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Solution scorecard for eco-friendly business processes and environmental behavioral influencers

Working Group 1: Requirements of AI and other
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Efficiency

Focus Group Technical Report

ITU-T



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Summary

This Technical Report contains a series of processes and eco-friendly self-assessment recommendations, examples, and criteria for review by a business or enterprise regardless of geographic region, industry, or size. The high-level score cards offered in this document provide the opportunity to rate a business holistically and individual contributions of employees or individuals.

Keywords

Climate process review; environmental best practices; environmental scorecard business; environmental standards; technology climate impacts

Note

This is an informative ITU-T publication. Mandatory provisions, such as those found in ITU-T Recommendations, are outside the scope of this publication. This publication should only be referenced bibliographically in ITU-T Recommendations.

Change Log

This document contains Version 1.0 of the ITU-T Technical Report on “*Solution scorecard for eco-friendly business processes and environmental behavioral influencers*” approved at FG-AI4EE sixth meeting held in Ålesund, Norway, 1-2 December 2022.

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1 Scope

This document provides recommendations and brief self-assessment solution scorecards for organizations to perform an impact assessment aimed at quantifying the environmental impact of the work they conduct.

- The first section covers eco-friendly business processes, provides some brief examples and offers a rating system for organizations to self-assess the positive and negative impact they are creating, and in some cases offer recommendations on finding more environmentally friendly practices as substitutes for a business process/function.
- The second section explores environmental behavioral influencers and proposes a scoring/scorecard system for measuring the positive impact organizations have created (internally and/or externally) on individuals who have incorporated more eco-friendly behaviors and practices in their regular activities. It does not cover individual behaviors that are climate positive such as recycling, re-use of materials and zero waste practices et al as these are well documented in numerous other sources. The focus is on broader behaviors that create climate champions.

2 References

None.

3 Terms and definitions

3.1 Terms defined elsewhere

This Technical Report uses the following terms defined elsewhere:

- 3.1.1 Artificial Intelligence (AI) [b-ITU-T F.749.13]:** An interdisciplinary field, usually regarded as a branch of computer science, dealing with models and systems for the performance of functions generally associated with human intelligence, such as reasoning and learning.
- 3.1.2 Energy consumption [b-ISO/IEC 13273-1:2015]:** The quantity of energy applied.
- 3.1.3 Energy efficiency [b-ISO/IEC 13273-1:2015]:** The ratio or other quantitative relationship between an output of performance, service, goods or energy, and an input of energy.
- 3.1.4 Energy efficiency improvement [b-ISO/IEC 13273-1:2015]:** An increase in energy efficiency that comes from technological, design, behavioural or economic changes.

3.2 Terms defined here

This Technical Report defines the following terms:

- 3.2.1 Solution Scorecard:** Scorecard is defined as a list or series of lists that provide either a quantitative or qualitative value for consumption in rating of self or processes of a company

4 Abbreviations

CEO	Chief Executive Officer
CSO	Chief Sustainability Officer
HR	Human Resources
NYSDOT	New York Department of Transport
PFAS	Polyfluoroalkyl Substances
R&D	Research and Development
TQEM	Total Quality Environmental Management

5 Conventions

None.

6 Specific contents

Introduction to a series of international climate efficiency and sustainability standards for AI and emerging technologies recommendations and score cards:

2022 continues a slow march to a more sustainable future. Scientists, corporations, and everyday citizens around the globe have seen a progressive decline and instability to global climate models; from flash floods to droughts, the global climate has become more erratic with each passing year.

The document herein contains a series of processes and eco-friendly self-assessment criteria for review by a business or enterprise regardless of geographic region, industry, or size. As well as areas to rate a business holistically and individual contributions of employees or individuals.

Global enterprise has a commitment to ecologically friendly and sustainable practices in the development of both AI and other emergent technologies. Below we will outline a series of focus areas in which organizations should take into consideration when doing internal assessments against global climate initiatives and standards. We recognize that emissions and sustainability practices have both local and global standard and as such this paper will provide recommendations on how to navigate those relative standards. Table 1 provides a snapshot for quick reference with additional explanation below.

Organizational Categories for Self-Assessment	
Resourcing, Material Sustainability and Manufacturing Footprint	<ul style="list-style-type: none"> • Sourcing and Procurement • Transport Emissions • Manufacturing and Resource • Sustainability Management • Decommissioning and Recycling
Organizational Processes	<ul style="list-style-type: none"> • People Processes • Product Enablement Towards Environmental Impact
Organizational Stewardship	<ul style="list-style-type: none"> • Leadership & Environmental Stewardship Initiatives • Environmental Sponsorship & Sustainability Investment

Table 1 - Organizational Categories for Self-Assessment

6.1 Resourcing, material sustainability and manufacturing footprint

6.1.1 Sourcing

Within the space of technical design, AI and emergent technologies the first phase of focus of enterprise should be to how materials are harvested and utilized. Factors should be considered as early in the design phase of any such technologies if applicable, inclusive of raw metals or natural resource harvesting, plastic composite compositions, power usage and other similar factors. If possible, materials that have a component of high biodegradability are ideal or provide a reuse potential post product decommissioning. One such example of a best avoided chemical would include polyfluoroalkyl substances (PFAS). or forever chemicals; these should be excluded from the material design and manufacturing process where possible as these often cause a direct and measurable reduction in environmental quality both in the short and long-term.

“Per- and polyfluorinated alkyl substances or PFAS, which includes a large chemical family of over 9,000 highly persistent chemicals that are non-naturally occurring. PFAS don’t easily degrade in the environment and are very mobile in water and other liquids. Once released in the environment, e.g. during manufacturing or leaching from a consumer products, PFAS tends to migrate in the water and remain intact for very long periods of time. This allows them to be transported over long distances. PFAS have been found in the environment all around the world, even in the most remote areas such as the Arctic. They have also been detected in the blood and breastmilk of people and wildlife globally. Removing PFAS from the environment is extremely challenging, PFAS’ extreme persistence means that humans and wildlife continue to be exposed to these chemicals via environmental routes for decades after their initial disbursement via environmental waste channels.” [b-ChemTrust].

When in such cases are impossible in the instance where harmful chemicals are unavoidable due to business use cases such as product or material stability, temperature resistance...etc. An enterprise should seek to create a track and trace. Technology focused on supply chain management or in some cases the block chain can be aptly employed to track material harvesting and collection level where feasible. The aim should be supporting material harvesting in an environmentally sustainable method compared to non-sustainable methods.

According to [Kotabe], “Global sourcing strategy requires close coordination of research and development (R&D), manufacturing, and marketing activities, among others, on a global basis. While national boundaries have begun losing their significance both as a psychological and as a physical

barrier to international business, the diversity of local environments still plays an important role not as a facilitator, but rather as an inhibitor, of optimal global strategy development.”

6.1.2 Transportation of materials

Materials transfer and shipping from point of origination to factories, if not made onsite, represent a hidden but consistent factor in negative emissions with regards to material operations. Often materials harvested or sourced in 2nd or 3rd world economies due to cost considerations. These environments traditionally suffer from corruption, lack of modern infrastructure and clean technologies employed in 1st world environments. As such, this is an area resistant to climate friendly practices and emissions reductions. Companies should investigate thoroughly materials that can be created or harvested in localized areas towards manufacturing if possible. Where such things are not feasible - companies should consider the following: whereby possible overstocking on materials to minimize shipment frequency, comparatively sea freight is less damaging to air freight and should be preferred where possible, local ground transport should be handled via Natural gas, Hydrogen or Electric shipping vehicles. Auditing this area bears great importance to overall emissions footprint. Especially when considering diverse environments that are affected by shipping operations.

6.1.3 Manufacturing and sustainability

According to [b-Walton], “The notion of a green supply chain is related to the broader concept of a “sustainable economy.” This view extends the idea of Total Quality Environmental Management (TQEM) beyond the boundaries of organizations and beyond the current generation of products and services. Fundamental to developing a sustainable economy is the recognition that environmental initiatives may start as operational initiatives to reduce waste and emissions, but these initiatives must grow to a point where the strategy and the vision of the company incorporates environmental issues” [b-Handfield].

Great leaps and bounds have been made in the quality of environmentally bio-degradable materials as well as ecologically sensitive harvesting practices in raw material collection. Organizations should benchmark where possible areas of confirmed sustainable practices in manufacturing. These include sustainable manufacturing waste containment and recycling, factory emissions management (both air and water). Coordination with local suppliers, customs and governmental agencies is paramount in understanding both feasibility, infrastructure and completion of environmentally sustainable disposal standards. There are multiple methods of reducing environmental emissions and impact one such method is “end of pipe” while not ideal to a reimagined more sustainable method of manufacturing may be easier to implement in regions where extensive retooling is less feasible:

According to [Walton], “A slightly more developed environmental management approach accepts the goal of minimizing waste, without trying to eliminate the source of the waste. Companies pursuing this approach often try to find ways to “clean up” or store the waste once it is created. Companies that install smokestack devices to reduce the level of pollutants emitted into the air, without trying to reduce the level of pollutants produced, are “embracing without innovating.” This reactive approach to environmental issues is characterized by “end-of-the-pipe” solutions. While embracing environmental issues without changing current processes provides the company with a sense of social legitimacy, it usually leads to narrow, incremental solutions” [b-Min].

In dealing with diverse regions and infrastructures enterprise can create breakout charts as the one below to illustrate for stakeholders' challenges with local systems and economies in an attempt to create specific strategies to facilitate cleaner standards across their manufacturing. See the below example table:

Decision Level	Strategy	Action	Reaction	Goal
Manager	Reactive	Seeks to mitigate negative outputs	Implement capture or reduction technology where possible	Reduce emissions end of pipe
Manager	Modernize	Embraces change to improve current climate impacts	Look at newest form of clean process while sticking to existing practices	Reduce emissions end of pipe
Regional Director or VP	Innovation	Break down the process to core needs and re-imagine	Find white space opportunity and implement combined processes to create net new	Change process to lower emissions at source components or legacy processes
Executive	Future Looking	Visionary outlook realigning all organizational or major operational processes – large scale road mapping	Set task forces and re-assess all organizational footprints in scope	Re-imagine a series of process across the organization, includes end of pipe, process rebuild and new vision

Table 2 - Breakout Chart example of efficiency and sustainability actions by level

Continued monitoring of sustainable practices should be planned after agreements have been set. It's recommended enterprises elect sponsors from the parent organization who are outside of local manufacturing environments and work alongside local manufacturing representatives within the supply chain process to monitor and assure environmental standards for sustainability are being kept within focus. This is imperative as multiple regions around the globe where manufacturing often occurs are subject to varying degrees of political corruption or differing standards of quality. Adding in a sponsor who is separate from local customs but has a partner to mitigate local communication and regulatory hurdles provides a more holistic version of oversight as compared to only an external observer or local reporting. Another such recommendation that enterprise can apply when selecting a 3rd party manufacturer is by recognized vendors who have an existing climate commitment that can be validated both by competitor, alliance verification and through walking site firsthand accounting of company representatives. Regular auditing of practices should be required to keep an active record of validation.

6.1.4 Decommissioning and recycling

In the overall supply chain of both manufacturing as well as product lifecycle. An area that provides large returns is the decommissioning and recycling options of products, machines, facilities et al. An enterprise should in all reasonable cases consider the ability to recycle, re-use, or dispose of products, technologies, and materials in a sustainable or ecologically low impact cycle.

In the initial stages of a product creation and technical design. Enterprises should put thought into how this end stage looks to both the consumer and marketplace. In the current era there is great appeal both from a marketing and real impact on the overall environment if biodegradable materials are used throughout the conceptualization and methodology of the product development lifecycle.

Within each of the original minimum requirement phase building in a component of sustainably will affect positive returns in end-of-life disposability via the minimum requirement flowing through. Components designed with no forethought to end of life recycling, reuse or disposability will be hard pressed to find easy solutions for sustainable recycling.

6.2 Organizational processes

6.2.1 People processes

People processes can be summarized as the operations within a company to which its employees and stakeholders are affected. These include facets such as Human Resources (HR), Marketing, Strategy, Operations. Enterprises should prioritize two key areas within affecting positive mind shift amongst its employees and stakeholders. The two areas are: awareness and sense of community and impact.

As companies take a more proactive role in defining their brands internally in relationship to sustainability this DNA should in theory filter down from top leadership. Awareness amongst various operations serves to highlight both the ongoing situation of both the companies and individual's role in relationship to climate friendly processes and how they can make difference. A key milestone that is easily modified is travel practices within an organization. When possible, travel incorporating major polluting avenues such as air travel should be avoided in favor of remote engagement and video conferencing solutions. During the Covid-19 pandemic these dramatically altered travel practices for many corporations. This forced change has shown that in many cases prior cases of business travel were not necessary.

The second key driver amongst people process's is providing an avenue for the employee, stakeholders and customs to get engaged in a number of potential company, sponsored activities around sustainability. An important point to note is that awareness without a method to interact is much less effective in providing real impact. Companies need to create enterprise resource groups or structured activities and campaigns that allow a direct route for interested parties to engage. Due to the community affect if these programs are effectively rolled out it more individuals will join, where individually they might have been resistant to such programs.

6.2.2 Product enablement to environmental impact

When considering product design and the associated functions, an organization where possible, should seek to understand how this product affects the viewpoint of sustainability as well as the actual effect it may create through its use and eventual disposal. This area of effect overlaps with other phases as highlighted in the document. Where it stands alone however, is via a product's direct footprint of use and consumption of materials in that usage; some example questions to be asked include:

- Is this product/technology designed for a long-life cycle of use or is it one time/short interval?
- When this product/technology is retired and disposed of, does it have a clear path to sustainable recycling of materials?
- Does this product in use and supporting technologies that are required for its function directly affect ecological environments or life forms within them from the standpoint of ecological quality (water condition, noise pollution, air quality...etc.)?
- Does this product as designed require manufacturing practices or chemicals that are potentially damaging to the environment?
- Does this product or technology advance viewpoints on sustainability in a positive or negative way? Or is it opaque?

A conscientious organization that seeks to create a more sustainable outcome should add questions such as the above into their product design Lifecycle as early as possible. In some cases, negative outcomes to the above are impossible but this can provide a framework to lessen damage from the products use down the line. Tackling the above in a streamlined fashion provides a better roadmap and more clarity product design sprints take place.

6.3 Organizational stewardship

6.3.1 Leadership and environmental stewardship initiatives

A critical facet of organizational momentum is the vision setting as done by senior leadership. The former sections of this document have spoken to a series of short examples and analysis of more tactical motions per business function. This section, however, will focus on how senior leadership alignment impacts an organization both from a visibility and goal setting perspective. The idea of environmental stewardship at an organizational level has two main functions visibility and internal and external goal setting.

Senior leadership should look to publicize their organizational climate stance clearly in both external briefings and operational goals. From an operational perspective this often means nomination of an individual or team to track and align broader working groups to specified climate targets and outputs. For example, a title that has grown in popularity is Chief Sustainability Officer (CSO). This individual often has the goals of working with the Chief Executive Officer (CEO) and directly setting goals for sustainably directly. Aligning management structures to a more granular level of process review for climate effect is a practice that becomes challenging in large multinational organizations. In such environments it may be preferable to have regional heads of sustainability and their direct working operatives reviewing high impact processes and working in conjunction with finance, operations and product heads for a more impactful result.

Senior leadership also bears the responsibility for publicizing both environmental goal setting as well as when said goals have been met. This can be in the form of business operations reimagining, emissions reduction, renewables investment and green infrastructure.

An example of this is the New York Department of Transport (NYSDOT) – when setting out to build a more sustainable department senior leadership set the following high-level goals

The initial objectives were set for NYSDOT’s Environmental Initiative had five major objectives:

- Promote and strengthen an environmental ethic throughout the department;
- Advance state environmental policies and objectives with NYSDOT resources;
- Partner with others to construct environmental enhancements;
- Pilot new environmental protection and enhancement methods; and Strengthen relationships with environmental agencies, organizations, and local municipalities.

This was then broken out into a subcategory for senior leadership actions:

6.3.1.1 Visibility goals:

- Establishing agency-specific environmental goals
- Adopting a mission statement that reflects an environmental stewardship ethic
- Issuing an official statement from executive management endorsing an agencywide environmental stewardship ethic ()
- Issuing official procedures and guidance on implementing environmental stewardship goals), and 90 Paper No. 02-2811 Transportation Research Record 1792
- Issuing an official environmental policy adopting environmental stewardship goals (.)

The above example clearly indicates how this goal setting exercise at the senior leadership level can filter down to the deeper workings of an organization in their pursuit of more efficient and sustainable operations.

6.3.2 Environmental sponsorship and sustainability investments

As organizations look outward towards a more sustainable future it is imperative that while focus remains on reducing or mitigating ecological and climate impact of both processes and technology

towards a greener outcome. There is a logical line to which all companies must walk in which it becomes no longer feasible, or disruption occurs between the dire for traditional business operations and sustainability initiatives. Opportunities for business to mitigate their impacts by investment in purpose-built vehicles designed to mitigate or improve sustainable outcomes. These are in the areas of environmental sponsorship via sustainability investments. Numerous NGO's, B Corporations, Registered 501c3 and other vehicles exist with a sole intention towards improving and reducing the impact from business and other human operations that negatively impact climate, sustainability, ..et al. Whereas possible it highly recommend for business to invest in technologies, companies and other such vehicles to further improve and lessen its operations impact. These investments can come from direct investment, mergers and acquisitions activities and philanthropy. Organizations should hold an annual summit led by the senior leadership and the Chief Sustainability Officer or representative to identify strategic areas of investments that not only improve business as usual operations but also those that work externally to lessen climate impacts. These external partners should be considered as an additional step that does not take precedence over earlier categories but should be considered and essential add on.

6.4 Individual behaviours and influence in an organization

Individuals can enact great change. identifying such individuals within an organization it paramount for success and growth. When considering climate impacts numerous individuals are passionate about such cause. However, when considering how to determine individual achievement and focus on the correct behaviors; we should look at three main areas:

- **Mentorship:** Acting as a guide and influencer to other individuals for whom there is no direct report.
- **Reach:** The ability and scale to which the individual has an audience, influence, and voice both internally and externally
- **Individual Contribution:** What has the individual personally contributed.

Within this document we will not cover individual behaviors that are climate positive such as recycling, re use of materials and zero waste practices.et al for the simple sake that these are well documented in numerous other sources. What the focus from an organizational standpoint should be is one how to create a or identify and sustainability champion among the broader workforce within and organization.

As outlined above, certain individuals through their normal line of business and by other interaction will demonstrate the above characteristics. As spoken to earlier, organizations should have environmental resource groups and other such outlets that allow individuals to participate in. In such that many individuals will self-select for those groups and organization should look at determining how to maximize the reach and influence of individual climate champions within their working lines. It could be feasible to designate certain groups with a local sustainability champion who reviews procedures where possible in addition to their normal duties and offers suggestion to designated sustainability groups for further action or consideration. In the scorecards section there is an individual contributor assessment. This can be used to better define who is likely a well-suited climate champion and whose impact would provide influence within the organization if prioritized and provided a platform.

6.5 Score cards

6.5.1 Global Environment Posture by Function – Table 3

Business Area	Function	Good	Improving	Poor
Resourcing, Material Sustainability and Manufacturing Footprint	Sourcing and Procurement			
	Transportation of Materials			
	Manufacturing and Resource Sustainability Management			
	Decommissioning and Recycling			
Organizational Processes	People Processes			
	Product Enablement to Environmental Impact			
Organizational Stewardship	Leadership & Environmental Stewardship Initiatives			
	Environmental Sponsorship and Sustainability Investment			

Table 3 - Global Environment Posture by Function

Instructions for Use:

This is to serve as a holistic organizational dashboard for review of areas to improve. This is not to specify where each line of business function could specifically improve but rather a quick reference for what is good, improving, or poor. In order to determine how each function is performing (green, yellow or red) please use the numerical assessment Table 4 to identify specific areas of action.

A function can be considered:

- Green and good if it has a summary score of greater than 8
- Yellow and improving if it has a summary score between 5-8
- Red and poor if it has a summary score of 4 or less

6.5.2 Function or Line of Business Assessment Scorecard Numerical: Table 4

Category	Definition	Yes	Somewhat	No
Auditing and Verification	Company has named sponsors and regular auditing to verify climate friendly practices are being considered and enacted where possible in this line of business or business function	+2	+1	0
Sustainable Chemical or Material usage	Company makes a best effort to identify and incorporate chemicals which biodegrade, recycle or produce low environmental impact in its products and manufacturing	+2	+1	0
Sustainable or ecologically friendly consumption on local Ecosystems	Company works with local ecosystems and resource companies (Gas, Water, Electricity...Etc.) To make a best effort in identifying and using sources of renewable energy and resources in its manufacturing and corporate operations.	+2	+1	0
Emissions	Company is actively reducing emissions from operations where possible.	+2	+1	0
Process Re-engineering	Company has undertaken efforts to create more climate friendly process by re-engineering existing or legacy operations, products or services to affect a lower or more sustainable environmental impact.	+2	+1	0
Summary Score		Total:		

Table 4 - Function or Line of Business Assessment Scorecard Numerical

Instructions for use:

The above Scorecard is to be used when considering a specific functions impact against sustainable practices, this should be used per each line of business within broader categories set as outlined in Table 3.

To some degree a company must make a best faith guess to interpret its numerical ranking per category. This unfortunately will be subject to regional difference of both understanding, standards and culture. It is encouraged that a company when using the above, take into account international benchmarking and standards to get a more appropriate score of each line of business, technology or product.

6.5.3 Individual Contributor Champion Assessment: Table 5

	High Performing	Above Expectations	Average
Mentorship	+2	+1	0
Reach	+2	+1	0
Individual Contribution	+2	+1	0
Summary Score	Total:		

Table 5 - Individual Contributor Champion Assessment

Instructions for use:

Individuals being considered for climate champion or influencer roles can be quickly scored with the above.

Definitions for use in scoring:

- **High Performing:** individual is recognized by wide audience either internal or external for performance in this area. They may have a large number of mentees, a recognizable brand internally or externally, they might have authored content or have a recognizable presence on social media. They exhibit charisma and ease in dealing with a large audience and are comfortable in taking charge.
- **Above Expectations:** This individual is gaining notoriety in their space of expertise or area of influence. Their peers respond to them in a favorable way and defer to them more often than not when working through complicated problem, they may have a few mentees or are recognized for their contribution to the company in some way that is easily recognizable to other workers.
- **Average:** This employee is competent but does not have an interest in larger opportunities and may shy away from additional opportunities to guide policy or otherwise step to the front of the pack. They blend into the larger audience and don't stand out for any particular measure.

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