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#EU GREEN WEEK

Integrating Circular Economy and the WEF Nexus: A Structured Review of Concepts, Synergies, and Gaps

Hai-Ying Liu[1,*], Janez Sušnik[2], Catarina Roseta-Palma[3], Hermine Mitter[4], Jerome el Jeitany[5], Malgorzata Blichaska[6], Mirela Sertic Peric[7], Sarah Milliken[8], Stefania Munaretto[9]

[1]Department of Environmental Impacts and Sustainability, The Climate and Environmental Research Institute NILU, Kjeller, Norway
[2]IHE Delft Institute for Water Education, Land and Water Management Department, Delft, the Netherlands
[3]Instituto Universitário de Lisboa, Business Research Unit, Lisboa, Portugal
[4]University of Graz, Department of Environmental Systems Sciences, Austria
[5]Department of Civil and Environmental Engineering, Univpersità degli Studi di Firenze, Firenze, Italy
[6]Natural Resources and Sustainable Development, Department of Earth Sciences, Uppsala University, Sweden
[7]Department of Biology, Faculty of Science, University of Zagreb, Croatia
[8] Department of Architecture and Landscape, University of Greenwich, London, United Kingdom
[9]KWR Water Research Institute, the Netherlands

*Corresponding author(s): E-mail: hyl@nilu.no

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

NexusNet

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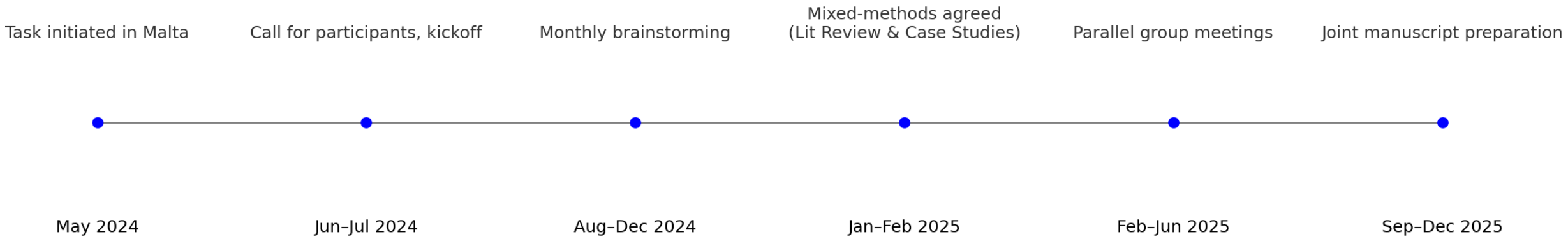
Task Background & Timelines



- Task co-led by Janez and Hai-Ying
- Group 1 - Targeted literature review (Led by Janez and Hai-Ying, eight contributors).
- Group 2 - Structured case studies analysis (Led by Dimitris, 12 contributors).

Literature Review Group – Objectives

- Explore how Circular Economy (CE) and the WEF Nexus are integrated in the literature, and identify gaps, challenges, and future opportunities.

Presentation Objective

- To present the methodology, findings, and implications of the literature review on CE-WEF integration.

Methodology – Article Screening

- **Search Strategy:**
  - **Databases**: Web of Science, Scopus, ScienceDirect
  - **Keywords**: (“Circular Economy”) AND (“nexus”) AND (“water”) AND (“food”) AND (“energy”) AND (“integrat*” OR “synerg*” OR “intersect*”)
  - **Period**: 2000–2025
- **Selection Process:**
  - Articles screened: **164**
  - Final sample: **57** (49 selected + 8 expert-suggested)
  - **Inclusion**: CE-WEF integration, peer-reviewed, English
  - **Exclusion**: Solely CE or WEF, grey literature, full books, pre-2000

Methodology – Assessment Framework

All **57 articles** were assessed based on **14 review criteria**, organized into **six thematic categories**

- **Conceptual Foundations**
  - Definitions and Conceptual Clarity
  - Rationale and Problem Framing
- **Relevance & Scope**
  - Inclusion/Exclusion Relevance
  - CE Elements Covered
  - WEF Elements Covered
- **Methodological Rigor**
  - Methodological Design and Transparency
  - Monitoring/Indicators
- **Integration Logic**
  - Conceptual Framing and Integration Logic
  - Trade-offs and Synergies
- **Impact and Innovation**
  - Sustainability Impact
  - Innovation or Contribution
  - Gaps and Challenges
- **Policy and Practical Relevance**
  - Policy and Practical Implications
  - Recommendations for Research

Key Findings from Literature Review

- Out of the 57 articles, 25 were excluded because they did not explain the relevance of CE-WEF integration or did not focus on the integration itself

🔍 **Conceptual Foundation**

CE is consistently defined (3R: reduce, reuse, recycle), but integration with the WEF nexus is often implicit or fragmented.

Theoretical alignment is emerging, but practical application lags behind.

Key Findings from Literature Review

🎯 **Integration Rationale & Framing**
Few studies clearly explain why CE-WEF integration matters.
Conceptual models and integration logic are limited.

🧪 **Methods & Innovation**
A range of tools is used (e.g., LCA, MFA), but methodological transparency and innovation are inconsistent.
Many studies replicate known approaches rather than proposing new ones.

🌱 **Sectoral Scope**
Water-energy interactions are well covered.
Food systems and cross-sector circularity are underrepresented.

Key Findings from Literature Review

📊 **Monitoring & Indicators**
Most studies lack measurable indicators for CE-WEF performance.
Trade-offs and system-wide metrics are rarely assessed.

🧩 **Policy & Implementation**
Policy implications are often acknowledged, but guidance remains general rather than operational.

Real-world integration is hindered by fragmented governance and limited stakeholder coordination.

Conceptual grounding exists, but real progress requires integration framework, applied tools, measurable outcomes, and clearer policy roadmaps.

Visualizing CE-WEF Nexus Integration

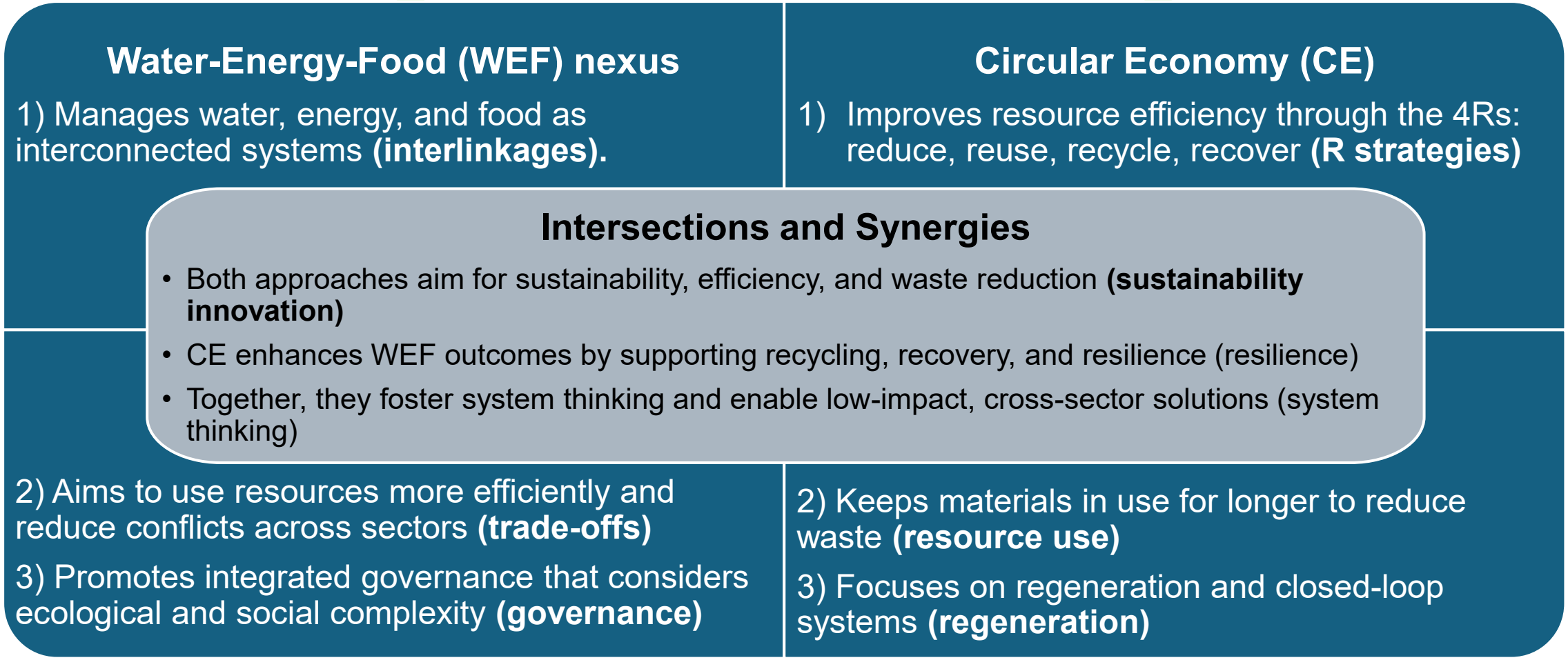
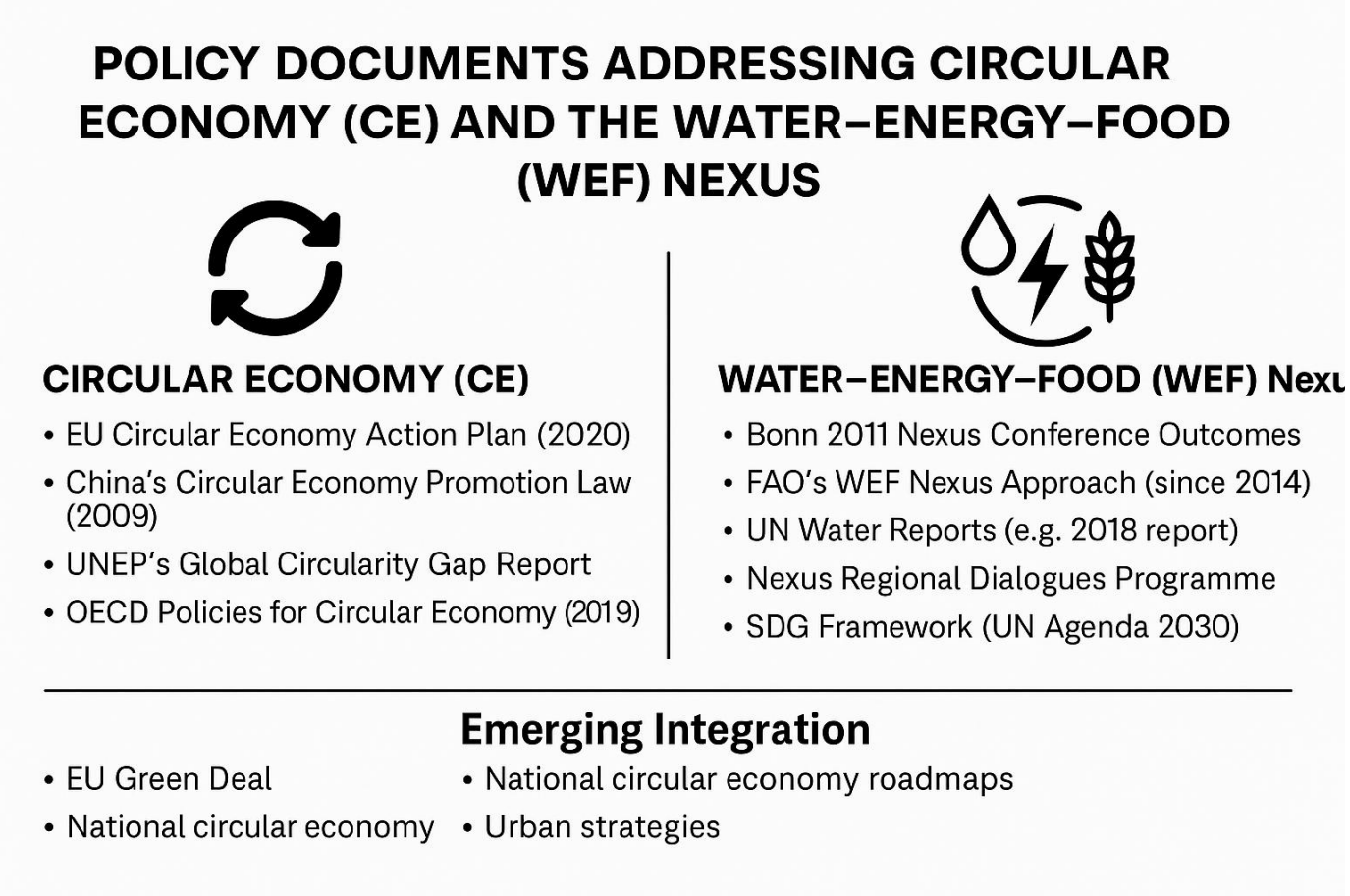
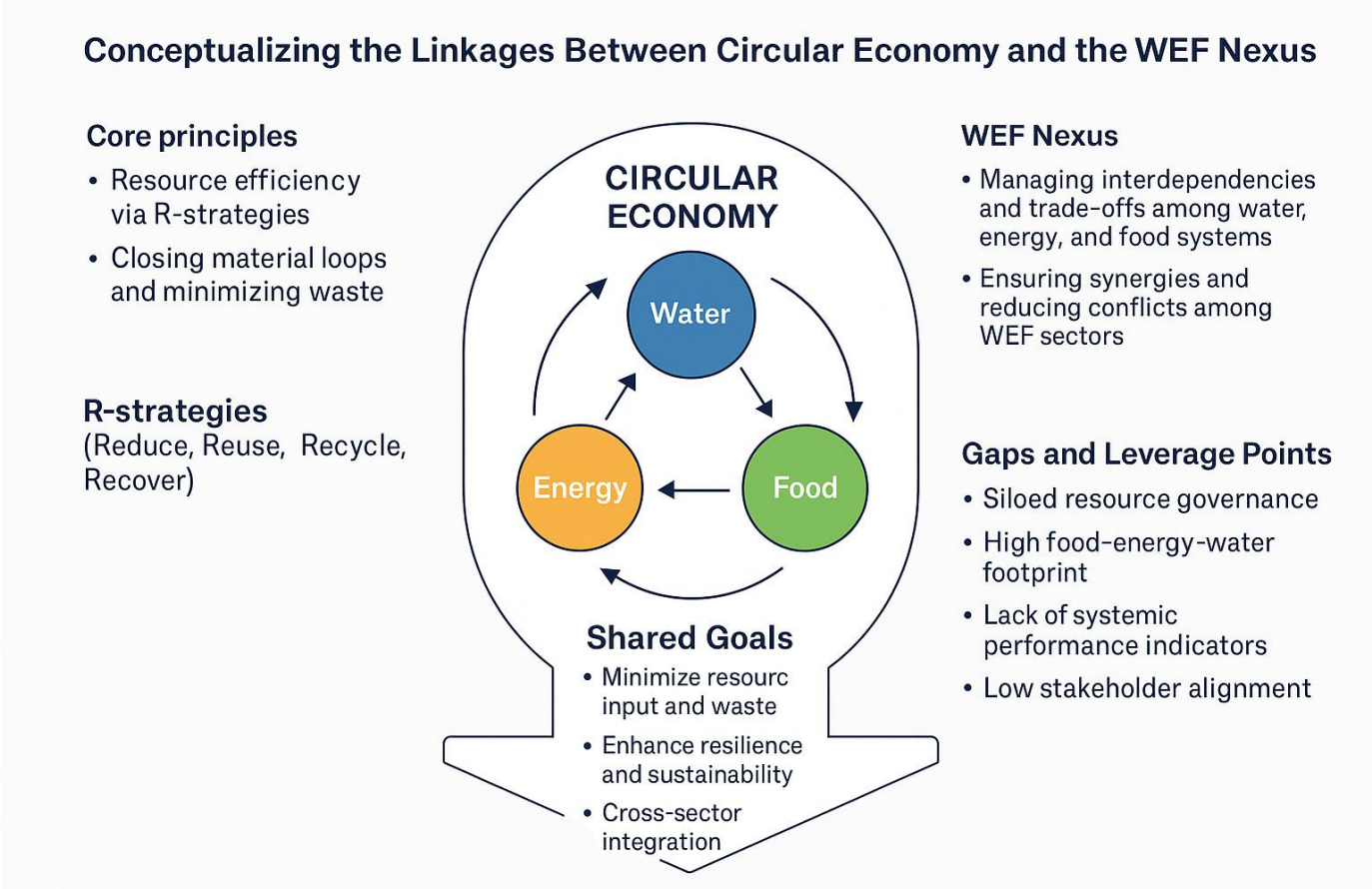


Diagram showing overlapping priorities and synergies between CE and the WEF Nexus

Policy Documents on CE and the WEF Nexus



Integrating CE strategies into the WEF Nexus: A Conceptual Framework



Conclusions & Strategic Recommendations

- CE-WEF integration is still developing – both conceptually and practically.
- Future work should promote clear frameworks, harmonized assessment methods, and cross-sector governance models.
- **Combined insights from literature and case studies will underpin a peer-reviewed, open-access publication**.

Acknowledgements & Contributions

- This work is supported by COST Action NEXUSNET (CA20138)
- Eight contributors for literature review.
- 12 case study collaborators led by Dimitris.

Case study contribution
Dimitris Kofinas, Bahar Beigi
Sarah Milliken (food waste)
Elvis Ahmetović
Edyta Hewelke
Cevza Melek Kazezyilmaz-Alhan
Caro Mooren (helped with CS methodology), Stefania Munaretto & Josje Brouwers (We will contribute a case study from the Ultimate project - insights from practice, we could maybe do a couple of interviews with some of our case studies if interesting for the paper)
Luca Polidori
Michalis Chatzigeorgiou (treated wastewater reuse for irrigation)
Tamara Avellan (WW reuse in Central America)

Next Steps

- Finalize Introduction and Results sections.
- Integrate findings from case studies analysis.
- Prepare and submit manuscript:

  "*Strategic Directions for Integrating Circular Economy and the Water-Energy-Food Nexus: Conceptual Insights and Case Studies*"

Thank you for your attention!