



## SDG 12: Responsible Consumption and Production

### Overview

The University of Science and Technology – Yemen (UST) actively advances **Sustainable Development Goal 12 (Ensure sustainable consumption and production patterns)** through sustainable campus operations, environmental education, applied research, and community outreach programs.

UST recognizes that responsible resource management and sustainable production are key to Yemen's recovery and resilience.

In 2024, the university integrated **green practices, waste reduction, resource efficiency, and environmental literacy** across its teaching, research, and operational systems.

UST's contributions to SDG 12 are structured around four pillars:

1. **Education and Research for Sustainable Production**
2. **Sustainable Campus Operations and Waste Management**
3. **Innovation and Industry Partnerships for Resource Efficiency**
4. **Community Outreach and Environmental Awareness**

### 1. Education and Research for Sustainable Consumption

#### a. Integration in Academic Curricula

UST embeds sustainability and responsible consumption concepts across undergraduate and postgraduate curricula, particularly in:

- Environmental engineering
- Industrial and manufacturing engineering
- Architecture and design
- Business administration and economics

Courses address:

- Sustainable materials and product life-cycle analysis
- Waste minimization in industrial processes
- Circular economy principles
- Environmental management systems (ISO 14001 framework)
- Corporate social responsibility (CSR) and ethical production

#### b. Student Projects and Theses

During 2023–2024, more than **60 student capstone projects** focused on sustainability-related topics, including:

- Renewable materials and green construction

- Recycling systems for plastics and e-waste
- Optimization of energy and water use in production systems
- Sustainable supply-chain management for Yemeni industries

### c. Research Publications

UST researchers published several relevant studies addressing sustainability and resource efficiency, including:

- *“Sustainable Waste Management Practices in Aden Industrial Zones”* – UST Journal of Environmental Science (2024)
- *“Optimization of Energy Consumption in Cement Production Plants in Yemen”* – Engineering Research Journal (2023)
- *“Circular Economy Applications in Post-Conflict Reconstruction Materials”* – UST Conference on Innovation and Sustainability (2024)

These research contributions directly support policy-making and industrial best practices for sustainable production in Yemen.

UST’s research advances the science and practice of responsible consumption and sustainable production through projects in waste management, circular economy, renewable materials, and green manufacturing.

Year	Project / Publication	SDG 12 Relevance
2024	<i>Solid Waste Management and Recycling Strategies for Yemeni Cities</i> — UST Journal of Environmental Engineering	Proposes sustainable waste segregation and recycling models.
2024	<i>Lifecycle Analysis of Cement and Building Materials in Yemen</i> — Faculty of Civil Engineering	Identifies energy-efficient production and emission-reduction opportunities.
2023 – 2025	<i>Pharmaceutical Waste Disposal and Environmental Impact in Health Institutions</i> — Faculty of Pharmacy	Evaluates sustainable management of biomedical and chemical waste.
2024	<i>Circular Economy Opportunities in Yemen’s Food and Agriculture Sector</i> — Faculty of Business Studies	Develops strategies for reducing food waste and improving resource efficiency.
2024	<i>Renewable Material Innovations for Packaging and Construction</i> — UST Engineering Research Group	Advances sustainable alternatives to plastics and imported materials.

These studies demonstrate how UST researchers are aligning scientific inquiry and applied innovation with SDG 12 targets — particularly 12.2 (sustainable resource use), 12.4 (chemical waste management), and 12.5 (waste reduction).

## 2. Sustainable Campus Operations and Resource Management

UST is committed to leading by example through the implementation of **sustainable operational practices** across its campuses.

#### **a. Waste Management and Recycling**

- Implementation of a **three-phase waste management program (2022–2024)** that includes segregation, recycling, and composting.
- Introduction of **separate waste bins** across all campus buildings for plastics, paper, and general waste.
- Collaboration with local recycling firms to process collected materials.
- Awareness campaigns led by the **UST Environmental Club** to promote waste sorting among students and staff.

#### **b. Energy and Water Efficiency**

- Installation of **solar photovoltaic systems** on selected campus facilities in Aden and Sana'a.
- Retrofitting lighting with energy-efficient LED fixtures.
- Implementation of a **water conservation plan**, including low-flow faucets and rainwater collection systems for landscaping.
- Transition to **digital documentation** and online forms to reduce paper consumption by an estimated **45% between 2022–2024**.

#### **c. Green Procurement Policy**

- UST's purchasing policy prioritizes **local, ethical, and sustainable suppliers**.
- Preference is given to vendors offering recyclable materials and reduced packaging.
- Procurement of environmentally friendly cleaning products and paper supplies certified for sustainability.

### **3. Innovation and Partnerships for Sustainable Production**

#### **a. Collaboration with Industry**

UST works closely with private and public-sector partners to advance sustainable production practices:

- **Aden Cement Factory** – joint research on energy efficiency and emission reduction.
- **Public Electricity and Energy Corporation** – renewable energy integration projects.
- **Local manufacturing SMEs** – student-led audits on waste minimization and eco-efficiency.

These collaborations allow technology transfer from academia to industry, aligning Yemen's production systems with sustainability goals.

#### **b. Entrepreneurship and Innovation**

The **Center for Innovation and Entrepreneurship (CIE)** encourages projects that address sustainability challenges:

- 2024 Innovation Challenge theme: *“Green Technologies for Yemen’s Recovery”* – awarded 5 student start-ups focusing on waste-to-energy, recycling, and biodegradable packaging.
- Mentorship programs with local industry experts on sustainable product development.
- Launch of **“Eco-Innovators Hub”**, a platform connecting students and entrepreneurs to develop low-cost, eco-friendly solutions for local markets.

#### 4. Community Engagement and Awareness

##### a. Environmental Awareness Campaigns

UST organizes community-focused awareness programs on waste reduction, resource conservation, and responsible consumption.

Highlights from 2024:

- **“Green Week Yemen 2024”**, organized by the Faculty of Environmental Sciences — featured public workshops, exhibitions, and eco-innovation competitions.
- Student volunteers conducted **neighborhood cleanup drives** in Aden and Sana’a.
- Public seminars on **“Sustainable Consumer Choices”** in partnership with local NGOs and municipalities.

##### b. Capacity Building and Training

The **Community Service and Continuing Education Center** conducted over **20 training workshops** in 2024 on:

- Environmental management systems (EMS)
- Waste segregation and recycling practices
- Energy auditing and sustainable procurement

These programs reached more than **600 participants**, including students, local business owners, and municipal staff.

##### c. Digital Education for Sustainability

Through the **2024 International Conference on Learning and Distance Education**, UST promoted e-learning initiatives that reduce paper waste, energy use, and travel-related carbon emissions.

This digital transformation contributes indirectly to SDG 12 by promoting **responsible resource use in educational delivery**.

#### 5. Performance Indicators (2024)

Indicator	2024	Progress / Description
Research publications addressing SDG 12 themes	14	Sustainability, waste, circular economy, and energy optimization.
Student sustainability projects and theses	12+	Architecture, engineering, and business programs.

Indicator	2024	Progress / Description
Waste reduction achieved on campus	45%	Through recycling, composting, and paper reduction.
Solar energy contribution to campus power use	25%	Installation of new PV panels.
Participants in sustainability workshops and training	78+	Including municipal staff and youth groups.
Number of green start-up projects supported	5	Through the 2024 Eco-Innovation Challenge.
Volume of recycled waste processed (annual)	2.5 tons	Verified through local recycling partner reports.

## 6. Case Studies

### Case Study 1 – Campus Waste Recycling Program

In partnership with **Aden Municipality**, UST implemented a pilot waste-sorting system in 2024 that diverted **2.5 tons of recyclable materials** from landfills.

The initiative also engaged **student volunteers** to manage awareness and collection logistics, developing leadership skills and environmental responsibility.

### Case Study 2 – “Green Technologies for Yemen’s Recovery” Innovation Challenge

Held by the **Center for Innovation and Entrepreneurship**, this competition supported five winning student projects that created:

- Solar-powered street lighting modules using recycled materials.
- Biodegradable packaging for local markets.
- Low-cost waste-to-energy converter for rural areas.

These innovations are currently being prepared for commercialization in partnership with local firms.

### Case Study 3 – Sustainable Construction Materials Research

Faculty of Engineering researchers developed **eco-friendly bricks** using industrial by-products, reducing cement use by 30%.

The research was featured in the 2024 UST Innovation and Sustainability Symposium and gained interest from local construction companies.

## 7. SDG Linkages

Linked SDG	Connection
<b>SDG 6</b> – Clean Water and Sanitation	Water recycling and efficiency measures.
<b>SDG 7</b> – Affordable and Clean Energy	Solar energy and energy optimization research.
<b>SDG 9</b> – Industry, Innovation and Infrastructure	Sustainable production technologies and circular economy.

## Linked SDG

**SDG 11** – Sustainable Cities and Communities

**SDG 13** – Climate Action

**SDG 17** – Partnerships for the Goals

## Connection

Waste management and green urban practices.

Emission reduction and environmental awareness.

Collaborations with industry and municipalities.

## 8. Future Outlook (2025 Targets)

UST aims to strengthen its leadership in sustainable operations and green innovation through:

1. Achieving **60% waste recycling rate** by end of 2025.
2. Expanding **solar power systems** to cover 40% of campus electricity use.
3. Launching a **Master’s program in Sustainable Production and Circular Economy**.
4. Publishing at least **10 new SDG 12-related research papers** in international journals.
5. Partnering with **private sector companies** to establish a **Green Business Incubator** on campus.
6. Conducting **nationwide awareness campaigns** on responsible consumption and waste minimization.

## 9. Conclusion

In 2024, UST demonstrated a strong and integrated commitment to **responsible consumption and production**.

From green campus practices to applied research and innovation, the university has built a foundation for sustainable growth, resource efficiency, and environmental awareness in Yemen. By combining education, technology, and community engagement, UST is not only reducing its environmental footprint but also fostering a **culture of sustainability** among its students, staff, and society at large.

These efforts position UST as a national model for sustainability leadership aligned with **SDG 12**.