

International Telecommunication Union

ITU-T

**Technical
Specification**

(03/2021)

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

ITU-T Focus Group on Environmental Efficiency for Artificial
Intelligence and other Emerging Technologies (FG-AI4EE)

FG-AI4EE D.WG1-04

**Key performance indicators for small
and medium enterprises to assess the
achievement of sustainable
development goals**

Working Group 1 - Requirements of AI and other
Emerging Technologies to Ensure Environmental
Efficiency

Focus Group Technical Specification

ITU-T



FOREWORD

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For more information about FG-AI4EE and its deliverables, please contact Charlyne Restivo (ITU) at tsbfgai4ee@itu.int.

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Technical Specification FG-AI4EE D.WG1-04

Key performance indicators for small and medium enterprises to assess the achievement of sustainable development goals

Summary

This ITU-T Technical Specification provides a set of key performance indicators (KPIs) for small and medium enterprises (SMEs) to help them achieve sustainable development goals (SDGs). It defines how environmentally sensitive issues could benefit from emerging technologies such as artificial intelligence (AI) and machine learning (ML), by providing a set of standard measurements and definitions in the form of a list of KPIs/metrics. This KPIs system focuses on finding indicators that are easy to measure and give a broad range of coverage. This system is for easy and straightforward use by SMEs and other smaller organizations. A set of 44 indicators is defined. Whenever possible, solutions rely on existing best practices and globally respected sources.

Keywords

Emerging technologies, environmental efficiency, KPI, SDG, SME.

Change Log

This document contains Version 1.0 of the ITU-T Technical Specification on "*Key performance indicators for small and medium enterprises to assess the achievement of sustainable development goals*" approved at the ITU-T Study Group 5 meeting held online, 11-20 May 2021.

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Technical Specification

Key performance indicators for small and medium enterprises to assess the achievement of sustainable development goals

Introduction

A list of 44 key performance indicators (KPIs) is provided together with their respective target sustainable development goals (SDGs) and enabling emerging technologies. Guidance on how these technologies can be applied to gather information, improve environmental efficiency, and communicate outcomes is also provided through examples.

1 Scope

This ITU-T Technical Specification outlines the key performance indicators (KPIs) in the context of smart, sustainable small and medium enterprises (SMEs) used to assess the achievement of sustainable development goals (SDGs). Evaluating these indicators can help SMEs, and their stakeholders understand to what extent their economic activity is sustainable.

The sustainability of SMEs is based on six main aspects:

- Work environment: taking into account the ability to ensure the welfare (safety, health, education, etc.) of the employees
- Transport: assessing the impact of transport of good and persons
- Emissions: evaluating greenhouse gases and noxious gases
- Procurement: measuring the effect of procuring resources deemed as unsustainable
- Energy: measuring the proportion of renewables and identifying the usage categories
- Waste: evaluating the enterprises' outputs.

This Technical Specification can be utilized as a:

- Compass of sustainability that allows SMEs to identify priorities on sustainability and track records.
- Communication tool for:
 - Financial institutions that set sustainability as a priority for investment and insurance
 - Employees or potential employees in search of environmentally friendly employers
 - Value chain partners (providers and customers) in search of a reduced footprint for their entire value chain.
 - Local authorities assessing the sustainability of current enterprises and startup creations.
 - Third party agencies and academia, supporting SMEs in the selection of relevant KPIs for assessing economic development.

There are currently many ecological reporting frameworks for large enterprises, but they are ill-suited for SMEs. The intention of identifying the KPIs is to establish the criteria to (self-)evaluate SMEs' performances and their progress towards becoming more innovative and sustainable. SMEs are encouraged to periodically check their performances against the recommended indicators listed in this Technical Specification to improve their performance.

Finally, this Technical Specification advises on how emerging technologies can be beneficial in reporting the metrics and, more importantly, enhancing the environmental impact of the SMEs processes and behaviours.

2 References

- [Herendeen] Herendeen, 2004, *Goods and Services: Energy Costs*.
<https://www.sciencedirect.com/science/article/pii/B012176480X000218>
- [Pearce] Pearce, 2012, *The case for open source appropriate technology*.
https://www.appropedia.org/w/images/0/0e/2012_case_for_OSAT.pdf

3 Definitions

3.1 Terms defined elsewhere

This Technical Specification uses the following terms defined elsewhere:

3.1.1 open-source appropriate technology (OSAT): [Pearce] Technologies for sustainable development that are designed similarly for free and open software. They are "easily and economically utilized from readily available resources by local communities to meet their needs and must meet the boundary conditions set by environmental, cultural, economic, and educational resource constraints of the local community"

3.1.2 embodied energy (EE): [Herendeen] The energy consumed 'upstream' to facilitate a flow of goods or services (units=energy)".

3.2 Terms defined in this Technical Specification

This Technical Specification defines the following terms:

3.2.1 GHG protocol scope 1-2-3: The GHG protocol¹ divides emissions into three mutually exclusive scopes:

- Scope 1: direct emissions from the company's vehicles and facilities
- Scope 2: indirect emissions related to production energy for own use (heating, cooling, electricity, etc.)
- Scope 3: any other indirect emissions related to the upstream production or downstream use of the manufactured goods and services.

As can be seen in Figure 1, while Scope 1 and 2 are relatively straightforward to compute, Scope 3 reportedly bears most of the companies' emissions but these emissions are much more complex to account for. Scope 3 accounting might currently not be affordable for most SMEs around the world. Nevertheless, to future-proof the KPIs, it is helpful to include Scope 3 values to anticipate future democratization. Thus, the Technical Specification allows 3 scopes, Scope 1 and 2 to be mandatory and Scope 3 when available.

¹ https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf

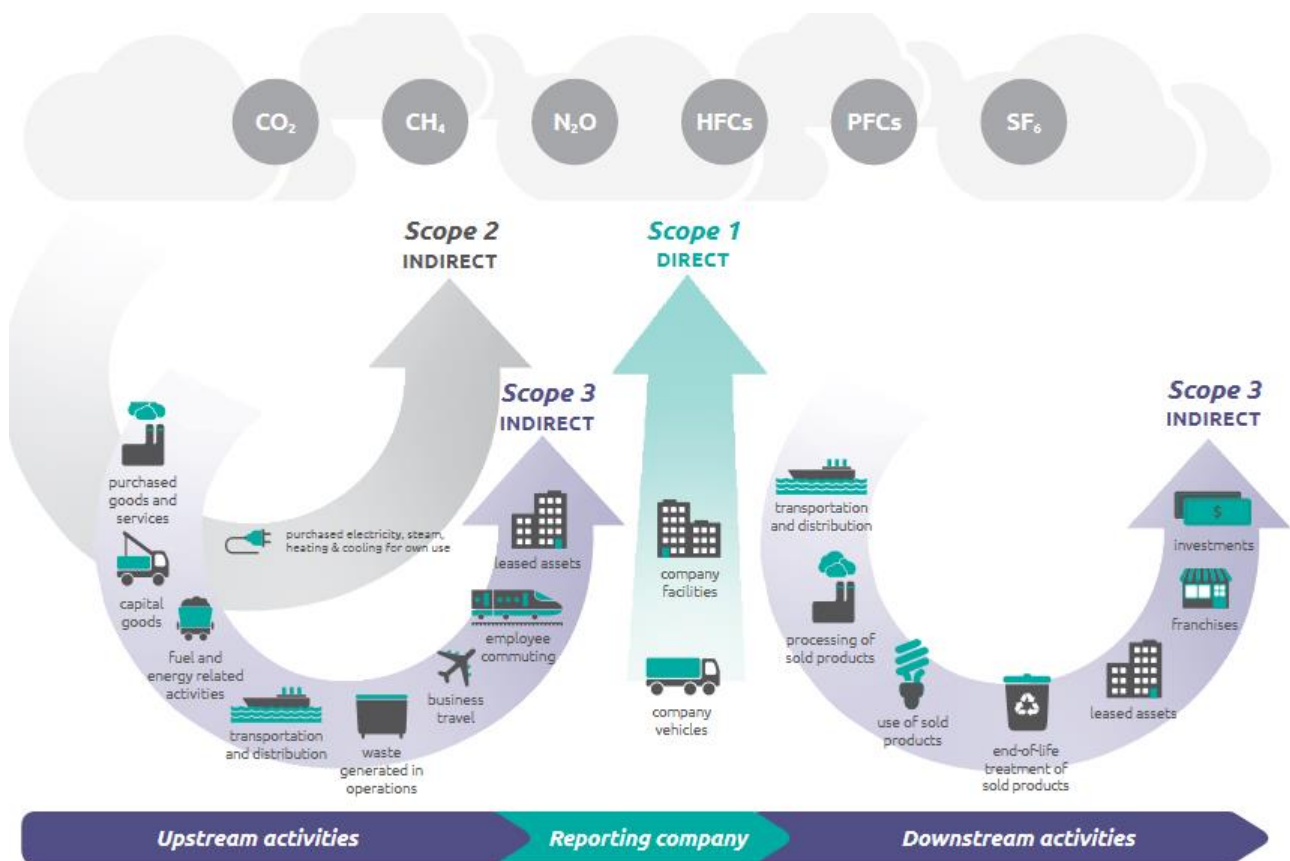


Figure 1 – Scope 1-2-3 emissions, credits²

3.2.2 Eco-lighthouse: Eco-lighthouse is a foundation that develops and administers the national certification scheme 'Eco-lighthouse' in Norway and in some other countries in Europe³. The foundation offers environmental regulation and a central ledger to store the environmental reporting.

3.2.3 MyClimate: A non-profit climate protection organization 'MyClimate' promotes climate protection on three levels: avoidance techniques such as capacity building and teaching, reduction (including energy efficiency, renewable energy and management methods) and carbon offsetting (e.g., air mileage)⁴.

3.2.4 small and medium-sized enterprise (SME): Given the lack of a global common definition of small and medium-sized enterprises an upper threshold number of employees of 250, without limitation of income, has been selected to define an SME for the purposes of this Technical Specification.

3.2.5 smart contracts: A distributed ledger technology allowing the electronic trackability of contracts without central servers. The technology helps authenticate the parties of a contractual transaction and a contract's terms: such as transfer of ownership and certificate of origin.

4 Abbreviations and acronyms

These Technical Specifications use the following abbreviations and acronyms:

AI Artificial Intelligence

² https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf

³ <https://en.wikipedia.org/wiki/Eco-lighthouse>

⁴ <https://en.wikipedia.org/wiki/Myclimate>

AR	Augmented Reality
B2B	Business to Business
dB	Decibel (unit of sound intensity)
DSP	Digital Signal Processing
EE	Embodied Energy
ERM	Enterprise Resource Management
ERP	Enterprise Resource Planning
GHG	Greenhouse Gas
HVAC	Heating, Ventilation and Air Conditioning
IoT	Internet of Things
ML	Machine Learning
OSAT	Open-Source Appropriate Technology
SME	Small and Medium-sized Enterprises
VOC	Volatile Organic Compounds
VR	Virtual Reality

5 List of KPIs/metrics

Table 1 lists 44 key performance indicators and metrics for small and medium enterprises to assess the achievement of sustainable development goals.

Table 1 – Key performance indicators and metrics for SMEs

KPI no.	Category	Parameter/performance indicator /KPI	SDG target	Comment/relevance for SDG	Enabling technologies (AI, ML, etc.)	Examples
1	Work environment	Sick leave (%)	3.8/5.4/8.8	Sick leave (%)	AI, IoT, semantic web, AR/VR	Gather non-intrusive data on CO2, noise level (dB), automatically include sick leave data for national statistics centres databases, make AI predictions on burnout related sick leave. Contextualize office variables (dB, VOC; CO2, light intensity, and spectrum) in a 3D visualization of the office/plant building
2		Noise level around facilities (dB)	3.8/8.8		AI/DSP	Use AI/digital signal processing to identify sources, categorize patterns, mitigate the consequences, and generate fines based on pollution periods
3		Gender income equality (%) quotient of average salary: women/men	5.b	Women empowerment and gender equality are essential for better management of natural resources	AI, AR/VR	Use AI and visualisation to identify bias in hiring algorithms. Use AR/VR to visualize training data sets on which algorithms have been trained. Use visualization to show the gender income gap of companies
4		KPI: Gender performance gap Metrics: - Balanced performance management procedure in place	3.2/3.3/3.9/4.3/ 4.4/ 6.1/6.2/2.4/5.1/5.5. 2/10.3/8.3/8.5/8.8/	Insufficient access to drinking water, sanitation, and hygiene (WASH) services (SDGs 6.1/6.2) impact female employees' productivity and performance appraisal through heightened absenteeism (i.e. work	AI, AR	There is substantial evidence of widespread quantitative performance ratings used in modern organizations, from businesses to universities, being biased against women, with the gender gap significantly widened in the most male-dominated fields. In addition AI-driven performance reviews penalize women through algorithmic bias. Visualization can identify algorithms'

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		- Percentage of total employees by gender and by employee category who receive regular balanced performance review during the year		leave due to water-borne disease, caring for ill children, etc.). Absenteeism also causes operational and supplier disruption, existing strong links between WASH services and the SDG 2.4 (Sustainable agriculture) required for climate change resilience. Inaccurate performance appraisals retract women from influencing water governance through managerial positions, key for sustainable water management.		bias in performance ratings, showing the gender performance gap of companies. Use visualization to visualize training data sets on which algorithms have been trained. AI-driven sentimental analysis can be a positive force to promote open ask-accept feedback in the workplace as part of balanced performance management procedures. Through anonymized unstructured comments in online surveys, hidden moods/problems that go unspoken for fear of retaliation can be revealed, so as to be tackled by management responsively.
5		KPI awareness (%)	12.8	Percentage of employees knowledgeable about the company's KPIs	AI/AR/VR	Gamification of educational methods is an emerging technological trend.
6		Percentage of workers practising physical activity at least 3 hours a week (%)	8.8	Huge effect on wellbeing, life quality, life balance can be combined with cleaner transportation	IT; Sensors, AI, AR	Apps on smartphones promote, incentivize, and gamify more healthy and more environmentally-friendly mobility. Visualize where employees live, visualize information across the company sites and compare to other industries

Table 1 – Key performance indicators and metrics for SMEs

KPI no.	Category	Parameter/performance indicator /KPI	SDG target	Comment/relevance for SDG	Enabling technologies (AI, ML, etc.)	Examples
7	Procurement	Number of third-party environmentally labelled products (no)	12.4/12.7	Should be split into the type of labels	semantic web, block chain, AR/VR	Connect procurement platforms (ERM/ERP) to environmental reporting platforms (Eco-lighthouse) to create automatic reporting. Visualize network of third parties with/without labels on a map in with augmented reality
8		Number of third-party certified suppliers (no)	12.4/12.7	Should be split into type of certificates	semantic web, cloud, AR	Connect procurement platforms (ERM/ERP) to environmental reporting platforms (Eco-lighthouse) to create automatic reporting. Visualize network of third parties with/without labels on a map with augmented reality to sensibelize local sourcing and environmental certificates
9		Percentage of procurement originating from second-hand retailers (%)	6/8/12	Promote circular business models	AI, VR	Use AI to optimize B2B market places Use 3D visualization to virtually inspect second-hand (for furniture, cloth, equipment)
10		Percentage of electronic equipment procured by second-hand retailers (%)	6/8/12	Promote longer IT-equipment life	AI	Use AI to optimize B2B market places Use 3D visualization to inspect second-hand electronic goods virtually. Use AI to optimize the battery life of IT equipment.
11		Proportion third-party environmentally labelled products	12.5/12.7	Difficult must be split into a set of performance indicators/measurable		Connect procurement platforms (ERM/ERP) to environmental

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		and certified suppliers of total procurement costs (%)		parameters and combined in a formula		reporting platforms (Eco-lighthouse ⁵) to create automatic reporting. Visualize proportion KPI on AR
12		Amount of paper and cardboard used (kg)	12.5	Purchased paper?	IT, AI/ML, distributed ledger	Use AI/ML to machine-read invoices from office supplies companies and deduce paper consumption. Connect procurement software to environmental certification and reporting, using blockchain smart contracts to identify transactional parties and the amount of paper purchased.
13	Transport	Total use of fuel (l)	11.2/11.7	Should be split into type of fuels	AI/ML, AR	Use AI/ML to machine-read invoices from oil companies and deduce fuel. Automatically connect to PMS/fleet management systems
14		Total driven distance (km)	11.2	Should be split into type of vehicles (also boats)	IT, AR	Connect fleet via cloud solutions to gather mileage, energy consumption, GPS position, etc. Automatically report on Eco-Lighthouse Visualize consumption on the map showing heat-maps and identify outliers, such as idle consumption, non-optimized trips
15		Number of travels by air in	11.2/11.3/11.7		AI/ML, AR	Use AI/ML to machine-read invoices from travel agencies and flight

⁵ <https://eco-lighthouse.org/>

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KPI no.	Category	Parameter/performance indicator /KPI	SDG target	Comment/relevance for SDG	Enabling technologies (AI, ML, etc.)	Examples
		the local region, countries, in continent, in the rest of the world (no)				companies to deduce destinations, mileage. Use AI/ML to estimate the amount of travel saved by video conferencing. Visualize data in AR as heatmaps on a map, visualize virtual meetings in the same manner
16		CO2-emissions from flights (tons CO2)	11.6	Calculation model to be described	AI	Use AI/ML to machine-read invoices from travel agencies and transportation companies to deduce destinations, mileage, CO2 based on aeroplane type. Connect to Use MyClimate ⁶ Calculation to automatically compensate for climate footprint. Visualize emissions per passenger kilometre per litre (pax-km/L) for each route using data from the ICCT (International Council for Clean Transportation) or equivalent
17		Percentage of employees using mobility with lower footprint	11.6	Use of public transport, walking, biking	IT; Sensors, AI, AR	Apps on smartphones promote, incentivize, and gamify more healthy and more environmentally-friendly mobility. Visualize where employees live, visualize information across the company sites and compare to other industries

⁶ <https://www.myclimate.org>

Table 1 – Key performance indicators and metrics for SMEs

KPI no.	Category	Parameter/performance indicator /KPI	SDG target	Comment/relevance for SDG	Enabling technologies (AI, ML, etc.)	Examples
18		Percentage of employees with home office or flexible work hours	11.1		AI, AR	Use AI to predict peak pollution and peak traffic hours and incentivize home office, alternative hours, or cleaner mobility. Visualize predictions, short- and long-term effects
19		Number of parking places paid by the company per employee	11.3			Visualize information across the company sites and compare it to other industries
20	Energy	Energy use from different energy sources (%)	7.1/7.2/	Should be split into renewables/non-renewables energy sources	Internet of things (IoT): smart sensors, distributed ledger	As the energy markets are going to diversify with complementary sources (wind, solar, nuclear, gas, hydropower), it will be critical to put in place certificates, probably supported by smart contract infrastructure (distributed ledger)
21		Energy use for different purposes (kWh)		Should be split by category: computing, heating, ventilation and air conditioning (HVAC), production, other	IoT, smart sensors, AI	Use smart devices/sensors to measure the consumption, especially for on-premises data centre, machines, etc. Use AI to machine-read invoices from IT and telecommunication providers and estimate the amount of energy used by each service. Automatically gather information from smart electricity meters. Collect energy consumption data from Cloud providers, using either ML or energy consumption models, which can be

Table 1 – Key performance indicators and metrics for SMEs

KPI no.	Category	Parameter/performance indicator /KPI	SDG target	Comment/relevance for SDG	Enabling technologies (AI, ML, etc.)	Examples
						parametrized by ML/reinforcement learning. Visualize the results (time series) in a 3D model of the building in AR to identify the primary sources of energy consumption and promote cleaner behaviours
22		Heated area (m ²)	7.1		Smart City IT	Automatically connect to municipal cadastre
23		Total sum energy use (kWh)	7b		IoT: smart sensors, AI/ML	Automatically connect to energy data hubs which collect total nation consumption and production. Use AI-driven algorithm to change the behaviour of consumers
24		Electricity (kWh)	7.1		IoT: smart sensors, AI/ML	Automatically gather information from smart electricity meters Visualize the results in a 3D model of the building in AR to identify the primary sources of energy consumption and promote cleaner behaviours
26		Demand response adoption (%)	7b	Number of sites with demand response adoption	IoT Sensor, AI, AR	AI can dramatically lower power consumption in non-working hours, as well as during work hours by better coordinating ventilation, heating, and room occupancy. Visualize the results (time series) in a 3D model of the building in AR to identify the primary sources of energy consumption and promote cleaner behaviours

Table 1 – Key performance indicators and metrics for SMEs

KPI no.	Category	Parameter/performance indicator /KPI	SDG target	Comment/relevance for SDG	Enabling technologies (AI, ML, etc.)	Examples
26		Total amount of fossil fuels (tons)	7.1/7.3		Smart sensors	Automatically connect to the fleet and industrial power management systems collect engine consumption and fuel type
27	Emissions to air	Greenhouse gasses (tons CO ₂ -equivalents)	3.9/11.6/12.4	Scope 1, 2, and 3	IT	Use the amount of fossil fuels and type (coal, gas, diesel, wood, renewable wood) to calculate GHG emitted. Use AR Use ML to automate the detection of objects within geospatial imagery https://picterra.ch/
28		Emissions of NO _x (tons)	3.9/11.6/12.4	Scope 1, 2, and 3	IT	Use https://www.ecoinvent.org/database/ to automatically gather information Use AR to visualize main sources, evolution over the years, and compare with other competing members of industry
29		Emissions of SO ₂ (tons)	3.9/11.6/12.4	Scope 1, 2, and 3	IT	Use https://www.ecoinvent.org/database/ to automatically gather information Use AR to visualize main sources, evolution over the years, and compare with other competing members of industry
30		Emissions of VOC (tons)	3.9/11.6/12.4	Scope 1, 2, and 3	IT, IoT Smart sensors	Use https://www.ecoinvent.org/database/ to automatically gather information Use indoor IoT sensors to monitor air quality Use AR to visualize main sources, evolution over the years, and compare with other competing members of industry

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KPI no.	Category	Parameter/performance indicator /KPI	SDG target	Comment/relevance for SDG	Enabling technologies (AI, ML, etc.)	Examples
31		Emissions of particles/sot/dust (tons)	3.9/11.6/12.4	Scope 1, 2, and 3	IT	Use https://www.ecoinvent.org/database/ to automatically gather information Use AR to visualize primary sources, evolution over the years, and compare with other competing members of the industry
32	Waste	Total volume of fresh water consumed	6.4	Increase water use efficiency for all	IoT, smart sensors	Water sensors can be connected to smart energy meters and collected by central units. AI-based integrated water management systems can identify water-leakages. AR can represent water consumption city-wise, and visualizations can draw awareness on the scarcity of this undervalued commodity
33		Total volume of wastewater (m3)	6.2/6.3/6a		IoT smart sensors, cloud, AI	Water sensors can be connected to smart energy meters and collected by central units. Visualizing instantaneous, aggregated, and previous consumption helps sensitizing and raises awareness. AI can also automatically attempt to modify consumption patterns, identifying when to store water, when to release.
34		Pollution to open water bodies by organic matters, suspended	6.3/6a/6b	Should be specified by type	AI/remote sensing	Use ML with real-time satellite pictures to rapidly discover sources and mitigate disasters

Table 1 – Key performance indicators and metrics for SMEs

KPI no.	Category	Parameter/performance indicator /KPI	SDG target	Comment/relevance for SDG	Enabling technologies (AI, ML, etc.)	Examples
		solids, oil products, etc.				
35		Waste in different fractions (kg)	11.6/12.3/12.4/12.5	Should be split into waste categories (paper, plastics, etc.), to recyclability, to incineration, etc., see below	AI/ML, IT, AR, smart contracts	Use AI powered sorting robots or smart dust bins to sort waste, use it as bottom line for billing and reporting from waste collection company. Connect billing to environmental reporting. Certify origin and destination via smart contracts (distributed ledger technology) Use AR to visualize the flow of materials, their destination and sensibelize employees and procurement on the topic, and use it as basis to compare performance with national levels or previous years
36		Electric waste	11.6/12.4/12.5		AI/ML, IT, AR, smart contracts	Use AI powered sorting robots or smart bins to sort waste, use it as bottom line for billing and reporting from waste collection companies. Connect billing to environmental reporting. Certify origins and destinations via smart contracts (distributed ledger technology) Use AR to visualize the flow of materials, their destination and sensibelize employees and procurement on the topic, and use it as basis to compare performance with national levels or previous years

Table 1 – Key performance indicators and metrics for SMEs

KPI no.	Category	Parameter/performance indicator /KPI	SDG target	Comment/relevance for SDG	Enabling technologies (AI, ML, etc.)	Examples
37		Paper and cardboard(tons/ Currency)	11.6/12.2/12.4/12.5	Measure the proportion of paper and cardboard in procurement. This also includespackaging	AI/ML, IT, AR, smart contracts	Use AI powered sorting robots or smart bins to sort waste, use it as bottom line for billing and reporting from waste collection companies. Connect billing to environmental reporting. Certify origins and destinations via smart contracts (distributed ledger technology) Use AR to visualize the flow of materials, their destinations and sensibelize employees and procurement on the topic, and use it as basis to compare performance with national levels or previous years
38		Glass (tons)	11.6/12.4/12.5		AI/ML, IT, AR, smart contracts	Use AI powered sorting robots or smart bins to sort waste, use it as bottom line for billing and reporting from waste collection companies. Connect billing to environmental reporting. Certify origins and destinations via smart contracts (distributed ledger technology) Use AR to visualize the flow of materials, their destinations and sensibelize employees and procurement on the topic, and use it as basis to compare performance with national levels or previous years
39		Plastics (tons)	11.6/12.4/12.5	Open-source 3D printing applied at community level can logically shift	AI/ML, IT, AR, smart contracts	Use AI-powered sorting robots or smart bins to sort waste and use it as the bottom line for billing and

Table 1 – Key performance indicators and metrics for SMEs

KPI no.	Category	Parameter/performance indicator /KPI	SDG target	Comment/relevance for SDG	Enabling technologies (AI, ML, etc.)	Examples
				the metrics from tons to kgs.		<p>reporting from the waste collection company. Connect billing to environmental reporting. Certify origins and destinations via smart contracts (distributed ledger technology)</p> <p>Use AR to visualize the flow of materials, their destinations and sensibelize employees and procurement on the topic, and use it to compare performance with national levels or previous years.</p> <p>Use open-source 3D printing and recycling for small-scale manufacturing in support of sustainable self-directed development.⁷ This coupled distributed recycling and manufacturing process reduces embodied energy by half while reducing substantially the cost of consumer products, so it has an economic incentive. 3D printing upcycles plastic waste into a filament through a recyclebot (open-source waste plastic extruder), to be further upcycled into valuable consumer</p>

⁷ <https://reprap.org/wiki/Recyclebot>

Table 1 – Key performance indicators and metrics for SMEs

KPI no.	Category	Parameter/performance indicator /KPI	SDG target	Comment/relevance for SDG	Enabling technologies (AI, ML, etc.)	Examples
						products. ⁸ Open tools also reduce maintenance costs, i.e. if it breaks, a part can be repaired or built locally from the design files ⁹
40		Metals (tons)	11.6/12.4/12.5		AI/ML, IT, AR, smart contracts	Use AI-powered sorting robots or smart bins to sort waste and use it as the bottom line for billing and reporting from the waste collection company. Connect billing to environmental reporting. Certify origins and destinations via smart contracts (distributed ledger technology) Use AR to visualize the flow of materials, their destinations and sensibelize employees and procurement on the topic, and use it to compare performance with national levels or previous years.
41		Hazardous waste (tons)	11.6/12.4/12.5		AI/ML, IT, AR, smart contracts	Connect billing to environmental reporting. Certify origins and destinations via smart contracts (distributed ledger technology) Use AR to visualize the flow of materials, their destination and

⁸ <https://www.sciencedirect.com/science/article/abs/pii/S0921344917303014>

⁹ <https://www.wilsoncenter.org/blog-post/open-tools-create-new-pathways-circular-economy>

Table 1 – Key performance indicators and metrics for SMEs

KPI no.	Category	Parameter/performance indicator /KPI	SDG target	Comment/relevance for SDG	Enabling technologies (AI, ML, etc.)	Examples
						sensibilize employees and procurement on the topic, and use it as a basis to compare performance with national levels or previous years.
42		Production waste sent to landfill (tons)	12.8		AI/ML, IT, AR, smart contracts	Connect billing to environmental reporting. Certify origins and destinations via smart contracts (distributed ledger technology) Use AR to visualize the flow of materials, their destinations and sensibilize employees and procurement on the topic, and use it as the basis to compare performance with national levels or previous years.
43		Waste sent to recycling (% of total)	12.2/12.5		Smart contract, AR, AI	Automatically connect to waste collecting company Use AI to incentivize eco-friendly behaviour. Visualize industry average, own current and past performance
44		Waste sent to incineration (% of total)	12.3		Smart contract, AR, AI	Automatically connect to waste collecting company Use AI to incentivize eco-friendly behaviour. Visualize industry average, own current and past performances