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Policy Coherence in the WEF Nexus: A Screening Matrix Approach for Croatia

**THE WATER-ENERGY-FOOD NEXUS:
BUILDING RESILIENCE TO GLOBAL
CHALLENGES**



Based on Outcomes of Virtual Mobility:

Policy Coherence & the WEF Nexus in Croatia

/under the 11th Call for Short-Term Scientific Missions (STSMs)/

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Introduction & Objectives

Aim: Assess policy coherence within the Water, Energy, and Food (WEF) Nexus in Croatia

- **Objective:** Analyze policy coherence across WEF sectors in Croatia. Evaluate how existing national laws and strategies align with WEF Nexus principles

- Identify gaps and conflicts in current policies
- Propose recommendations for improved integration

- **Methodology:** applying the Screening Matrix approach to identify synergies, trade-offs, and gaps.

- **Scope:** Evaluation of Croatian laws and strategies (e.g., Water Law, Energy Law, Food Law).

Challenges in Achieving Policy Coherence

Goal: **Achieve sustainable development through integrated policymaking.**

Challenges:

- Sectoral silos and fragmented policies
- Conflicting sectoral interests
- Data and knowledge gaps
- Governance complexities

Key Elements for Coherent Policymaking

- Intersectoral policy integration
- Multi-level governance
- Data and evidence-based decision-making
- Stakeholder participation

The Screening Matrix Approach

- A systematic tool to evaluate policy coherence
- Purpose: Evaluate coherence between policies and the WEF Nexus
- Systematic assessment across sectors and laws; Assesses alignment, contradictions, and gaps between laws/strategies and WEF Nexus principles; Facilitates identification of areas for policy improvement; Visualize interactions between WEF policies.

Structure:

- Rows: Water, Energy, Food policies.
- Columns: Synergies (✓), Trade-offs (X), Gaps (Ø).

Applying the Screening Matrix in Croatia

Analyzing national laws and sectoral strategies

- Application of the Screening Matrix to evaluate policy coherence
- Stakeholder consultations and expert assessments
- Clear identification of policy gaps and conflicts

Key Findings Overview

- - Synergies: Renewable energy supports water/food security when aligned.
- - Trade-offs: Bioenergy crops compete with food production.
- - Gaps: Lack of cross-sectoral coordination and data sharing.

Applying the Screening Matrix in Croatia (2)

From / To	Water Policy	Energy Policy	Food Policy
Water Policy	—	(±) Hydropower may conflict with ecological flows; renewable policies may not account for water stress.	(±) Irrigation expansion may strain water resources; water pricing may not reflect agricultural consumption.
Energy Policy	(–) Energy subsidies and planning (e.g. biofuels, hydropower) often neglect water availability and seasonal flows.	—	(+) Bioenergy crops support energy security and rural income, but risk land and water competition.
Food Policy	(±) Agricultural intensification may overdraw water; CAP measures may support sustainable water use if aligned.	(±) Increased mechanization and processing demand energy; food waste reduction can save energy.	—

Detailed initial insights from the global matrix

Positive interactions (Synergies)

- Water–Food: When coordinated, CAP measures (e.g. agri-environmental schemes) can support water conservation goals.
- Food–Energy: Integrated food-energy systems (e.g., biogas from agricultural residues) can promote sustainability in both sectors.
- Water–Energy: Renewable energy (e.g., small hydropower) can support decentralized rural electrification if ecological flows are respected.

Negative interactions (Trade-offs)

- Hydropower vs. River Ecosystems: Large-scale hydropower development can reduce downstream water availability and disrupt ecosystems, contradicting environmental flow mandates of the Law on Water.
- Irrigation vs. water scarcity: Expanding irrigation without proper integration with water management plans risks over-extraction and long-term water insecurity.
- Bioenergy vs. food production: Incentivizing bioenergy crops may reduce land and water available for food crops, particularly during dry years.

Neutral or weak links

- Many energy and food policies are still designed in silos, with weak institutional coordination with water management authorities. This limits the potential for co-benefits and leads to missed opportunities for optimization.

Implications for policy coherence in Croatia

The screening matrix reveals that while Croatia has a strong water governance framework, especially under the Law on Water, sectoral disconnects persist:

- Cross-sector policy alignment is inconsistent.
- Legal mandates for inter-ministerial cooperation exist but are often underutilized or vague in practice.
- Data integration across water-energy-food systems remains limited, hindering evidence-based coordination.

To improve Nexus-based policy coherence, the following steps are recommended:

1. Institutionalize the screening matrix as a routine policy assessment tool in strategic planning (e.g. in national development strategies or climate adaptation plans).
2. Establish coordination platforms (e.g., a WEF Nexus task force) with representation from water, energy, and agricultural ministries.
3. Harmonize planning tools, such as integrating irrigation development strategies with basin-level water management plans and energy demand projections.
4. Develop shared indicators for Nexus monitoring, including water-energy efficiency, irrigation return flows, and energy use per ton of food produced.

Detailed Screening Matrix application/analyses have been performed for:

- **Water Law & Policy Coherence**
- **Energy Law & Policy Coherence**
- **Food Law & Policy Coherence**
- **Environmental Law & Policy Coherence**
- **Climate and Environmental Impact Laws**
- **Spatial Planning & Emergency Management**
- **Critical Infrastructure & Environmental Liability**

with detailed findings per strategy, identification of strengths and gaps, and recommendations for better integration.

Policy Coherence in the Context of the Croatian Institutional Governance

While formal policy references to intersectoral collaboration have increased, practical coherence is constrained by siloed administrative structures, budgetary separations, and fragmented data systems.

The distribution of individual sectors into ministries is often changed by pure political voluntarism.

State-owned enterprises and public agencies are key operational actors whose strategic priorities and investment patterns significantly shape the trajectory of nexus coherence.

Varying degrees of coherence, ranging from moderate synergy (e.g., between the Ministry of Agriculture and “Hrvatske vode” on irrigation planning) to weak coordination (e.g., between HEP and the Ministry of Agriculture on energy use in agri-food systems), to significant institutional gaps (e.g., absence of joint planning platforms between energy and biodiversity departments).

The main systemic constraint lies in the absence of a permanent inter-ministerial body with a formalized mandate to govern nexus-related planning and implementation, supported by cross-sectoral data and performance indicators.

To address these shortcomings, a comprehensive suite of WEFE nexus indicators must be institutionalized across planning and implementation bodies.

Future Challenges & Initiatives

Croatia's strategic orientation towards a low-carbon, resource-efficient economy is increasingly shaped by the principles of the Water-Energy-Food-Environment (WEFE) Nexus. Ambitious goals necessitate a holistic consideration of interlinked resource systems, including water, energy, food, and environmental sustainability.

Croatia's commitment to sustainable development is further reflected in its alignment with the United Nations Sustainable Development Goals (SDGs), particularly those related to clean water and sanitation (SDG 6), affordable and clean energy (SDG 7), responsible consumption and production (SDG 12), and climate action (SDG 13).

Croatia's strategic goals for carbon-neutral development are intrinsically linked to the effective management of water, energy, food, and environmental resources. Continued integration of nexus considerations into policy planning and implementation will be critical to realizing these ambitions and fostering a sustainable future.

Conclusions

- Croatia has strong sectoral policies but lacks Nexus coherence.
- The screening matrix reveals practical and concrete insights for urgently needed integration.
- Urgent need for cross-sectoral governance reforms.

Thank you for your attention.

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