the decision making process.
4. Energy production as such is not being regarded as overriding public interest in general in relation to other public interests
5. Hydropower development has to take into account effects of climate change on the aquatic ecosystems and water resources
6. The role of citizens and citizens' groups, interested parties and non-governmental organisations whose interests are being affected by a certain hydropower project, is crucial to optimise planning processes and to develop a common understanding and acceptance in the practical implementation of new hydropower projects.
7. Technical upgrading of existing hydropower plants should be promoted to increase the energy production

Development of hydropower projects

- General principles -

8. The technical upgrading of existing hydropower plants should be linked to ecological criteria for the protection and improvement of the water status and promoted as well as financially supported

9. The combination of technical upgrading with ecological restoration of existing hydropower installations implies a win-win situation for energy production on the one side as well as for the improvement of the environmental conditions on the other side

10. A strategic planning approach is recommended for the development of new hydropower stations based on a two level assessment (including lists of recommended criteria), the national/regional assessment followed by the project specific assessment

11. The national/regional assessment is an instrument for administrations in the process of directing new hydropower stations to those areas where minimum impacts on the environment are expected - by an integration of hydropower production and ecosystem → decision making through clear and transparent criteria.

12. Assessment of national / regional - classified opportunity for the river stretches to use a their hydropower potential; specific evaluation of the project

13. More detailed and comprehensive assessment of benefits and impacts for a project-specific

14. Incentives schemes for new hydropower projects should take into account the results of the strategic planning approach and adequate mitigation measures.