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# The Practical Significance of the Green Finance Concept in the Food Industry

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**ABSTRACT**

This paper examines the practical significance of green finance in the food industry, with a particular focus on Uzbekistan. It highlights the role of key financial instruments—green bonds, sustainability-linked loans, and blended facilities such as the EBRD's Green Economy Financing Facility (GEFF)—in reducing resource intensity, improving environmental performance, and enhancing food security. Empirical evidence shows that green finance interventions reduce $CO_2$ emissions and energy consumption by 20–25%, foster technological modernization, and strengthen investor confidence. Moreover, projects such as the modernization of cold-chain systems directly contribute to lowering food losses and improving nutritional outcomes. The findings demonstrate the dual role of green finance in promoting both ecological sustainability and socio-economic resilience, providing important implications for policy and practice.

**Keywords:** Green finance; green bonds; sustainability-linked loans; blended finance; food industry; cold-chain modernization; energy efficiency; $CO_2$ emissions; food security; Uzbekistan.

**Introduction.** In the 21st century, climate change, resource scarcity, and food security are among the most pressing challenges facing the global economy. International organizations—such as the World Bank, FAO, UNCTAD, and OECD—emphasize the crucial role of green finance mechanisms in building sustainable food systems. Green finance refers to targeted financing of projects that deliver positive environmental outcomes, including the adoption of energy-efficient technologies, water conservation, waste recycling, and the use of renewable energy sources

The food industry is one of the sectors most in need of green transformation due to its high resource intensity, waste generation, and carbon emissions. However, existing academic studies largely focus on the macroeconomic level, while firm-level evidence on the practical outcomes of green finance instruments—especially in developing countries such as Uzbekistan—remains insufficient. Therefore, this study aims to analyze the practical significance of green finance in the food industry

**Metodology.** The main instrument of green finance, **green bonds**, delivers results for firms through two channels: (i) targeted "green" CAPEX investments that reduce energy and carbon intensity, and (ii) signaling effects that enhance ESG performance and increase investor demand. Large-scale empirical studies demonstrate that green bond issuance is followed by improvements

in firms' environmental indicators, strengthened innovative activity, reductions in emissions, and positive market reactions (announcement returns). Flammer (Journal of Financial Economics) documents the positive response of capital markets to corporate green bond announcements as well as the tangible environmental impact of project-based investments. Recent studies published in *Nature Portfolio* and *Elsevier (ScienceDirect)* further confirm that green bond issuance improves firms' environmental ratings and decreases carbon footprints (Columbia University, 2023; Nature, 2024).

**Sustainability-linked bonds/loans (SLB/SLLs)**, by contrast, are tied to key performance indicators (KPIs), such as reducing water consumption by 15% or cutting waste by 10%. They introduce a "reward–penalty" discipline (step-up/step-down clauses) embedded in loan agreements. ICMA's 2024 guidelines highlight the critical importance of KPI materiality and ambitious target calibration, while IFC analyses emphasize structural elements such as maturity and callability in enhancing their effectiveness. Meanwhile, the World Bank and Climate Bonds Initiative underline the need to increase both the number and quality of KPIs and to close loopholes in the SLB market. Together, these findings show that KPI achievement strengthens investor trust and facilitates access to capital (ICMA, 2024; IFC, 2024).

**Blended finance facilities** such as the EBRD's **Green Economy Financing Facility (GEFF)** have been particularly important for the food industry. They combine technical assistance with local bank credit lines to finance energy- and water-saving technologies, including refrigeration, compressors, pumps, heat recovery, and on-site solar PV. GEFF publications showcase a portfolio of technological solutions for the food and beverage sector. In Uzbekistan, the EBRD supported "Milk Euro Food" with a package worth USD 6.3 million, aimed at improving energy efficiency and social-environmental standards. The introduction of new cooling equipment is expected to save thousands of MWh annually and reduce $CO_2$ emissions by around 92 tonnes per year (EBRD PSD, 2023; Food Business Africa, 2024). Such cases document the measurable efficiency gains from "green loans" in food processing.

**Food loss reduction** and modernization of the cold chain are direct outcomes of green finance projects. Systematic reviews and empirical studies published in 2024–2025 confirm that advanced cold-chain technologies reduce both energy use and food waste. This leads not only to a lower carbon footprint but also to improved food security. Evidence shows that investments through GEFF, SLBs, or green bonds targeting cold chain upgrades significantly reduce post-harvest losses (*ScienceDirect, 2024*).

At the macro–micro level, recent empirical work demonstrates that green finance contributes to reductions in **agricultural methane ($CH_4$) and nitrous oxide ($N_2O$) emissions** and supports food security by enhancing resource efficiency. These findings validate the dual role of green finance in promoting both ecological sustainability and food security. Reported improvements in corporate-level indicators of energy efficiency and emission reductions (around 20–25%) are consistent with the claims made in this thesis (*ScienceDirect, 2023–2024*).

In conclusion, the literature highlights how the combined use of **green bonds, SLBs, and GEFF loans** contributes to: (i) reduced energy and water intensity, (ii) lower $CO_2$ footprints, (iii) accelerated technological modernization, (iv) stronger investor confidence and higher firm valuations, and (v) improved food security through cold-chain efficiency and lower food losses.

These scholarly findings provide strong empirical support for the thesis statement that "green finance instruments can reduce emissions and energy use by 20–25%, improve market trust and competitiveness when KPIs are met, and significantly enhance food system resilience."

**Results.** The compiled evidence from multiple international sources highlights the diverse channels through which green finance instruments contribute to the development of the food sector in Uzbekistan. The EBRDs Milk Euro Food project demonstrates a clear case where targeted investment in energy-efficient technologies leads to both environmental and financial benefits, including a reduction of 6,500 $m^3$ of water use and 368 tons of $CO_2$ emissions annually.

Similarly, the **GEFF (EBRD)** program underlines the importance of blended finance in promoting modernization of cooling and pumping systems, thereby improving overall energy efficiency within the sector.

**Table 1. Green Financing and Food Sector Statistics**[1]

| Source / Indicator | Key Figures / Results | Reference |
|---|---|---|
| EBRD – Milk Euro Food (Uzbekistan) | $6.3 million package; water use −6,500 $m^3$/year, $CO_2$ −368 t/year | EBRD PSD, 2023 |
| GEFF (EBRD) – Uzbekistan | Modernization of cooling and pumping systems; improvement in energy efficiency | EBRD GEFF Uzbekistan |
| Food Loss Index (SDG 12.3.1a) | Food losses (%) monitored since 2015 | FAO, SDG 12.3.1a portal |
| UNICEF MICS 2021–22 (Uzbekistan) | Stunting, wasting, WASH indicators (child nutrition) | UNICEF MICS 2021–22 report |
| WDI – Agricultural $CH_4$ and $N_2O$ (Uzbekistan) | $CH_4$ and $N_2O$ emissions (Mt $CO_2e$, AR5 methodology) | World Bank, WDI DataBank |
| FAOSTAT – Food Security & Nutrition (Uzbekistan) | Calorie supply, undernourishment, dietary composition | FAOSTAT (HDX portal) |
| OECD – Financing Uzbekistan's Green Transition | Policy recommendations for developing the green bond market | OECD (2023) Green Transition report |
| Climate Bonds Initiative – Global State of the Market 2024 | Record GSS+ issuance in 2024; downward trend expected in 2025 | Climate Bonds Initiative (2024) |

The **Food Loss Index (SDG 12.3.1a)** and **UNICEF MICS 2021–22** provide essential evidence of the socio-economic and nutritional dimensions of food security. These datasets reveal persistent challenges in food losses, child malnutrition, and WASH indicators, which green finance initiatives can indirectly address through improved supply chains and infrastructure investments. The **WDI agricultural $CH_4$ and $N_2O$ data** emphasize the environmental footprint of Uzbekistan's agriculture, indicating that targeted green finance has the potential to mitigate greenhouse gas emissions at the sectoral level.

Moreover, **FAOSTAT nutrition indicators** point to ongoing concerns about undernourishment and dietary quality, which are closely linked to the resilience of food production and distribution systems. At the policy level, the **OECD report**underscores the need for a more developed green bond market in Uzbekistan, while the **Climate Bonds Initiative (2024)**situates the country within the broader global context of sustainable debt issuance, noting the global record issuance in 2024 followed by a decline in 2025.

**Analysis.** Taken together, these findings illustrate a coherent narrative: green finance interventions not only generate measurable environmental benefits (reduced emissions, energy savings, water efficiency), but also contribute to broader socio-economic outcomes such as improved food security, healthier diets, and reduced post-harvest losses. The synergy between environmental indicators (emissions, water use) and human development metrics (nutrition, WASH) highlights the dual role of green finance in achieving ecological sustainability and socio-economic resilience.

The evidence confirms that green finance instruments—green bonds, blended facilities like GEFF, and sustainability-linked instruments—are effective in addressing systemic challenges in the food sector. In Uzbekistan, such mechanisms have already delivered tangible improvements in resource

[1] https://www.fao.org/platform-food-loss-waste/flw-data/en/, https://www.oecd.org/en/topics/environment.html, https://www.climatebonds.net/data-insights/publications, https://mics.unicef.org/?utm_source=chatgpt.com

efficiency and emission reductions, while simultaneously strengthening food system resilience. However, the overall scope remains limited compared to the magnitude of the challenges, particularly in relation to undernourishment, food losses, and agricultural emissions.

**Conclusion.** The analysis shows that green finance instruments—particularly green bonds, sustainability-linked loans, and blended finance facilities such as GEFF—play a crucial role in modernizing Uzbekistan's food industry. These mechanisms generate measurable environmental benefits, including reductions of 20–25% in energy use and $CO_2$ emissions, while simultaneously improving food system resilience. Beyond ecological gains, they also enhance investor confidence, support access to international markets, and strengthen food security through more efficient cold-chain infrastructure and reduced post-harvest losses.

Recommendations:

Expand the green bond market: Develop a national framework aligned with international standards (ICMA, EU Taxonomy) to attract sustainable investment.

Scale up blended finance facilities: Broaden GEFF-style programs to provide affordable financing for SMEs in the food sector.

Integrate social KPIs: Include indicators related to food loss reduction, child nutrition, and WASH improvements in sustainability-linked instruments.

Strengthen MRV systems: Establish robust monitoring, reporting, and verification to ensure transparency and prevent greenwashing.

Policy coordination: Enhance collaboration between agriculture, finance, and environment ministries, supported by OECD and FAO guidance, to embed green finance into Uzbekistan's long-term food security strategy.

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