IRENA
International Renewable Energy Agency

10 December 2025

Sixteenth session of the Assembly
Abu Dhabi, 11-12 January 2026

Background Note

Interministerial Dialogue on Renewable Energy for Agri-Food Systems

Co-hosted by the International Renewable Energy Agency (IRENA) and the Food and Agriculture Organization of the United Nations (FAO)

Background

1. Agrifood systems lie at the intersection of three interlinked global imperatives: energy access, climate action, and food security. They account for nearly 30% of global energy consumption and have the potential to help reduce a third of the global anthropogenic greenhouse gas (GHG) emissions, underscoring the sector's centrality to climate goals[1]. At the same time, over 1 billion people are dependent on agrifood systems for livelihoods and food security. Yet the majority of smallholder farmers - over 500 million, who operate more than 80% of farmland globally and produce over one-third of the world's food[2], lack access to reliable, affordable and modern energy services – constraining productivity, resilience and livelihoods.

2. Agrifood systems remain highly dependent on fossil fuels. A shift towards renewable energy solutions is pivotal to accelerate agrifood transformation and decarbonization, while boosting productivity, food system resilience, and rural development. Renewable energy can be a catalytic enabler across the entire agrifood value chain: from increasing yields through solar-powered irrigation, to reducing post-harvest losses via cold storage, to improving incomes through renewable-powered agro-processing, and linking farmers to markets via conventional or digital infrastructure. In addition, the production of sustainable bioenergy from agricultural residues and organic waste, along with energy-efficiency measures, can further enhance sustainability and productivity across agrifood systems.

3. In this context, IRENA and FAO are convening an Interministerial Dialogue during the sixteenth session of the IRENA Assembly in January 2026 to accelerate the integration of renewable energy across agrifood systems. The session will facilitate strategic exchanges amongst Ministers of Energy and Agriculture.

[1] *Renewable energy for Agri-food systems, IRENA and FAO 2021; FAOSTAT 2024*
[2] *International Fund for Agricultural Development (IFAD)*

Key challenges undermining progress

Challenges to unlocking the transformative potential of renewables to power sustainable and resilient agrifood systems include:

- **Energy and associated equipment deficits in the agrifood systems**: Smallholder farmers struggle to access energy for essential services such as irrigation, cold storage, mechanisation, and processing. This energy gap leads to low productivity and high post-harvest losses, with up to 40% of food lost before it reaches markets due to inadequate preservation and value addition infrastructure, much of which is preventable through renewable energy solutions.

- **Limited market access and value chain fragmentation:** Even when productivity improves, many farmers lack access to structured markets, roads, logistics, and digital platforms. Weak rural infrastructure, high transaction costs, and poor connectivity prevent smallholders from securing fair prices or reaching buyers beyond their local communities.

- **Dependency on fossil fuels:** The heavy reliance on diesel pumps and generators drives up food system costs, increases emissions, and exposes farmers to price shocks and supply disruptions.

- **Gaps in policy and finance:** Many national strategies remain adequate to integrate renewable energy solutions in agrifood systems and their overall contributions to climate action. Investment flows remain fragmented or insufficient to scale solutions. Smallholder farmers lack access to affordable financial instruments to acquire renewable energy technologies or productive-use equipment. High upfront costs and perceived risks hinder financing from both public and private sectors.

- **Limited awareness and capacity**: There is often a lack of technical knowledge and institutional capacity to design, implement, and maintain renewable energy systems in agrifood value chains, especially in remote and underserved areas.

Opportunities for transformation

- **Rapid fall in renewable energy costs**: Over the last decade, solar photovoltaics (PV) costs have declined by over 80%, unlocking new opportunities for distributed energy solutions tailored to agricultural operations.

- **Policy making focus on agrifood:** Agrifood solutions, including energy-smart agrifood solutions, need to be integrated and implemented as part of national climate policies to achieve the SDGs and climate targets.

- **Accelerating financing for energy transition in agrifood systems:** Only 7.2% of global climate finance tracked in 2021-22 was addressed to agrifood systems solutions. Scaling up investments and innovative financing mechanisms is crucial to expanding clean energy adoption in agriculture and unlocking opportunities for small-scale farmers.

- **Innovative financing mechanisms:** Blended finance models, results-based financing, and carbon markets present emerging tools to crowd in capital for energy-smart solutions in agrifood systems.

- **Innovation in technology and business models:** From solar irrigation to biogas for agro-processing, decentralized renewable energy technologies are increasingly viable, scalable, and adaptable to diverse agricultural contexts.

- **Cross-sectoral policy alignment:** Policy coherence across sectors and national strategies and plans can catalyse impact, avoid duplication, and create enabling environments for private sector engagement.

- **South-South and Triangular co-operation**: Peer learning and technology transfer between countries in the Global South and beyond, can accelerate the adoption of successful approaches and business models on productive uses of renewable energy across agriculture and food systems.

Objectives of the session

4. This high-level session is the first ever dialogue focusing on the links between renewable energy and agrifood systems. It is expected to highlight the key enablers of just energy transition in the context of a transformation towards inclusive, sustainable, and resilient agrifood systems. Decarbonization by mid-century is simply not possible without considering energy used in agrifood systems. The high-level session aims to catalyse political momentum to prioritise renewable energy within national agricultural and climate strategies. It will facilitate peer exchange on effective policies, integrated planning frameworks, and delivery models that connect renewable energy access with the agrifood sector.

5. The session will highlight emerging solutions and approaches that advance productivity, resilience, and decarbonisation objectives. It will build on IRENA's flagship initiative *Empowering Lives and Livelihoods*, which places people and communities at the centre of the energy transition, by advancing sustainable livelihoods powered by renewables in rural and agricultural contexts. At the same time, the session will build on the FAO's *Energy-Smart Agrifood Systems Programme* that focuses on providing energy-smart solutions to transform agrifood systems, while ensuring food security, building climate resilience, and providing access to clean, affordable energy for all.

6. The dialogue seeks to identify priority areas for international cooperation and support, including public-private partnerships and regional initiatives, and stimulate financial mechanisms for the adoption of renewable energy solutions and the transformation of agrifood systems.

Expected Outcomes

- ✓ Ministerial recognition of the key role of renewable energy solutions in agrifood systems in achieving the ambition of the Paris Agreement.

- ✓ Ministerial commitment to boost the integration of renewable energy solutions in agrifood systems into national and regional policies

Focus of the Interministerial dialogue

- ✓ Concrete country-level priorities for technical assistance, investment pipelines, and policy support for adopting renewable energy technologies and renewables-powered equipment across agrifood systems.
- ✓ New partnerships and coalitions to coordinate efforts and priority actions across renewable energy, agrifood, and finance sectors, to accelerate the transition to sustainable and resilient agrifood systems.

About the IRENA–FAO Collaboration

- The IRENA–FAO partnership is grounded in a shared vision to empower countries in delivering sustainable, inclusive, and resilient agrifood systems through renewable energy. The collaboration brings together FAO's expertise on agrifood systems and IRENA's leadership in renewable energy, supporting countries to build policy coherence, deliver context-relevant solutions, and align with global commitments.

- Drawing on complementary mandates, both agencies are committed to working together towards strengthening country capacities, scaling up innovative solutions, and aligning action with the global climate and development agendas.

Associated Publications

- Decentralised renewable energy for agriculture in Nepal (IRENA, 2025)
- Decentralised renewable energy for powering agri-food value chains in the Republic of Guinea (IRENA, 2024)
- Decentralised renewable energy for agriculture in Malawi (IRENA, 2025)
- Decentralised renewable energy for agriculture in Zimbabwe (IRENA, 2025)
- Bioethanol for clean cooking - An analysis of its role in energy transition in Africa (FAO, 2025)
- Solar energy and the cold chain - A guide for small-scale fisheries interventions (FAO, 2025)
- Green recovery in agrifood chains through sustainable energy interventions in Zambia (FAO, 2025)
- Bioethanol for clean cooking. An analysis of its role in energy transition in Africa (FAO, 2025)
- Feasibility assessment of biogas potential in the Solomon Islands (FAO-UNDP, 2024)
- Feasibility assessment for biogas potential development in The Gambia (FAO-UNDP, 2024)
- Hazelnut sector in Azerbaijan - Options for green energy interventions along the value chain (FAO, 2023)
- Renewable energy interventions in the wheat landscape in Uzbekistan (FAO, 2023)

- Sustainable bioenergy potential from crop, livestock and woody residues in Rwanda: An integrated bioenergy and food security approach (FAO, 2023)
- The small-scale fisheries and energy nexus (FAO, 2023)
- Sustainable Food Cold Chains: Opportunities, Challenges and the Way Forward (FAO-UNEP, 2022)
- Bioenergy and food security (BEFS) assessment – Seychelles (FAO, 2022)
- Establishing residue supply chains to reduce open burning – The case of rice straw and renewable energy in Punjab, India (FAO, 2022)
- Powering Agri-food Value Chains with Geothermal Heat: A Guidebook for Policy Makers (IRENA, 2022)