

“Guidelines for SMEs on the Use of Smart Contracts in Contributing to the Sustainable Development Goals (contributing to ISO/AWI PAS 24874) and Utilizing DLT Transactions for Reporting Verifiable ESG Criteria to Relevant Stakeholders”

1. Introduction

The world is evolving rapidly, and businesses must innovate to keep SUSTAINABILITY. For **Small and Medium-sized Enterprises (SMEs)**, the challenge is how to grow sustainably while meeting the increasing demands for **Environmental, Social, and Governance (ESG)** transparency. By integrating **Smart Contracts** and **Distributed Ledger Technology (DLT)**, SMEs can streamline operations, contribute to global **Sustainable Development Goals (SDGs)**, and report ESG criteria in a verifiable and transparent manner.

This guideline provides Small and Medium-sized Enterprises (SMEs) with a comprehensive framework for using smart contracts and Distributed Ledger Technology (DLT) in alignment with the Sustainable Development Goals (SDGs). It also offers best practices on how to leverage these technologies to report Environmental, Social, and Governance (ESG) criteria transparently and verifiably to relevant stakeholders, contributing to compliance with **ISO/AWI PAS 24874**

ISO/AWI PAS 24874¹ is a guidebook currently in development by ISO/TC 307, focusing on the use of smart contracts to support Sustainable Development Goals (SDGs). It is designed to explore how blockchain-based smart contracts can enhance transparency, efficiency, and accountability in achieving these global objectives. The standard has the aim to provide practical frameworks and methodologies for implementing smart contracts effectively in sustainable projects.

2. Understanding Smart Contracts and DLT

- Smart Contracts: Self-executing digital contracts with terms directly written into code, facilitating automated, secure, and transparent transactions without intermediaries.
- Distributed Ledger Technology (DLT): A decentralized database maintained across a network, enabling secure, transparent, and immutable recording of transactions.

¹ <https://www.iso.org/standard/88312.html>

These technologies have significant potential for enhancing SMEs' contribution to SDGs by improving accountability, transparency, and efficiency in their operations.

3. Contribution to the Sustainable Development Goals (SDGs)

Smart contracts and DLT can support SMEs in achieving and demonstrating their alignment with SDGs² by:

- Enhancing transparency: Providing verifiable records of activities that contribute to SDGs, such as responsible sourcing, fair labor practices, and sustainable resource management.
- Automating sustainability practices: Implementing smart contracts to automatically enforce compliance with sustainability criteria and SDG-aligned goals.
- Facilitating traceability: Tracking the lifecycle of products and services to ensure adherence to sustainability standards.

4. Key Steps for Implementing Smart Contracts to Support SDGs³

4.1. Define Objectives and Scope

- Identify 17 Sustainable Development Goals⁴ and 169 targets that align with your business operations and strategic goals.
- Define specific Environment, Social and Governance criteria relevant to your industry and stakeholders.
- Set clear, measurable targets for each SDG (i.e. “Ensure healthy lives and promote well-being for all at all ages” GOAL3 -, “Employment creation” GOAL 4, etc.) that can be tracked using smart contracts and DLT, monitoring also last SDG Progress Report.

4.2. Develop Smart Contract Frameworks

- Create smart contracts that enforce ESG-related terms and conditions, such as for example: *carbon emission and/or waste reduction (environmental); increasing of*

² *Guidelines for Improving Blockchain’s Environmental, Social and Economic Impact, World Economic Forum (WEF) -2023*

³ *“The Role of Smart Contracts in Sustainability: Worldwide Research Trends”, Esther Salmerón-Manzano, Universidad Internacional de La Rioja and Francisco Manzano-Agugliaro, Universidad de Almería*

⁴ <https://sdgs.un.org/2030agenda>

corporate welfare and work-life balance (social); increasing the value chain transparency (governance).

- Collaborate with technology experts or service providers specializing in DLT to ensure the smart contract code is secure, efficient, and aligned with your sustainability objectives by periodical Audits⁵ based on the Team, the Community and the Code.

4.3. Integrate with Supply Chain Partners

- Engage supply chain partners in adopting smart contracts and DLT for consistent, transparent ESG reporting.
- Implement blockchain-based traceability systems for example in food or fashion industries to monitor compliance with sustainability standards across the entire supply chain⁶.

4.4. Monitor and Report Progress

- Use DLT to record and verify ESG transactions, making data accessible and immutable.
- Regularly audit smart contract executions to ensure compliance with ESG criteria and SDG targets⁷.
- Share verified ESG data with stakeholders, enhancing credibility and demonstrating commitment to sustainability.

5. Utilizing DLT Transactions for ESG Reporting

5.1. Establish Clear ESG Metrics

- Ensure KPIs are aligned with recognized ESG frameworks (e.g., GRI, SASB, or TCFD) and regulations (e.g. CSRD, CSDDD)⁸.

⁵ *Comprehensive Smart Contract Audit Readiness Guide, Open Zeppelin -2022*

⁶ *“Proof of Concept Report: Harnessing the potential of blockchain technology for due diligence and sustainability in textile and leather value chains”, United Nations- Economic and Social Council - 2023*

⁷ *“Progress towards the Sustainable Development Goals”, Report of the UN Secretary-General -2024*

⁸ *“Adopting Blockchain-based E-Liability ESG reporting to comply with the upcoming CSRD regulation”, DELOITTE- 2024*

- Define key ESG performance indicators (KPIs) in areas such as energy consumption, waste management, social impact, and governance practices.

For defining KPIs we should consider “module’s topics” (as drivers) evaluated and concept of “materiality” and its importance in the audit of financial statements and now in CSRD with concept of “double materiality”, both financial and impact.

Materiality KPIs (Key Performance Indicators) are metrics used to measure and disclose a company’s performance against its most significant Environmental, Social, and Governance (ESG) risks and opportunities. Below is a categorized list of common materiality KPIs used across various industries, tailored to align with global reporting standards such as GRI, SASB, and the TCFD.

Environmental KPIs	Social KPIs	Governance KPIs
Greenhouse Gas (GHG) Emissions <ul style="list-style-type: none"> - Scope 1, 2, and 3 emissions (in metric tons of CO₂ equivalent). - Carbon intensity (emissions per unit of revenue or product output). 	Diversity, Equity, and Inclusion (DEI) <ul style="list-style-type: none"> - Workforce diversity (e.g., gender, ethnicity) by job category. - Pay equity metrics (gender pay gap, living wages). 	Board Composition and Independence <ul style="list-style-type: none"> - Percentage of independent board members. - Diversity metrics for board and executive leadership.
Energy Management <ul style="list-style-type: none"> - Total energy consumption (renewable vs. non-renewable sources). - Energy efficiency improvements (e.g., reduction in energy use per product). 	Employee Health and Safety <ul style="list-style-type: none"> - Total recordable incident rate (TRIR) or lost time injury rate (LTIR). - Occupational health program participation rates. 	Ethical Business Practices <ul style="list-style-type: none"> - Number of confirmed incidents of corruption or ethical violations. - Employee training completion rates on ethics policies.
Water Management <ul style="list-style-type: none"> - Total water withdrawal and consumption by source. - Water reuse and recycling rates. 	Community Impact <ul style="list-style-type: none"> - Local hiring rates and economic contributions to communities. - Donations or investments in community development projects. 	Cybersecurity and Data Privacy <ul style="list-style-type: none"> - Number of data breaches and incidents reported. - Investments in IT security infrastructure.
Waste Management <ul style="list-style-type: none"> - Total waste generated (hazardous and non-hazardous). - Waste diversion rate (percentage diverted from landfills). 	Human Rights <ul style="list-style-type: none"> - Cases of child or forced labor identified and remediated. - Supplier audits for adherence to human rights policies. 	ESG Strategy and Oversight <ul style="list-style-type: none"> - Integration of ESG goals into executive compensation. - Public disclosure of ESG risk assessments (e.g., climate risk).
Biodiversity and Land Use <ul style="list-style-type: none"> - Impact on protected areas or areas of high biodiversity value. - Land restoration and conservation initiatives. 	Training and Development <ul style="list-style-type: none"> - Hours of training provided per employee. - Percentage of workforce with access to upskilling programs. 	Stakeholder Engagement <ul style="list-style-type: none"> - Frequency and quality of stakeholder engagement activities. - Results of stakeholder satisfaction surveys.

Sector-Specific KPIs

Depending on the industry **Statistical Classification of Economic Activities in the European Community**, commonly referred to as **NACE**, is the industry standard classification system used in the European Union. NACE CODE⁹ material KPIs may vary:

- **Financial Services:** *Green financing volume, portfolio emissions intensity.*

⁹ https://en.wikipedia.org/wiki/Statistical_Classification_of_Economic_Activities_in_the_European_Community

- **Healthcare:** Access to affordable medicine, patient safety metrics.
- **Manufacturing:** Lifecycle emissions of products, sustainable raw material sourcing.

These KPIs should be tailored to align with a company's specific material ESG issues and regulatory requirements. Tools like the GRI Standards or SASB Materiality Map can further refine KPI selection.

5.2. Record ESG Data on the DLT

- Capture ESG-related data (e.g., energy usage, waste reduction, social initiatives) in real-time using IoT devices, other technologies, oracle platforms or manual inputs.
- Utilize smart contracts to validate and record transactions on the DLT, ensuring accuracy, timestamping and reducing the risk of manipulation of data.

Several companies and institutions are leveraging Distributed Ledger Technology (DLT) to enhance ESG (Environmental, Social, and Governance) data disclosure.

Here are some notable examples and practices:

- **Circularise:** This company focuses on creating transparency in supply chains by using blockchain to authenticate the sustainability credentials of materials, particularly in industries like plastics and chemicals. Their platform ensures verifiable and immutable ESG data sharing.
- **Energy Web Foundation:** They utilize blockchain to manage ESG data in energy systems, providing a decentralized approach to tracking renewable energy production and carbon credits.

5.3. Provide Transparent and Verifiable Reporting

- Generate reports from the DLT to present verifiable ESG data to stakeholders, including investors, customers, regulators, and the public (e.g. ESAP¹⁰).

¹⁰ The three European Supervisory Authorities (EBA, EIOPA and ESMA – the ESAs) today published the [Final Report](#) on the draft implementing technical standards (ITS) regarding certain tasks of the collection bodies and functionalities of the European Single Access Point (ESAP).

The ESAP is foreseen in Level 1 legislation to be a two-tier system, where information is first submitted by entities to the “collection bodies” – Officially Appointed Mechanisms (OAMs), offices and agencies of the EU, national authorities, among others – and then made available by the collection bodies to the ESAP. These ITS¹¹ are the first milestone for the successful establishment of a fully operational ESAP. The requirements are designed to enable future users to be able to access and use financial and sustainability information effectively and effortlessly in a centralised ESAP platform.

- Use standardized format for ESG reporting to enhance comparability and credibility. Each standard is divided into "Disclosure Requirements" (DR), which specify the data to be collected and included in the report.

For example, the climate standard includes DR such as *decarbonization strategies, climate adaptation initiatives, transition plans and associated financial means*.

Example: Detailed KPI Example (Social)

Metric: Workforce Diversity

- **Goal:** Achieve 50% female representation in leadership roles by 2025.
- **Data Visualization:** Pie chart showing current gender split; trendlines for historical progress.
- **Data Sources:** HR analytics software and employee surveys.

5.4. Engage Stakeholders

- Allow stakeholders access to DLT data through user-friendly platforms, enabling them to verify ESG claims.

Best Practices for Materiality KPIs Visualization

- **Interactivity:** a) Use interactive dashboards (e.g., Power BI or Tableau) to allow stakeholders to drill down into specific metrics; b) giving access to information as verifier on DLT by open badge 3.0 for single Criteria/Goal.
- **Comparative Analysis:** Show benchmarks vs. industry averages.

¹¹ The ITS on the functionalities of the ESAP specify the requirements for making information easily accessible to users. These requirements define, among other things, how reporting entities should be categorised by industry and size, which identifier should be used, what types of information should be made available on the ESAP, and the characteristics of the public Application Programming Interface (API) available to data users.

- **Trendlines:** Highlight historical and projected trends.

- Incorporate feedback from stakeholders by survey, comments, public audition, etc. to continuously improve your ESG practices and reporting.

6. Compliance with ISO/AWI PAS 24874 and other ISO TC 307 Standards

- Adhere to the requirements outlined in ISO/AWI PAS 24874 for the use of smart contracts and DLT in supporting SDGs and ESG reporting.

- Regularly update smart contracts and DLT systems to align with evolving standards, ensuring your practices remain compliant.

- Verify link with relevant Standards in blockchain (ISO TC 307) can impact on topic of this guidelines are:

- *ISO TC 307 JWG4- Security, privacy and identity for blockchain and DLT*
- *ISO TC 307 WG3 – Smart Contract and their application*
- *ISO TC 307 WG5 – Governance*
- *ISO/TC 307/WG 6 – Use Cases*
- *ISO/TC 307/WG 7 - Interoperability*
- *CEN/CLC/ JTG 19/WG 02 - Environmental Sustainability*
- *CEN/CLC/ JTG 19/WG 01 – Decentralised Identity Management*

7. Challenges and Risk Management

- Data Privacy¹²: Ensure that the use of DLT complies with data protection regulations (e.g., GDPR, E-Privacy, DATA ACT, etc.).

- Smart Contract Security¹³: Regularly audit and test smart contracts to mitigate risks of bugs or vulnerabilities.

- Interoperability¹⁴: Choose DLT platforms that support interoperability with other systems, enabling seamless integration with existing technologies.

¹² “Blockchain and the GDPR”, European Union Blockchain Observatory & Forum - 2019

¹³ “Blockchain applications in the United Nations system: towards a state of readiness” United Nations, Prepared by Petru Dumitriu -2020

¹⁴ “A Framework for Standardization of Distributed Ledger Technologies for Interoperable Data Integration and Alignment in Sustainable Smart Cities”, Journal of the Knowledge Economy- 2023

8. Case Studies and benchmark with Best Practices

- Highlight successful examples of SMEs using smart contracts and DLT for ESG reporting and SDG contributions.

Fujitsu: Through their technology and infrastructure called “Data e-TRUST” based on DLT Hyperledger Fabric & Besu, they provide reliable, traceable and immutable data on the conditions of this wasted water. Creating a certification between parties, without the need for a trusted third party, and allowing the reuse of this water between third parties. The project named “botanical water” enables the fulfilment of ESG criteria for companies by reducing water use, reducing water stress, promoting smart water use, and generating wealth through water reuse. It also enables the generation of an ethical and efficient market for water credits. The Project, recognized by United Nations and Alastria¹⁵, addresses several SDGs and ESG criteria:

- (Goal 9) Industry, innovation and infrastructure. The objective is to implement a layer of transparency and guarantee in the primary sector industry, providing disruption of the model: no intermediaries, reliable data, ethical market.
- (Goal 12) Responsible production and consumption. The aim is to make production more sustainable and reduce its impact on the environment.
- (Goal 13) Climate action. The aim is to conserve the earth’s moisture cycle and mitigate drought.
- (Goal 15) Life of terrestrial ecosystems. The aim is to improve the production cycle of fruit and vegetables, reusing part of the water.

Project Savannah (UNDP): The United Nations Development Programme's Project Savannah¹⁶ uses verifiable credentials to support SMEs in their ESG efforts. By standardizing and digitizing sustainability metrics, the project improves data reliability and accessibility, enabling companies to meet global ESG requirements and access green financing opportunities

- Share lessons learned and best practices for implementing these technologies effectively and efficiently.

¹⁵ <https://alastria.io/en/botanical-water-2/>

¹⁶ ” White Paper on Project Savannah: Common ESG Metrics for Generating Digital Sustainability Credentials for MSMEs”, United Nations Development Programme (UNDP) - The Monetary Authority of Singapore (MAS) - Global Legal Entity Identifier Foundation (GLEIF)- 2024

9. Conclusion: “A sustainable and decentralised future for SMEs”

The integration of Smart Contracts and Distributed Ledger Technology (DLT) represents a significant opportunity for Small and Medium-sized Enterprises (SMEs) to modernize their operations while contributing to a sustainable future. These technologies are not just tools for automation or efficiency—they are enablers of transparency, accountability, and trust. By embracing smart contracts, SMEs can simplify complex processes, enforce sustainability standards, and reduce reliance on intermediaries. Meanwhile, DLT provides a secure and immutable platform for recording and sharing verifiable data, ensuring stakeholders have access to real-time updates on Environmental, Social, and Governance (ESG) performance.

For SMEs, sustainability is no longer optional. Governments, investors, customers, and other stakeholders increasingly demand verifiable proof of commitment to Sustainable Development Goals (SDGs). Smart contracts and DLT make it possible to meet these demands with precision and confidence, fostering stronger relationships with partners, regulators, and consumers.

Moreover, these technologies allow SMEs to scale their sustainability efforts. Whether tracking carbon emissions, enforcing fair labor practices, or enhancing governance transparency, smart contracts and DLT provide SMEs with the tools to operate ethically and efficiently. By reducing compliance costs, preventing fraud, and improving data accuracy, SMEs can reinvest resources into innovation and growth while staying aligned with global sustainability goals.

As the global economy pivots toward a more sustainable and inclusive model, SMEs have a unique opportunity to lead the way by adopting these innovative technologies. By doing so, they can position themselves as responsible and forward-thinking businesses that drive positive change, strengthen stakeholder trust, and gain a competitive edge in an increasingly eco-conscious market.

Embracing smart contracts and DLT is not just a step toward compliance; it is a commitment to a better, sustainable future. Together, we can create a world where

economic growth is balanced with social equity and environmental preservation, ensuring that no one is left behind.

Now is the time for SMEs to take bold action and contribute to a sustainable and prosperous future for all!

Possible use of Smart Contracts and DLT for ESG impact

1. Environmental Criteria

In the environmental dimension, SMEs can use smart contracts and DLT to promote responsible resource usage, reduce waste, and minimize negative environmental impacts.

Key Environmental SDGs:

- ***SDG 6 (Clean Water and Sanitation),***
- ***SDG 7 (Affordable and Clean Energy),***
- ***SDG 12 (Responsible Consumption and Production),***
- ***SDG 13 (Climate Action),***
- ***SDG 14 (Life Below Water),***
- ***SDG 15 (Life on Land).***

Best Practices:

1. Energy Efficiency Monitoring:

- a. **Smart Contracts:** Implement smart contracts that automatically measure and enforce energy efficiency standards within your operations. For instance, a smart contract could trigger payments or penalties based on energy consumption levels in public procurements
- b. **DLT:** Use DLT to record real-time energy consumption data from IoT sensors, creating an immutable record for auditing and reporting. This ensures transparency in meeting carbon reduction commitments and stakeholders monitoring (e.g. Smart Cities)

2. Carbon Emission Tracking and Offsetting:

- a. **Smart Contracts:** Automate carbon credit purchases using smart contracts based on pre-determined emission thresholds. This ensures accountability when an SME exceeds its emission goals.
- b. **DLT:** Record carbon emissions data on a distributed ledger to provide verifiable evidence of emissions levels and offsetting actions.

3. Sustainable Resource Management:

- a. **Smart Contracts:** Enforce sustainable sourcing practices via smart contracts that automatically validate suppliers based on environmental performance criteria (e.g., adherence to sustainable forestry or agricultural practices).
- b. **DLT:** Use DLT for product traceability, ensuring that raw materials are sustainably sourced and comply with environmental standards throughout the supply chain.

4. Waste Management and Recycling:

- a. **Smart Contracts:** Implement contracts that incentivize recycling by automating rewards for meeting waste reduction goals, specially for citizens.
- b. **DLT:** Track waste disposal and recycling practices using DLT, ensuring that waste is handled in accordance with local regulations and sustainability commitments.

2. Social Criteria

The social dimension involves promoting fair labor practices, welfare benefits, community engagement and human rights. SMEs can harness smart contracts and DLT to create more equitable and transparent practices in these areas.

Key Social SDGs:

- **SDG 1 (No Poverty),**
- **SDG 3 (Good Health and Well-being),**
- **SDG 4 (Quality Education),**
- **SDG 5 (Gender Equality),**
- **SDG 8 (Decent Work and Economic Growth),**
- **SDG 10 (Reduced Inequality),**
- **SDG 11 (Sustainable Cities and Communities).**

Best Practices:

1. **Fair Labor Practices and Worker Rights:**

- a. **Smart Contracts:** Automate wage payments and ensure contract terms comply with labor laws, providing transparency and ensuring workers are compensated fairly.
- b. **DLT:** Record employment contracts, working hours, and wage payments on a decentralized ledger to prevent exploitation and enhance transparency in labor practices.

2. **Health and Safety Compliance:**

- a. **Smart Contracts:** Automatically enforce health and safety standards within the workplace. Smart contracts can trigger alerts or corrective actions when certain safety thresholds are breached.
- b. **DLT:** Store health and safety audits on a distributed ledger, creating an immutable record of compliance and corrective actions taken.

3. **Diversity and Inclusion Initiatives:**

- a. **Smart Contracts:** Establish and enforce quotas or goals related to diversity hiring or gender balance, triggering automated hiring actions if diversity targets are not met.
- b. **DLT:** Track diversity metrics within your workforce using DLT, enabling verifiable and transparent reporting of inclusion initiatives to stakeholders.

4. **Social Impact Initiatives:**

- a. **Smart Contracts:** Use smart contracts to automate the issuing of credentials or funds or resources (welfare) for workers achievement development programs based on pre-set performance indicators (e.g., education support, healthcare access, work-life balance, etc.).

- b. **DLT:** Record the impact of social programs on the blockchain, providing transparent and auditable evidence of contributions to people strategy for workers or social causes link to improvement of local community.

3. Governance Criteria

The governance dimension focuses on ethical business conduct, corporate transparency, and effective oversight. Smart contracts and DLT can provide solutions for improving accountability and governance structures.

Key Governance SDGs:

- **SDG 9 (Industry, Innovation, and Infrastructure),**
- **SDG 16 (Peace, Justice, and Strong Institutions),**
- **SDG 17 (Partnerships for the Goals).**

Best Practices:

1. Transparent and Accountable Decision-Making:

- a. **Smart Contracts:** Implement smart contracts for governance decisions (e.g., board votes or shareholder actions). The smart contract can automate the voting process and ensure results are automatically enacted.
- b. **DLT:** Record governance decisions, such as executive decisions or board votes, on a distributed ledger, creating an immutable, transparent audit trail.

2. Anti-Corruption and Ethical Practices:

- a. **Smart Contracts:** Automate ethical compliance checks for transactions or partnerships. For example, a smart contract can block transactions with entities that fail to meet anti-corruption standards.
- b. **DLT:** Record all financial transactions on the blockchain to ensure transparency, reduce the risk of fraud, and provide an immutable record for audits.

3. Regulatory Compliance and Reporting:

- a. **Smart Contracts:** Embed compliance rules directly into smart contracts. If regulatory criteria are not met, contracts can be halted or trigger corrective actions.

- b. **DLT:** Use DLT for real-time regulatory reporting, providing a transparent and verifiable record of compliance with governance-related laws and standards.

4. **Supply Chain Governance:**

- a. **Smart Contracts:** Automatically enforce contracts with suppliers based on governance standards, such as ethical sourcing or responsible procurement.
- b. **DLT:** Record supplier audits and compliance metrics on DLT, allowing verifiable oversight of governance practices throughout the supply chain.

4. **Cross-Dimensional Best Practices**

In addition to focusing on individual ESG criteria, SMEs can adopt holistic best practices that integrate all sustainability dimensions.

Best Practices:

1. **Holistic ESG Data Collection and Reporting verifiable credentials on DLT:**

- a. **Smart Contracts:** Automate the collection of ESG data across environmental, social, and governance areas. Use contracts to trigger data submissions or reporting actions at regular intervals.
- b. **DLT:** Store ESG data on a distributed ledger to create a comprehensive, transparent, and immutable record of sustainability performance. This can be shared with stakeholders to demonstrate verifiable progress.

2. **Partnerships for Sustainability:**

- a. **Smart Contracts:** Establish and manage partnerships with NGOs, governments, or other businesses via smart contracts that define shared sustainability goals and responsibilities (e.g. in funding and/or public procurement process)
- b. **DLT:** Use DLT to track and report the progress of multi-party sustainability initiatives, ensuring all partners are accountable for their contributions to shared ESG goals.

3. **Stakeholder Engagement and Communication:**

- a. **Smart Contracts:** Automate stakeholder communications, such as triggering notifications when key ESG milestones are met or when corrective actions are taken.
- b. **DLT:** Provide stakeholders with real-time access to ESG data on DLT platforms, enhancing transparency and building trust through verifiable sustainability reporting.

4. **Innovation and Sustainability R&D:**

- a. **Smart Contracts:** Use smart contracts to manage innovation grants or funds aimed at sustainability research and development. Automatically disburse funds based on milestone achievements in R&D projects.
- b. **DLT:** Record intellectual property, patents, or innovations related to sustainability on a DLT, ensuring transparency and encouraging innovation-sharing for global sustainability goals.

SMEs are using blockchain and smart contracts for sustainable impact

These examples demonstrate that **blockchain** and **smart contracts** are not limited to large corporations; SMEs are leveraging these technologies to create substantial impacts on sustainability by enhancing transparency, accountability, and efficiency in their operations.

1. Provenance

Sector: Supply Chain Transparency

Technology Use: Blockchain

Impact on Sustainability:

Provenance, a UK-based SME, uses blockchain technology to ensure the transparency of product supply chains. By recording product journeys on an immutable ledger, the company allows consumers and businesses to verify the ethical sourcing of goods.

- **Environmental Impact:** Encourages sustainable sourcing by validating suppliers who adhere to eco-friendly practices.
- **Social Impact:** Promotes fair labor practices by tracking labor conditions in the supply chain.
- **Governance Impact:** Enhances trust through transparent reporting, allowing stakeholders to verify claims such as “carbon-neutral” or “ethically sourced.”

2. Everledger

Sector: Ethical Sourcing and Traceability

Technology Use: Blockchain

Impact on Sustainability:

Everledger, an SME based in the UK, tracks high-value goods like diamonds, wine, and batteries to ensure their ethical sourcing and proper recycling. Using blockchain, the company creates a digital twin of each product with information about its origin and lifecycle.

- **Environmental Impact:** Reduces environmental harm by tracking and encouraging responsible recycling of goods like batteries.
- **Social Impact:** Ensures ethical sourcing of diamonds, reducing human rights abuses in mining.
- **Governance Impact:** Provides immutable proof of compliance with international sourcing and environmental laws.

3. Circularise

Sector: Circular Economy and Resource Efficiency

Technology Use: Blockchain and Smart Contracts

Impact on Sustainability:

Circularise, a Dutch SME, uses blockchain to promote transparency in the circular economy. Their platform allows companies to share information about the materials they use, ensuring they are recyclable or made from recycled content.

- **Environmental Impact:** Encourages responsible consumption and production (SDG 12) by supporting material recycling and reuse.

- **Social Impact:** Boosts community awareness of sustainable practices through accessible material traceability.
- **Governance Impact:** Simplifies compliance with government regulations related to waste management and circular economy goals.

4. SmartAgri

Sector: Agriculture and Food Supply Chain

Technology Use: Blockchain and Smart Contracts

Impact on Sustainability:

SmartAgri, an SME based in South Africa, uses blockchain and IoT to monitor crop conditions, optimize water usage, and ensure fair trade practices in the food supply chain. Smart contracts automate payments to farmers when quality metrics are met.

- **Environmental Impact:** Reduces water waste through IoT-based monitoring and blockchain tracking.
- **Social Impact:** Provides small-scale farmers with timely payments and fair market access.
- **Governance Impact:** Creates transparency in food sourcing and pricing, building trust among stakeholders.

5. Plastic Bank

Sector: Recycling and Waste Management

Technology Use: Blockchain

Impact on Sustainability:

Plastic Bank, a Canadian SME, uses blockchain to incentivize recycling. People can collect plastic waste and exchange it for tokens recorded on a blockchain, which can be redeemed for essential goods.

- **Environmental Impact:** Reduces ocean-bound plastic waste and promotes recycling.
- **Social Impact:** Provides income opportunities for individuals in developing countries, helping alleviate poverty.

- **Governance Impact:** Ensures transparency in the recycling process, building trust among consumers and stakeholders.

6. SunContract

Sector: Renewable Energy

Technology Use: Blockchain and Smart Contracts

Impact on Sustainability:

SunContract, a Slovenia-based SME, connects renewable energy producers directly with consumers through a blockchain platform. Smart contracts automate energy transactions, reducing reliance on intermediaries.

- **Environmental Impact:** Promotes the use of renewable energy, reducing carbon emissions.
- **Social Impact:** Lowers energy costs for consumers and provides income for small-scale renewable energy producers.
- **Governance Impact:** Enhances transparency in energy transactions, ensuring accountability in renewable energy markets.

7. AgUnity

Sector: Agriculture and Community Development

Technology Use: Blockchain and Smart Contracts

Impact on Sustainability:

AgUnity, an SME in Australia, uses blockchain to empower smallholder farmers in developing countries. Their platform enables farmers to record and verify transactions, access markets, and collaborate efficiently.

- **Environmental Impact:** Reduces food waste by improving supply chain efficiency.
- **Social Impact:** Increases income for farmers and ensures fair trade practices.
- **Governance Impact:** Provides a transparent system for tracking transactions, fostering trust among farming communities.

8. Bioledger

Sector: Waste Management and Bioeconomy

Technology Use: Blockchain and Smart Contracts

Impact on Sustainability:

Bioledger, a UK-based SME, tracks organic waste streams on a blockchain, ensuring proper recycling and compliance with bioeconomy standards.

- **Environmental Impact:** Reduces waste mismanagement and promotes recycling of organic materials.
- **Social Impact:** Provides transparency in waste disposal, building trust with local communities.
- **Governance Impact:** Simplifies compliance with regulatory requirements for waste tracking and recycling.

9. Workers Badge/ Blockchain Credentials

Sector: Human Resource Management

Technology Use: Blockchain

Impact on Sustainability:

Workers Badge, an Italian-based SME, trace skills, experience and performance of Workers and Jobseekers, ensuring for them more chances to obtain achievements or obtain a job, and, for HR Officers less time and money in hiring process.

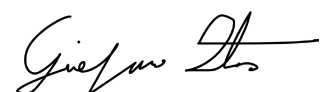
- **Environmental Impact:** Reduces paper thanks to digital credentialing DLT-based and favourite digital learning and smart working.
- **Social Impact:** Guarantee rewards by smart contract useful to continuous upskilling for less wealthy people and reduce unemployment.
- **Governance Impact:** Provides transparency in skills and job validation for all Job Stakeholders

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