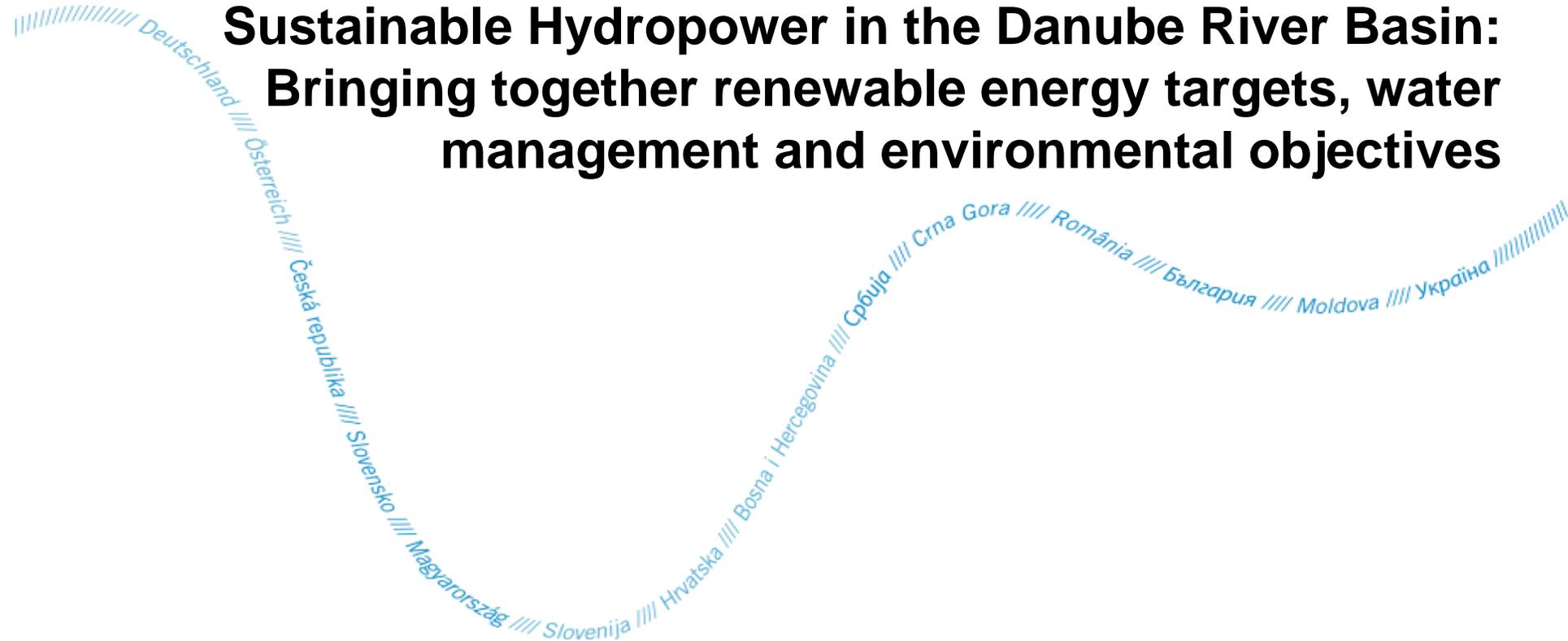


Sustainable Hydropower in the Danube River Basin: Bringing together renewable energy targets, water management and environmental objectives



**Ivan Zavadsky, International Commission for
the Protection of the Danube River (ICPDR)**

Table of content

- I. Danube River Basin**
- II. Sustainable Hydropower in the Danube River Basin**
 - Legal Framework
 - Outlook and Impacts
- III. Guiding Principles for Sustainable Hydropower Development**
- IV. Summary and Conclusions**

I. Danube River Basin



II. Sustainable Hydropower in the Danube River Basin

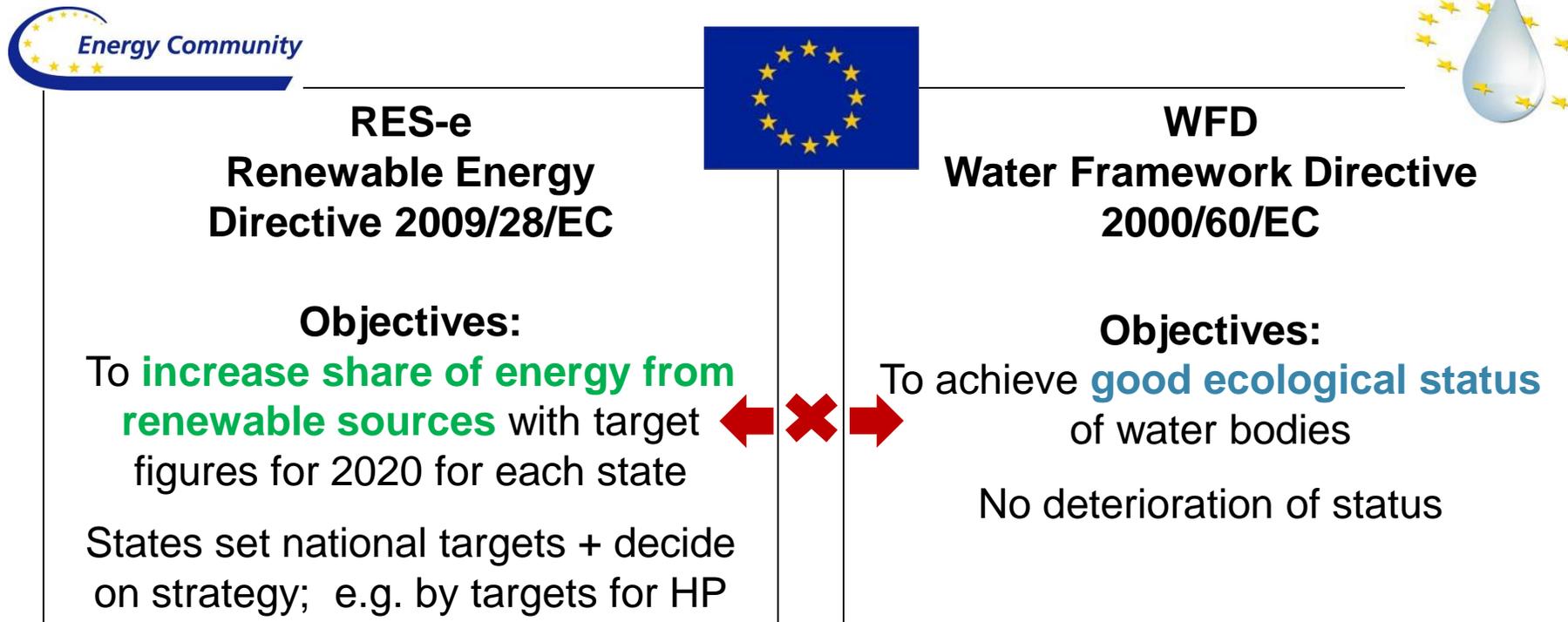
- **Danube Ministerial Mandate from 2010** to develop
 - „**Assessment Report** on Hydropower Generation” and
 - „**Guiding Principles on Sustainable Hydropower Development in the Danube Basin**“
- **Process launched in 2011** and led by Austria, Romania and Slovenia
 - **Broad participative process:** Involvement of administrations from Danube countries on energy and environment, hydropower sector and businesses, NGOs and scientists

Adopted in June 2013



Legal framework

Ambitious EU legislation for **energy** + **water**

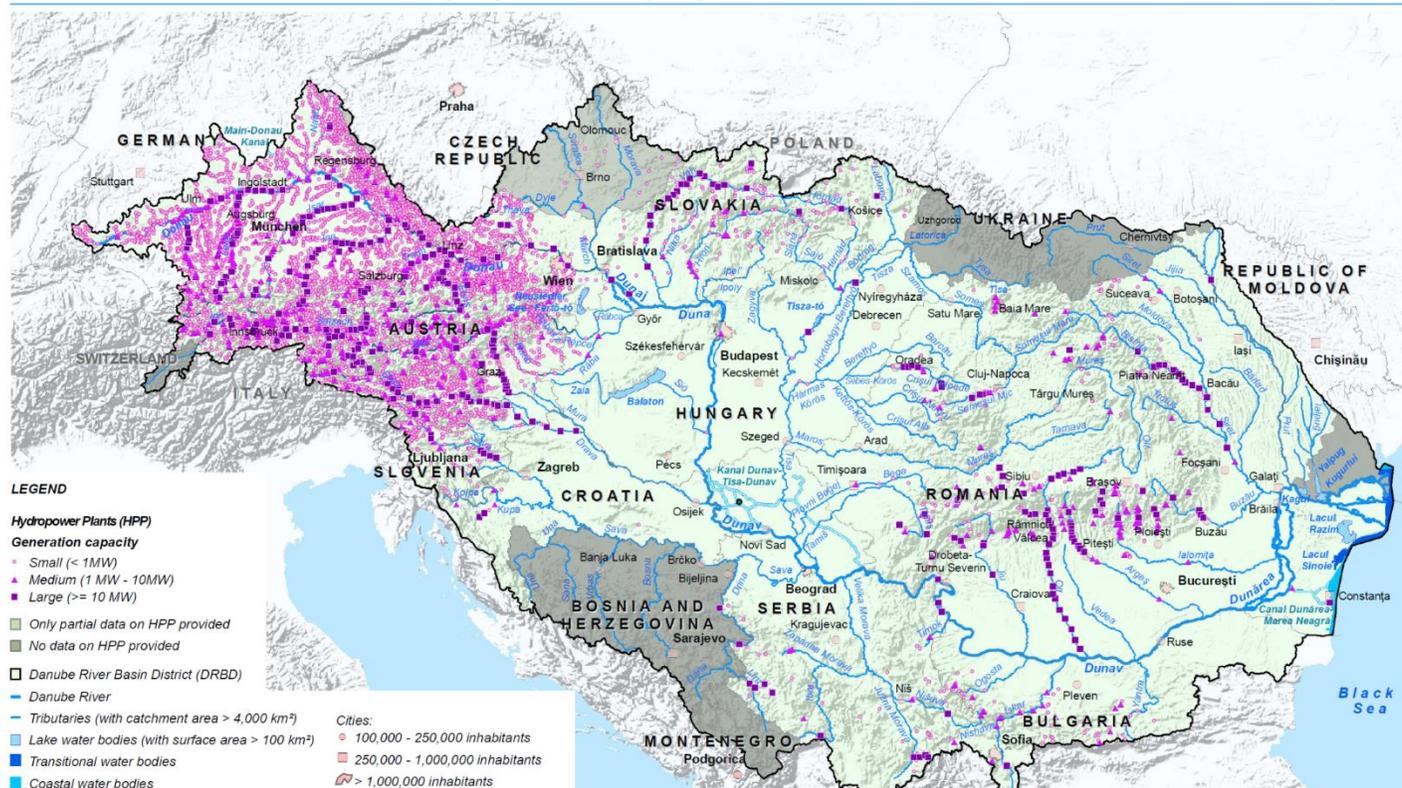


Without cross-sectoral dialogue both sectors are at risk to fail achieving the objectives and legal compliance!

Hydropower plants in the Danube River Basin (2012)

MAP 18 - Danube River Basin District: Hydropower Plants (HPP)

Draft DRBM Plan - Update 2015



Majority of electricity generated by large hydropower

- ~ 300 large facilities (>10MW) generate ~ 90% of electricity from HP
- > 8,000 small facilities (<10MW) generate ~ 10% of electricity from HP

Notes:
CZ: Incomplete data provided
RO: HPP >= 1 MW are multipurpose facilities
(water supply, mitigation of floods / droughts, ensuring water resources)
This ICPDR product is based on national information provided by the Contracting Parties to the ICPDR (AT, BA, BG, CZ, DE, HR, HU, MD, RO, RS, SI, SK, ES, FR, GR, IT, PL, PT, RO, SE, SI, SK, UA, UK, YU).
ESPR World Countries was used. Shuttle Radar Topography Mission (SRTM) from USGS. Seamless Data Distribution System was used as elevation data.
AT data provided by: WWF BOKU Hadersback et al. (2012)
Input data: HAC (2007), Federal states of Austria (2010/2011)
Hydropower operators (2010-2012)
Vienna, October 2014

Outlook: Increasing trends

Outlook hydropower:

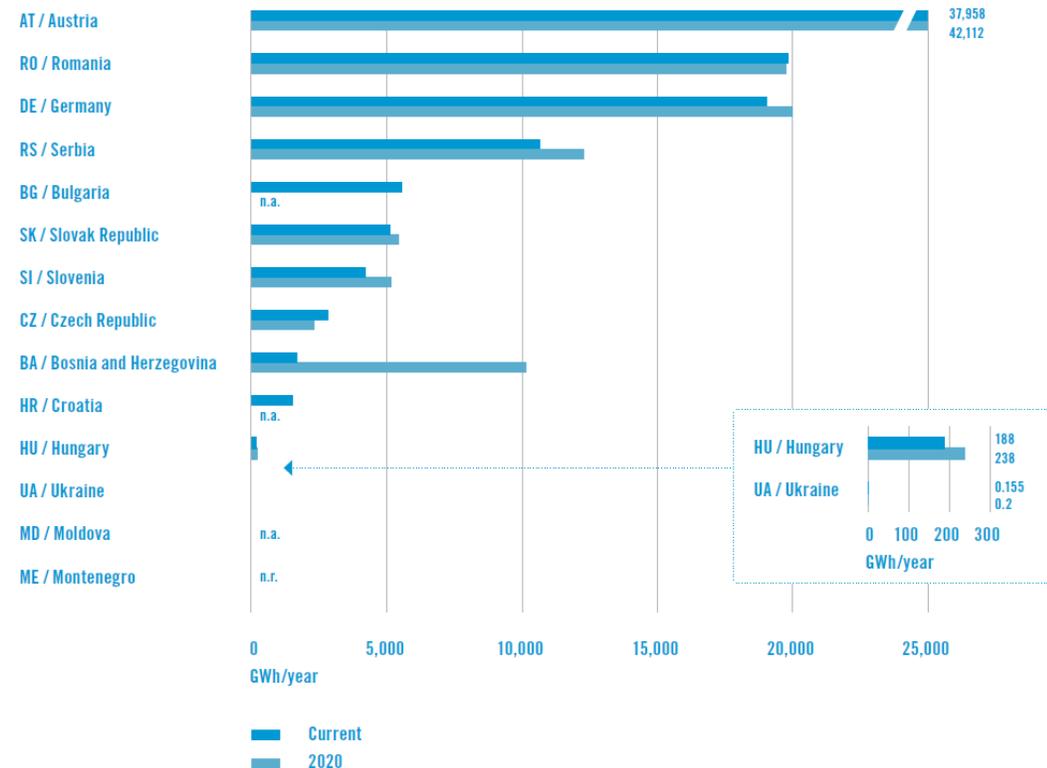
- Intention to increase hydropower capacities by Danube countries

Main drivers:

- To increase share of renewable energy
- Reduction of greenhouse gas emissions and climate protection policies
- Integration of other forms of renewable energy (wind, solar)

Electricity production from hydropower currently and expected in 2020, in GWh/year (excluding pumped storage)*

FIGURE 3



Impacts – why should we care?

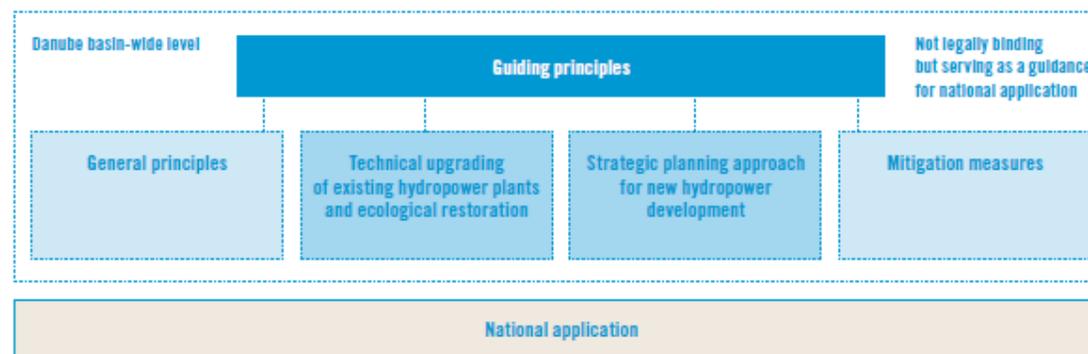
- Environmental protection and **biodiversity conservation** issues
- Negative impacts of hydropower generation have led to rather **negative reception of new projects** by civil society and financial institutions → assess impacts in detail
- Economic, social and environmental **benefits can be maximised** in case all benefits and impacts are considered from the very beginning
- Significant investments needed to **remediate negative impacts of existing facilities** to meet requirements of EU environmental legislation - **costs (much) higher** compared to initial consideration
- **Legal compliance** with existing legislation

III. Hydropower Guiding Principles

- a) Set of **general principles**
- b) Technical upgrading of **existing hydropower** plants combined with ecological restoration
- c) Strategic planning approach for **new hydropower** based on two level assessment (regional + site specific)
- d) **Mitigation** of negative ecological impacts

Main elements of the Guiding Principles

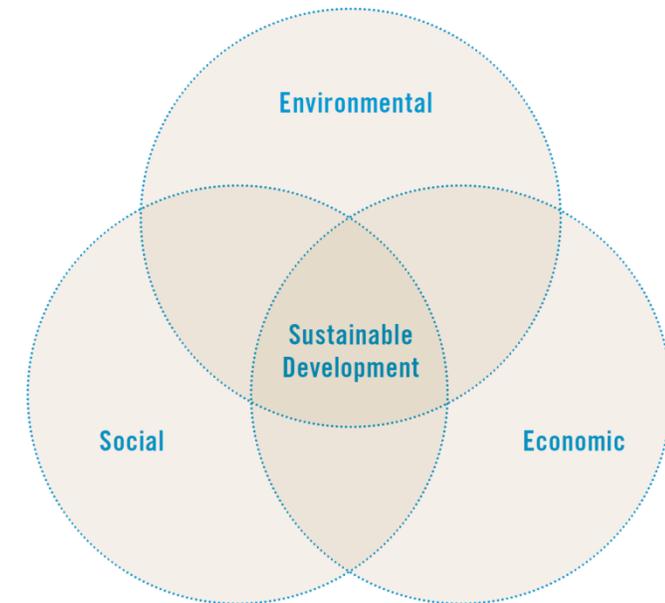
FIGURE 10



III. Hydropower Guiding Principles

1. General principles

- Principle of **sustainability**
- Holistic approach in **energy policies**, incl. energy efficiency gains
- Consideration of plant size and capacities – taking **cumulative impacts** into account
- **Weighing public interests in decision making** → hydropower is not automatically of overriding public interest just because it generates renewable energy
 - Consideration of **climate change**



III. Hydropower Guiding Principles

2. Principles related to existing hydropower plants

Technical upgrading and ecological restoration

- Need to reach WFD objectives – **Good Ecological Status/Potential** – **Need for mitigation measures**
- **Technical upgrading** should be promoted to **increase energy** production from existing facilities
- Should be **linked to ecological criteria** for improvement of the water status
 - Combination of technical upgrading with ecological restoration implies a **win-win solution**
- **Should be promoted** by national energy strategies and instruments

III. Hydropower Guiding Principles

3. Strategic planning approach for new hydropower development

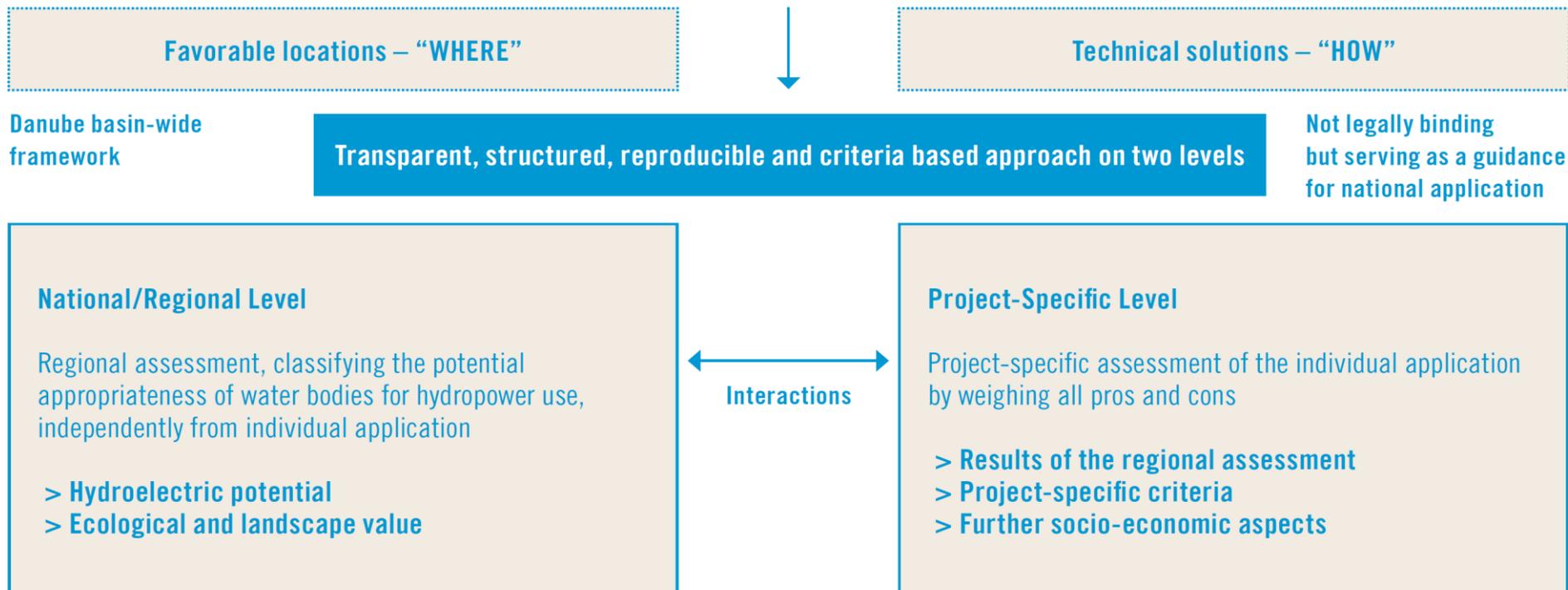
Two level assessment –

- **The national/regional assessment** classifying the appropriateness of river stretches for potential hydropower use
 - Identification of exclusion zones where hydropower development is forbidden by national or regional legislation/agreements
 - All other stretches to be assessed using an assessment matrix and classification scheme for hydroelectric potential as well as ecological and landscape value
- Followed by the **project specific assessment**
- More detailed and in-depth assessment of benefits and impacts
 - Project specific criteria
 - Energy management
- Environment and water management
- Socio-economic criteria

Strategic planning for new hydropower

Two-level assessment

1. National/Regional level – „WHERE“?
2. Project-Specific Level – „HOW“?



Strategic planning for new hydropower Tool for assessing appropriate locations for new projects

Step One

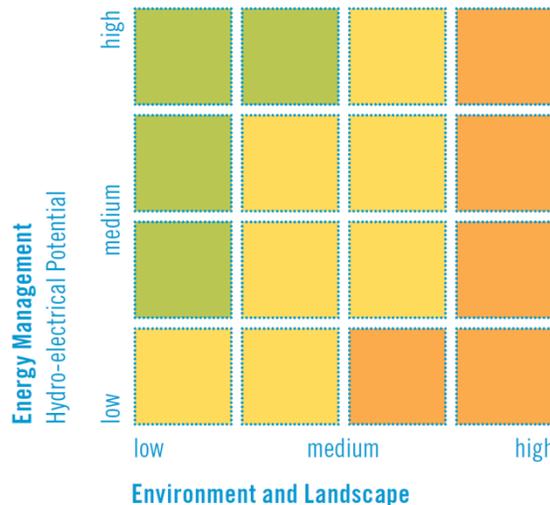
Is hydropower development possible according to existing national or regional legislation/agreements?*

no

yes

Exclusion*

Step Two



- Criteria-based assessment of river stretches (energy management, environment and landscape value)

- Provides information on **suitability of river stretches** for new hydropower development



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**

III. Hydropower Guiding Principles

4. Mitigation measures to make hydropower more sustainable

Fish migration aids for ensuring connectivity and access to habitats



Ensuring ecological flow requirements



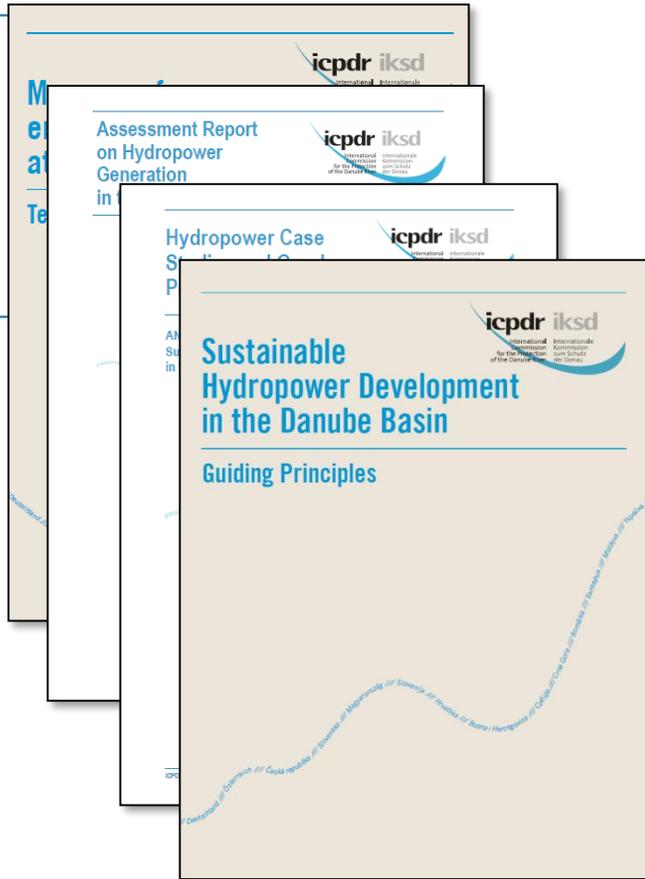
Mitigating artificial flow fluctuations (hydropeaking)



+ other issues (such as sediment transport, improvement of lateral connectivity)

IV. Summary and conclusions

- **Ambitious EU legislation** in place for water and energy – **challenge is implementation**
- **Inter-sectoral cooperation** is key for sound implementation of legislation
- Practical application of ICPDR Guiding Principles and strategic planning approach for new hydropower provides broad range of **potential benefits**
 - **Energy sector:** Streamlined authorisation processes, improvement of predictability and upfront information where authorisation is likely
 - **Environmental sector:** Transparency, involvement in decision making process, protection of sensitive river stretches
 - **Authorities:** Increase of security for legal compliance, balanced approaches with involvement of relevant actors at an early stage



More information available for download under
Hydropower Guiding Principles, Assessment Report, Good Practice Examples and other related document:
<http://www.icpdr.org/main/activities-projects/hydropower>

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