

T5 • Water, Energy, Food, Ecosystem Nexus

1. BACKGROUND

The complex challenges posed by global crises—including climate change, demographic shifts, habitat loss, urbanization, pollution, armed conflicts, migration, and unsustainable agricultural practices—cannot be effectively addressed through simplified, sectoral approaches. Instead, integrated and holistic strategies are essential to manage the interactions and interdependencies among sectors. For decades, natural resources have been managed through siloed approaches, since Integrated Water Resources Management (IWRM) marked significant progress, attempting to coordinate development and water management. However, IWRM was a "water-centric" model, unable to address the profound environmental interdependencies and pressures coming from the energy and agriculture sectors. For that very reason IWRM evolved in the Water/Energy/Food (WEF) nexus, elevating to equal pillars food and energy security. Since then, the nexus has further evolved. The broad recognition that human security is impossible without healthy ecosystem services led to the addition of the "E" for Ecosystems transforming the nexus from a resource efficiency model to a sustainability governance framework.

Nowadays, the WEFE (Water-Energy-Food-Ecosystems) Nexus approach enable governing complexity overcoming avoiding silo-based approaches, that are no longer merely inadequate: they represent an exacerbated risk that policies, and actions undertaken under their guidance, destabilize economies and natural ecosystems. The Nexus approach calls policymakers to consider the impacts of a decision in one sector on all others, promoting policy coherence and actionable sustainable solutions.

WEFE nexus has been widely recognized as a valuable tool for policymakers and stakeholders to identify synergies, minimize trade-offs, and promote sustainable resource management. WEFE nexus approach drives decision-making processes moving from impact driven decisions to trade-off-based agreements. The main WEFE benefits span over enhanced resource-efficient cross-sectoral planning, fostering sustainable smart technologies and innovative solutions development and uptake, multiple shock adaptation and resilience, ecosystems stewardship, and funds' orienting providing sound evidence of creditworthiness of projects clusters aligned under the WEFE Nexus approach.

2. KEY CHALLENGES AND OBJECTIVES

A paradigmatic shift is necessary to move WEFE nexus from just a theoretical approach to the much-needed pragmatic response to extend and recalibrate governance logic. This session aims to focus the operationalisation of the WEFE Nexus approach, acknowledging its criticisms while striving to move beyond theory. The goal is stimulate moving from a resource efficiency model to a sustainability governance, rightsizing social, economic and political pressures and resistances building solid evidence and provide policymakers and stakeholders with actionable tools to harness the recognized benefits of the Nexus, while avoiding the pitfalls of misinterpretation or oversimplification.

A WEFE driven sustainable governance requires mobilising resources, either natural or economic, often from a pillar to another (i.e. from food production to environment or vice-versa). Lacking ambitious financial multiannual planning backing equally ambitious policies, WEFE nexus development is limited to local actions in need to be elevated at systemic level. It is widely acknowledged that no large-scale paradigmatic shift can be successfully undertook if not economically (self) sustainable, as well as its social acceptance is undermined by negative economic impacts. Similarly, to let WEFE governance become a reality, nexus trade-offs need to be balanced by tangible socio-economic advantages. Beyond rhetoric advocacy, to operationalise WEFE nexus economic self-sustainability must be sought. The outcomes of this panel will be brought to the UN Water Conference December 2026 through the Spanish Government (MITECO) as a contribution of the Euro-Mediterranean Region.

Challenge 1 • Create an environment conducive to operationalisation

Governance and institutional fragmentation often result in limited policy cohesion across water, energy, food, ecosystems, climate, and land-use policies. This can create conflicting objectives, regulatory inconsistencies, and fragmented investments, limiting the operationalisation of the WEFE Nexus. Institutionalize WEFE nexus through legislative reforms that enshrine the integration of resources governance is essential to reorients actions and investments from reactive crisis management toward proactive risk mitigation and long-term systemic stability.

Challenge 2 • Engage sectors in co-creation processes

WEFE operationalisation must happen empowering a diverse range of stakeholders through participative co-creation processes, thus securing social legitimacy while ensuring that policy interventions are grounded in local economic, ecological and political realities. This approach enables a context-sensitive integration as well, allowing scale, geography, and political/institutional maturity to shape the integration path also leveraging traditional practices and existing infrastructures. Co-creation, jointly with rewarded compliance, facilitate moving from voluntary accomplishment to binding legal mechanisms that ensure the durability, accountability, and effective implementation of WEFE policies. Policies compliance and public funding schemas ought to require cross-sectoral coordination and collaborative decision-making across the water, energy, and food domains.

Challenge 3 • Infrastructuring the nexus

Moving away from a silo's perspective brings into view an array of interconnections entwining existing infrastructures and production processes, themselves heterogeneously aligned with environmental issues. Many so-called WEFE Nexus projects (e.g.) could be implemented without explicitly applying the Nexus framework. Transformational steps, as create clusters of complementary measures (i.e., combining highly efficient irrigation methods with solar energy, multifunctional storage basins/biodiversity hotspots, solar-powered desalination plants and wastewater reuse), require highly multidisciplinary expertise to maximize synergies. Moreover, a systemic nexus approach cannot be separated from specific design, monitoring, and impact verification standardised methods. Infrastructuring WEFE nexus with Design & Management Supporting Tools and Standardised Monitoring & Assessment Methodologies is an inevitable challenge to ensure that policies are evidence-based and WEFE projects are actionable and viable. This will facilitate as well shifting from fragmented financing flows to blended finance models (public-private partnerships) and novel finance instruments (carbon and nature credits) to make bankable WEFE nexus projects' non-marketable components.

3. GUIDING QUESTIONS

- WEFE Nexus approach is progressively operationalised and embedded in institutional frameworks. Can you give an example that you consider particularly relevant and paradigmatic and describe its pros and cons?
- To establish WEFE nexus-driven sustainability governance, policy and decision makers, a diverse range of stakeholders and multidisciplinary skills must be mobilised. Can you indicate three actions/measures you see as crucial to making WEFE nexus a focal point?
- How can we allow WEFE operationalisation without stretching single pillars to the limits, reconciling socioeconomic development with limited, essential resources exploitation?

4. EXPECTED OUTCOMES

Outcome 1 • Bring WEFE nexus driven sustainable governance to life

The session aims provide to the audience clear insights on the WEFE nexus state-of-art, implementation opportunities (extended to socioeconomic benefits and new finance instruments), practical constraints and administrative/bureaucratic stumbling blocks encountered. Successful WEFE nexus implementation pilot lighthouses are needed to motivate decision makers and stakeholders explicitly applying the Nexus framework overcoming cultural, technical, and administrative siloes.

Outcome 2 • Effectively integrate environmental policies within an operational multi-sectoral framework

The session will generate key messages and practical recommendations to advance the operationalisation of the WEFE Nexus in the Mediterranean region, with a focus on effectively integrate sectoral policies and environmental targets (e.g.: Climate Adaptation, Biodiversity Strategies, Reg. on Nature Restoration; Water Framework Directive, Water Resilience Strategies; Green Deal, Fit for 55; Common Agricultural Policy). Often, WEFE nexus is focused mainly on two axes: water/energy and water/food. Environment is either considered a constraint, an indirect outcome, or a trade-off. Effective integration of “E” into the pre-existing WEF nexus still is an ongoing process. Instruments to facilitate walking on nexus instead try to let pillars touch are needed.

Outcome 3 • WEFE nexus social awareness and stewardship as a policy driver

Real understanding of WEFE nexus implications, awareness of trade-offs it generates, and social acceptance are precondition to let emerge WEFE Nexus capability to improves practical decision-making (e.g. hydraulic or energy infrastructure design, desalination/water reuse planning). A broad stewardship of quintuple helix actors is essential to support policies targeting WEFE institutionalisation processes. A clear and stable policy framework is needed as well to activate public/private and innovative finance instruments.

Outcome 4 • WEFE nexus assessment as part of trade-off analysis

Environmental and Social Impact Assessments were standardised and inserted as a mandatory action or limiting criterion in many European laws. Nevertheless, socioeconomic analyses based solely on cost/benefit balance criteria have proven insufficient to correct and redistribute the impacts of EU regulations with a strong environmental component. The implementation of trade-off analysis can no longer be postponed, and when structuring standard intersectoral evaluation methodologies, it will be impossible to ignore the inclusion of a WEFE Nexus assessment. To develop and standardise a WEFE nexus assessment shall ensure that the advantages for a sector will not be forfeited by losses in others. Moreover, a standardised assessment serves as a lever for attracting investment, facilitating green finance to invest in WEFE certified projects. WEFE assessment criteria need to be developed and integrated within a broader socioeconomic and environmental impact analysis.