INDICATOR METHODOLOGY FOR SDG 17.7.1

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I Introduction

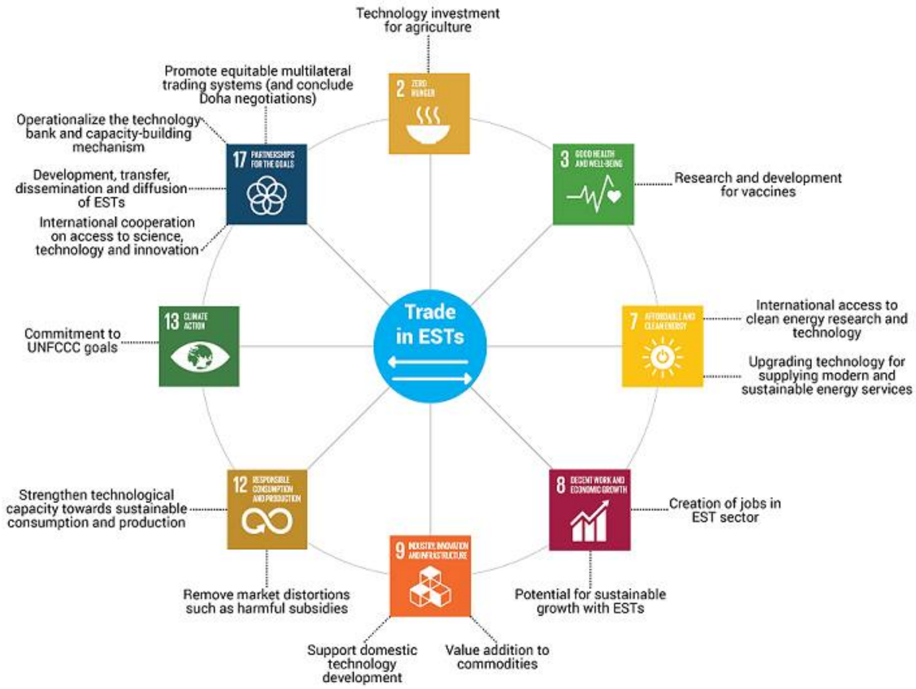
In light of the 2030 Agenda for Sustainable Development and the Paris Agreement on Climate Change, the international regulatory and political framework for trade and investment in environmentally sound technologies is being decisively reshaped. Environmentally sound technologies are technologies that protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products and handle residual wastes in an environmentally-friendly manner. Such technologies can also be referred to as clean technologies. Examples include renewable energy technologies such as solar panels and wind turbines, as well as air pollution mitigation equipment. Increasing the uptake of those technologies can result in several benefits for the environment.

Trade can scale up the use of clean technologies by opening markets and stimulating innovation. This brings down their cost through economies of scale, and thereby making clean technologies more accessible to less developed countries. Trade policy instruments include tariff reductions, elimination of subsidies, voluntary sustainability standards, green procurement rules and trade finance. They can – if designed and applied properly - serve as effective vehicles to the development and application of environmentally sound technologies.

Connecting to global markets and clean technology value chains can help countries to achieve the Sustainable Development Goals.

SDG 17 is one of the most important Goals in that it acts as a facilitator and connector for many if not all the other Goals. UNEP has identified a number of SDGs where uptake of ESTs contributes to their achievement, as depicted in the illustration below: Goal 7 on ensuring access to affordable, reliable, sustainable and modern energy for all; Goal 8 on the promotion of sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all; Goal 12 on sustainable consumption and production patterns, and Goal 13 on taking urgent action to combat climate change and its impacts[1]

[1] Policy Brief (2018) Trade in Environmentally Sound Technologies Implications for Developing Countries



SDG Target 17.7 is one of 19 targets under Goal 17: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development.

Target 17.7
Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed.

Indicator 17.7.1
Total amount of approved funding for developing countries to promote the development, transfer, dissemination and diffusion of environmentally sound technologies.

As part of the overall Sustainable Development Goals put in place to achieve a reduction in inequality, end poverty, protect the environment and promote justice and peace, SDG 17 is intended to strengthen the means of implementation and revitalize the global partnership for sustainable development.

UNEP is custodian of Target 17.7 of the Sustainable Development Goals, regarding the promotion of environmentally sound technologies (ESTs). The key associated indicator, 17.7.1, is the total amount of approved funding for developing countries to promote the development, transfer, dissemination and diffusion of environmentally sound technologies.

The purpose of this proposal is to develop a methodology for tracking such funding. The Expert Group set up by UNEP has suggested a two-pronged approach:
Level 1. Use globally available data to create a proxy of funding flowing to developing countries for environmentally sound technologies, or of trade in environmentally sound technologies
Level 2. Collect national data on investment in environmentally sound technologies.

In addition to the current indicator wording, which focuses on funding for developing countries, the methodology stresses the importance of including a second indicator to track the total uptake of ESTs globally. This is critical in order to provide a complete picture of the EST market globally, including the influence of the global market on access to ESTs by developing countries.

There are five crucial elements which make up Goal 17 - finance, capacity building, systemic issues, technology and trade- all of which must be aligned for the Goal to be achieved. One of the key lessons over the last couple of decades has been that in order to achieve potential growth, measurement of financial flows (in terms of amount, type, geography, donor, recipient and investors) is a necessary step in such a transformation. In order to understand systemic issues, trade, capacity building, technology lock-in, innovation and deployment, we must understand how, why and where finance is being deployed. Only then we can begin to realign its flows.

There is a wide recognition of the fact that there can be no transition to a green economy without green technologies and technological innovation[2]. Various definitions of 'environmentally sound technology' exist and are in use. Terms such as 'environmental technology', 'clean technology', 'and cleantech 'or 'low- carbon technology' are sometimes used, although low-carbon technology can be considered as a sub-set of green technology. Other less commonly used terms include climate-smart and climate-friendly technology.[3]

Key to the effective development of such a methodology are definitional aspects, including criteria for the identification of ESTs, as well as guidance for their application by national governments. It

[2] Green Growth Knowledge Partnership https://www.greengrowthknowledge.org/about-us
[3] Jawahar (2018) Literature Review for SDG 17.7.1

also includes research that would identify potentially relevant data from both national and international sources, and development of a proposal for a data collection system for the indicator.

2 Definition and Rationale

The UNEP definition of environmentally sound technologies (ESTs) is: "*Technologies that have the potential for significantly improved environmental performance relative to other technologies. ESTs protect the environment, are less polluting, use resources in a sustainable manner, recycle more of their wastes and products, and handle all residual wastes in a more environmentally acceptable way than the technologies for which they are substitutes. ESTs are not just individual technologies. They can also be defined as total systems that include know-how, procedures, goods and services, and equipment, as well as organizational and managerial procedures for promoting environmental sustainability."*

The definition of an environmentally sound technology (EST) to be used to track SDG 17.1 at this point is always to include both hardware and software, including total systems that include know-how, procedures, processes, goods and services, equipment, as well as organizational and managerial procedures for promoting environmental sustainability.

There are however a number of challenges in issuing a bounded definition of an EST, especially given the difference is spatial, temporal and capacity differences in areas of deployment, the lack of easily accessible and affordable rigorous analysis of all technologies to potentially be considered and the different stages of transition in which countries find themselves. There is no such technology that is inherently environmentally sound; its environmental soundness depends on the context under which it is utilized. Trade-offs, rebound effects, uncertainty, available data and the law of unintended consequences have a role to play in the extent to which a technology can be considered environmentally sound.

This means that the environmental soundness of a technology needs to be assessed in a specific temporal and spatial context. For example, incandescent street lights *were* an environmentally sound technology when they were used to displace gas lights at the dawn of the 20th century, while it can no longer be considered as an EST with the presence of LED technologies. Likewise, a battery electric vehicle (BEV) might be considered as an EST in California, while the same technology deployed in the regions dominated by coal-based electricity would not qualify on the same grounds.

Following on from this it is clear that the environmental soundness of technology cannot be judged based only on a single environmental impact of concern, such as greenhouse gas (GHG) emissions. Studies have found that trade-off may exist among environmental objectives such as GHG emissions, water consumption, toxic substances emissions, land use change, biodiversity losses, and other impact categories. Multiple environmental impact categories should be considered and the trade-offs among them should be understood when determine the environmental soundness of a technology. This will be explored further in the section on modelling impact.

Neither can the environmental soundness of a technology be determined on the ground of a single life-cycle stage. Environmental problems can be shifted from one life-cycle stage to another, and without considering the full life-cycle of a product, claims of environmental soundness such as "zero emission car" that accounts for only the exhaust emissions cannot be justified.

There is also the concern that the introduction of a technology may induce unintended consequences that may aggravate the environmental performance of said technology. Corn starch-based bioethanol technology and the policies that promote it are believed to have led to additional land conversion in other countries, which is often referred to as 'indirect land use change (ILUC),' leading to additional GHG emissions.

Following the recommendations of the National Academy of Sciences (NAS), the US EPA, for example, included ILUC in determining the GHG mitigation potential of biofuels. More broadly, the technologies that improve (energy) efficiency are susceptible to 'rebound effects,' while the degree at which it negates the gains through efficiency improvement can vary widely.

The greatest challenge that exists to the definition of an EST however is that any estimate of the life cycle environmental impacts of a technology may suffer from large uncertainty. A measure without understanding the underlying uncertainty means little, and therefore uncertainty behind the measurements of environmental soundness should be duly taken into account.

The long-term goal of the project is to define the soundness of an environmental technology as the result of rigorous research that quantifies environmental impacts of a technology considering all the before mentioned criteria. The challenge in doing so, however, is that this would certainly increase the costs and probably adversely affects the timeliness of any EST determination. It is important to acknowledge that developing a comprehensive environmental impact measurement is costly, and the benefits of more rigorous measurement should be compared with their costs.

A major area of debate is also the extent to which existing performance standards and life cycle analysis could be used to assess the environmental soundness of a technology, and the potential for prioritizing technology solutions when less expensive options are available.

For example, in Bangladesh, there is naturally occurring arsenic which needs to be removed from water. This can be done through technological solutions including chemical intervention, prevention and control, water treatment and environmental monitoring. This can cost up to $1m while at a local level the same result can be gained from a simple process using locally available goods such as iron chips, charcoal and sand.[4] The appropriateness of technology in specific situations and environments should therefore also be a factor in assessment.

It is clear that what is appropriate for use in one country or region may not translate to another, unless it has been adapted or redesigned for local needs. What needs to be taken into consideration is "the full life cycle flow of the material, energy and water in the production and consumption system. It also implies the development and application of environmentally sound technologies underpinned by more holistic environmental management strategies based on the characteristics of natural systems, which include: species diversity; resilience; adaptiveness; regenerative capacity; interconnectedness; spatial and temporal fluctuation; etc. Examples of ESTs that emulate natural processes are ecological engineering and ecotechnologies."[5]

There are also challenges in ascertaining full life cycle assessments or performance standards in terms of costs and time in the deployment of new technologies and approaches. It is worth noting that new approaches to economic development, from circular economy[6] to regenerative or restorative technologies[7] and approaches are being developed and deployed and existing codifications, standards etc may not encompass new developments.

In terms of boundary setting, it is difficult to measure the extent to which it is possible to set an independent standard for improvement.

[4] https://www.tandfonline.com/doi/abs/10.1080/10934520009377018
[5] ibid
[6] https://www.ellenmacarthurfoundation.org/circular-economy/concept
[7] https://www.resilience.org/stories/2018-05-23/sustainability-is-not-enough-we-need-regenerative-cultures/ and https://www.wbdg.org/resources/living-regenerative-and-adaptive-buildings

The idea is that the environmental soundness of a technology is revealed only in relation to its alternatives that meet the same needs or functions. Therefore EST is considered as a technology that exhibits substantially superior environmental performance throughout the life cycle as compared to the alternatives that satisfy the same or similar purpose.

This is a contextualized definition and it opens the question of what is meant by "fulfil the purpose". That could be defined as the operational purpose, economic purpose, operational purpose, SDG purpose, environmental purpose and, once again, the definition is back in the situation of setting boundaries with insufficient information and setting prescriptive outlines for very different situations.

Various discussions have resulted in an agreement to use a back-casting approach and accept that the definition of an EST will change over time. The goal is that by 2030 all technologies and approaches that qualify as ESTs are defined as 'environmentally acceptable' in and of themselves e.g. they are technologies, systems, processes, goods and services that in replacing an alternative have a clear environmental purpose and benefit and result in an overall environmental good e.g. the generation of electricity from coal with any form of existing coal technology would be insufficient, in order to qualify it would need to be renewable generation, or a new form of coal technology that prevented environmental harm at all stages of the life cycle.

This works by defining ESTs currently as documented through Agenda 21, while recognizing that more ambitious performance goals will continue to evolve through and beyond 2030. The definition under Agenda 21 specifically accommodates the role of improved performance (i.e., "improved environmental performance over that which it replaces").

3 Methodology

This methodology outlines a two-pronged approach:

Level 1. Use globally available data to create a proxy of funding flowing to developing countries for environmentally sound technologies, or of trade in environmentally sound technologies.

Level 2. Collect national data on investment in environmentally sound technologies.

Level 1: International Proxy

An international proxy is critical in order to provide a complete picture of the EST market globally, including the influence of the global market on access to ESTs by developing countries. For example, this would help in assessing the impact of the falling costs of different technologies as they are deployed globally[8]. Without such a figure, it will be difficult to ascertain the levels of finance/support being transferred and whether it is above or below the global average.

It was therefore agreed that the indicator should be split into two sub-indicators: one global, one domestic.

The international proxy that provides the closest indicator of investment flows is that of trade (using HS codes). While a number of different potential proxies have been explored, trade is the closest proxy to have any informational value at the country level.

To calculate level 1, this methodology suggests using the most detail level HS data - 08 digits for exports and 10 digits for imports. The next step is assessing for each detailed HS its ECT (Environmental and Clean Technology) component, since not the entire HS is used for ECT purposes. It is important to use and explain and document the assumptions made in this phase, as it is difficult to always know the use of the goods (e.g. chlorine could treat wastewater but serves for multiples other non-EST activities).

Indeed the 04-digit level HS would rarely be solely EST and even so at the 06 level. Trade proxies will therefore assess the EST at the most detail level, and sum EST components into HS 04 in order to get the percentage of EST at that level. The next step is to link this HS 04 level to a sector/activity. That

[8] https://environmentlive.unep.org/egm/paris

last concordance should be the same (or really similar) for all counties. The sum of EST components will be calculated in monetary terms, in US dollars.

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Level 2: National dataUNEP recognizes that an EST cannot be defined in absolute terms. How environmentally sound a technology is will depend to a large extent on the context in which it is used. Socio-economic, geographic, temporal and other factors influence the effectiveness of technologies.

In deciding which technologies are most appropriate, there will always be trade-offs between cost and a range of economic, social, health and environmental impacts, to be determined based on national or local contexts and priorities. It would also not be feasible for all countries to strive towards the best available technologies globally if these are not appropriate in a domestic context. An approach whereby countries and other actors would strive towards incremental changes, based upon their available resources, capacities, and national technological contexts, could achieve greater impact.

Given the highly contextual nature of ESTs, it is therefore something that is better defined at the national level, taking into account the national context and mainstream technologies nationally. However, there is a real need to support national, sub-national governments and other actors with decision-making and defining the most nationally or locally appropriate technologies.

For level 2 a simple process is recommended based on a set of criteria which could be used to evaluate if an environmental objective is achieved or not.***

It was agreed[9] that the environmental objective can be assessed with the performance and operational data (in relevance to the environmental objective) and whether or not the technology has any negative environmental impact (cross-media effects). A core set of environmentally sound technologies has been identified through analysis of existing work on the subject, to provide a non-

[9] While there had been discussion as to the extent to which suitability for the local market should be addressed, the UNEP Expert Group finally agreed that addressing suitability was related to the issue of prioritization and not within the purview of an analysis of 'environmental soundness'.

prescriptive starting point to gather country specific EST information for the purpose of SDG reporting.

This would cover national investment in ESTs in addition to tracking only funding for ESTs in the form of international cooperation. With this information, it would be possible to complement the original indicator with a second on the status of investment in ESTs and provide a more complete picture of the uptake of ESTs globally.

Given that the goal of the indicator is to track financial or in-kind support to developing countries for ESTs (to include support for enabling conditions and capacity development within developing countries), it will be assessed in terms of monetary value, expressed in US dollar.

Steps involved in constructing the indicator

Developing an indicator for tracking ‘environmentally sound technologies’ involved several steps. Although these steps are presented in a linear fashion, in practice, a degree of iteration was required through processes of discussion and investigation.

1. Determining the scope of the indicator

The choice made for indicator 17.7.1 is to focus on clearly identified groups of technologies meaning individual technologies, but also total systems which include know-how, procedures, goods and services, and equipment, as well as organizational and managerial procedures for promoting environmental sustainability”. It was also agreed that the initial scope of the indicator would be of technologies which have an improved environmental performance over those they replace, without a specific boundary, enabling individual countries to make their own assessments according to domestic goals, resources, capacity and frameworks.

2. Determining the dimensions to be covered

The choice made for indicator 17.7.1 is to include performance, operational and cross-media dimensions in the assessment of environmental soundness.

3. Choosing the scale for the sustainability assessment

This will be an in-country selection based on capacity and focus. While respective technologies are usually not entirely environmentally sound, but rather environmentally sound concerning a specific aspect (e.g. concerning a specific resource or function). Furthermore, there might be a range of technologies which are only potentially environmentally sound or are integrated in plants or components.

4. Selecting the data collection instrument(s)

The initial proposal of the methodology suggested a survey to monitor the level of investment in ESTs. In consultations, however, concern was expressed about the extent to which complex reporting requirements created expense and pressure which should be avoided where possible. The key initial focus of reporting will therefore be the existing proxy value through trade, although it is hoped that this will be the bedrock for the development of more specific in-country reporting to include aid, grants, trade, private sector investments etc.

5. Selecting the criteria through which an EST could be defined.

A number of criteria were reviewed in order to ascertain their usefulness in building up a picture of approved funding for developing countries to promote the development, transfer, dissemination and diffusion of environmentally sound technologies. These include:

- Policy relevance: the indicator must be easily understood (reasons why it is selected) and the results easily interpreted by policy makers (is environmental performance increasing and why? Which policies need to be implemented, or cross-SDG approaches developed, in order to ensure the continuing progress for ESTs domestically?
- Universality: the indicator must be relevant for all countries in the world, both developing and developed.
- Replicability: the methods that countries use to determine the financial indicators relating to ESTs should be replicable if a requirement is made for independent reporting and verification.
- International comparability: the way indicators are calculated must ensure comparability across countries in order to ensure global reporting. Comparability, however, does not necessarily mean the use of absolute standards. For instance, there may be a difference in the degree to which different countries require improved environmental performance to be bounded. Similarly, compliance with national environmental standards, nationally recognized certification systems or global performance standards can be considered, even if national criteria vary from one country to another.
- Measurability: many themes are important sustainability issues but their measurement is difficult, complex or would involve costs that cannot be sustained in the framework of a

regular monitoring exercise. To the extent possible, alternative measures have been proposed to maintain indicators that are considered relevant while offering feasible measurement solutions.

- Sub-indicators: there are two key sub-indicators which are initially to be tracked by proxy of trade in agreed/approved ESTs. In order to track the import of approved funding transferred to developing countries, it is important to have a clear picture of the global market for ESTs and its impact on domestic deployment in emerging markets.

6. Assessing environmental performance at a project or plant level

Specific criteria are to be applied within an MCA tool in order to assess the sustainability level of the project and/or plant to be upgraded.

7. Deciding the periodicity of monitoring the indicator

The proxy for performance should be monitored on an annual basis to assess trends and the impact of changes in the global markets, that reporting should be undertaken on an annual basis and that the criteria and boundaries for assessing an EST should be reviewed every 4-5 years.

8. Modality of reporting the indicator.

This is yet to be determined but suggestions are available in the section on reporting.

The methodology does not specify a degree of improvement that a technology must demonstrate in order to qualify as an 'environmentally sound technology', but it is hoped that the long term goal will be the achievement of overall environmental benefit.

Criteria for Identifying Environmentally Sound Technologies

Given the challenges that exist for a prescriptive definition of environmentally sound technologies, UNEP has taken the approach of identifying goods and sectors through existing HS codes (e.g. traded goods and services that have been internationally agreed to have a positive environmental benefit). There are challenges with this approach as not all such traded goods are used for environmental purposes.

It is however a starting point for each country looking to assess its own definition and use of ESTs at this time. While not a prescriptive list, the sectors deemed to be ESTs through historical research include:

- Air pollution control (APC),
- Wastewater management (WWM),
- Solid and Hazardous waste management (SHWM),
- Renewable Energy (RE),
- Environmentally Preferable Products (EPPs)

Other areas which the Expert Group have proposed as pertinent to being defined as ESTs (especially with relation to their links with other SDGs) include:

- Water Supply & Sanitation (relating to indicators for #6 and #11)
- Energy Storage & Distribution (relating to indicators for #7 and #13)
- Land & Water Protection & Remediation (relating to indicators for #14 and #15).

With regard to sectors such as agriculture, urban development, health, education, industry, transport, etc, modelling can be undertaken to identify ESTs within individual sectors.

Following the identification of such technologies in-country, nations can add to their own definition of ESTs through the use of the following criteria in a number of different ways, from checking priorities with their NDCs for climate change approaches and through VNRs for their priorities in achieving the Sustainable Development Goals. The remaining criteria selected by UNEP for the initial identification of ESTs are:

- Compliance with national priorities
- Compliance with local environmental law
- Evidence of improved performance[10]
- Life cycle impact analysis
- Modeling of temporal and spatial dimension, alongside impact /trade-offs with regard to water, air and land

[10] This criterion recognizes that other approaches and tools (i.e., beyond the existence of standards, and the demonstration of compliance and/or certification against standards) may be more appropriate for demonstrating and quantifying the performance of ESTs. For example, ISO 14034 environmental technology verification (ETV) is a process standard, used by accredited bodies to verify the performance of environmental technologies, thereby charting a path for technology performance assessments where sustainability and innovation are inextricably linked. Use of ISO 14034 provides evidence and helps build credibility, increasing confidence that environmental technology performance claims are true and supported by high quality, independent data.

- *Others to be identified by the Expert Group*

It is generally agreed that the process should allow for individual countries to choose their rate of transition e.g. set their own boundaries for the level of environmental improvement initially shown. In that vein, countries should be encouraged to sue support system-based approaches for implementation that align well with the way governments are organized to address the 17 SDGs and their associated targets.

IV Tools, reporting and national data collection

A number of reporting frameworks already exist that can be used and/or combined for reporting on ESTs. On the climate part of ESTs, for example, this is already covered by the UNFCCC technology 'reporting tool' of TNAs used by developing countries to identify, prioritize and articulate their technology needs.

It is recommended that in their Voluntary National Reviews (VNRs) on the SDGs, countries should emphasize the integrated nature of the 2030 Agenda and the need for integrated strategies to meet the 17 goals, recognizing that SDG outcomes are highly interdependent with significant relationships across many goals and targets.

MCA for identification of ESTs

Multi criteria analysis (MCA) provides a structured framework for comparing a number of technologies across multiple criteria to gauge whether or not they can be considered 'environmentally sound'. While using multi-criteria analysis to address the extent to which a technology can be seen to be 'environmentally sound' can be complex, using a simple scorecard approach it provides an option which is well understood and can be supported by a network of global expertise, as well the development of in-country knowledge and skills.

If the criteria measures are qualitative and can only be measured by the extent to which the trade-off is considered negative, they should be converted to a numerical form on a scale, e.g. from 0 to 100 where "0" means the least preferred option and "100" means the most preferred option. There are broadly two sets of criteria, one related to the benefits and the other related to negative trade-offs.

The intention is to start with a simple scorecard approach, ensuring that all relevant considerations have been assessed with regard to the 'environmental soundness' of a technology. For those projects which are looking for green, climate or SDG related finance there will already be assessment factors in the proposal. As monitoring and reporting improves, impacts and trade-offs can be estimated and assessed. As this process continues to improve, performance can be rated over time and more standardised assessments can be made.

The use of the MCA in this instance is not meant as a tool for prioritizing technology needs, but rather as a tool for prioritising trade-offs. Further work on this can be done through the modelling of impacts over time and the trade-offs that need to be considered.

Modelling impact and trade-offs

The SDGs are a network of goals and targets working on the interlinkages and integrated nature of the complex challenges of sustainable development. Given that SDG 17 overall is to "strengthen the means of implementation and revitalize the global partnership for sustainable development" it is clear that any attempt to address this goal and its targets requires nations to effectively quantify the trade-offs and potential synergies available, in order to provide decision-useful data for policy making.

In the development, transfer, dissemination and diffusion of environmentally sound technologies it is imperative to ensure that the selection will address any underlying trade-offs between new technology implementation and its goals, and the impact on existing infrastructure, emissions and resources. It is also imperative to ensure that the selection is suited to local conditions. If these issues are ignored, the technologies may end up having no net environmental benefit and could have long term negative impact overall, not simply on the growth in the use of ESTs but in the achievement of the SDGs overall. It is the therefore critical to identify and assess technologies against appropriate criteria when prioritizing technologies.

While it is accepted that many of the targets under the Sustainable Development Goals have significant interactions, it is the extent to which they will play out in identifying what is 'environmentally sound' that is the key factor for this Indicator. However it cannot be ignored that decisions made about what constitutes 'environmentally sound' must take into consideration impacts on other SDGs, including food, water, energy, industry, and poverty etc.[11] It is important to be able to assess outcomes that existing technology solutions choices have produced and identify what the expected environmental, economic and social implications of new projects.

For example, some forms of energy generation emit lower GHGs but demand more water (such as nuclear) the question of whether energy production should compete with agricultural water use becomes a key parameter. The transboundary nature of many large river basins further complicates

[11] Fader et al (201(Toward an Understanding of Synergies and Trade-Offs Between Water, Energy, and Food SDG Targets) Frontiers in Environmental Science

the water-energy linkages. Because of the nexus, agricultural, water, energy and climate policies influence each other and jointly determine outcomes not only for the environment but for the poor. The use of food crops in power generation is also a significant concern for many. There is a significant body of academic work exploring trade-offs at the water, energy, food nexus and while much of the work has not yet been undertaken at a hyper-local or local level, this could be explored further to identify frameworks to support modelling of the trade-offs.

This is important not only for environmental reasons. As has been reported by CIGAR, tensions over water, energy and food uses are already severe in rapidly growing Asia and are growing in Africa south of the Sahara and Latin America. Working with partners to identify these trade-offs and reducing adverse outcomes will be a central part in ensuring that all SDGs are addressed in a holistic fashion. The work being done by CIGAR and ILWM on Water, Land and Ecosystems can provide support in this approach.

In a similar vein, air pollution caused by forms of energy generation can have a direct impact on health and well-being. Work by the IGES is exploring how this can be linked to other SDGs and as such, environmental trade-offs should be considered in terms of SDG 6 - water in terms of improved water quality and restoration of water related ecosystems; SDG 9 - industry in terms of environmentally sound technologies and industrial processes; SDG 11 - cities in terms of sustainable transport systems, SDG 13 – climate in terms of integrating climate change measures into national policies; and SDG 15 – land, in terms of restoring sustainable use of ecosystems. In particular, land and ecosystems could be related to acid rain, and climate could be related to co-benefits.[12]

The following impact criteria have been identified as important when assessing trade-offs e.g. to ensure that the implementation of a potential environmentally sound technology does not have adverse impacts in the following areas:

- Increase in greenhouse gas (GHG) emissions
- Increase in resource use (land, water, energy, minerals)
- Impact on ecosystems (eutrophication, acidification)
- Impact on human health (e.g. toxicity and particulates)
- Prevention, abatement or control of other types of air pollution
- Reduction in direct soil and water pollution, reclamation of soil, and restoration water quality

[12] Elder, M (2016) Application of SDGs to Air Pollution (IGES)

- Reduction of impacts and/or improvements of natural habitats and biological species, including humans (e.g., toxicity, particulates, loss of habitat, habitat fragmentation, etc.)
- Impact due to emission of pollutants ,waste, ozone depletion, biodiversity loss
- Impact on transportation, education, agricultural land
- Impact on urban habitats (e.g. green cities)
- Impact on climate information technologies and early warning systems
- Impact on socioeconomic development that is crucial, especially for developing countries
- Impact on Job creation/loss [13]

There is a large body of literature available that can be used as a source for assessing impact, from the academic literature, professional papers such as those provided by the UK's Institution for Chartered Engineers and by the growing body of specialists working on impact assessment, from Bridges and its five dimensions of impact to the Global Impacting Investing Network and its IRIS+ approach.

While the majority of resources available for modelling within the Impact Toolkit provided by The GIIN are focused on the impact of capital deployment and operate at an asset/investor level rather than a country one, they may be useable as a framework to explore localized trade-offs. The GIIN has aligned its IRIS+ core metrics and strategic goals with the SDGs at the Goal level.

One of the other tools available is Invest, a Stanford University based suite of free, open-source software models used to map and value the goods and services from nature that sustain and fulfil human life. While the models are based on production functions that define how changes in an ecosystem's structure and function are likely to affect the flows and values of ecosystem services across a land- or a seascape – they could potentially be adapted to work with environmental trade-offs.

At the same time, "the integrated nature of the SDG targets means that progress towards one target is also linked through complex feedbacks to other targets, placing demands on science and research to support national implementation"[14]. While scenario analysis is an increasingly popular tool in climate modelling, there is less available support for its implementation at a national or more local

[13] While generally speaking the EG is happy with this list there should be some further elaboration of what would constitute an indicator versus a parameter for measuring performance. Given the progress that has already been made across a wide spectrum of SDGs, it will be essential to align this list with indicators that have already been vetted

[14] Allen et al (2017) An Iterative Framework for National Scenario Modelling for the Sustainable Development Goals (SDGs), Sustainable Development

level. A major challenge to adopting a long-term, integrated planning approach in the past has been the lack of methodologies that enable a comprehensive, multi-dimensional and dynamic perspective, as well as tools that can evaluate the interactions and trade-offs among the economic, social and environmental dimensions of development[15]. There is however a growing body of literature presenting guidance and providing methodologies for approaching the assessment of impact. It is possible that this literature could be explored to provide guidance for the use of scenario analysis at a project or programme level.

As a baseline it could prove useful to work with the three classes of scenarios identified by Vergragt and Quist to provide guidance at different scales[16]. The three scenarios, which answer different questions, operate at different scales and ask the following questions:
(1) "what will happen?" (trend extrapolations; business-as-usual (BAU) scenarios)
(2) "what could happen?" (forecasting; foresighting; strategic scenarios) and
(3) "what should happen?" (normative scenarios; backcasting; desirable futures, visions or future visions).

Currently countries used a range of different models to support their analyses, including top-down system dynamics, CGE, macro-econometric or hybrid models (e.g. Threshold 21, Polestar, International Futures, E3ME, GEM-E3, MAMS, GCAM), as well as a range of bottom-up sectoral models across the energy, agriculture, transport, building, land- use and other sectors (e.g. POLES, LEAP, MARKAL, PRIMES, IMPACT, ESM, LUTO, PATHWAYS, TIMES) Many countries used nationally developed CGE and IAMs, and a variety of other tools including simple input–output tables, spreadsheets and MACCs.[17] These approaches could be assessed to identify the most useful approach at a scale selected level.

National Data Collection

UN data shows that only 52 per cent of results indicators were drawn from country-owned result frameworks and only 44 per cent of result indicators were monitored using data and statistics from government monitoring systems. It would be appearing that there is an urgent need to build up capacity in understanding and reporting interventions in-country that cover trade, aid and private

[15] Scrieciu, S. Serban, 2007. "Can economic causes of tropical deforestation be identified at a global level?," Ecological Economics, Elsevier, vol. 62(3-4), pages 603-612, May.
[16] Vergragt PJ, Quist J. 2011. Backcasting for sustainability: introduction to the special issue. Technological Forecasting and Social Change 78: 747–755
[17] Allen et al (2017) An Iterative Framework for National Scenario Modelling for the Sustainable Development Goals (SDGs), Sustainable Development

investment that are able to assess trade-offs and identify synergies, and that can be monitored and verified by independent bodies. While statistics offices using the United Nations Fundamental Principles of Official Statistics are now operating in 111 countries in 2018, up from 71 in 2017, they are under increasing pressure from a number of international agencies for a range of reporting.

The following questionnaire was sent out to a selection of 13 countries in 2018, and a total of 6 returned it including Canada, China, Germany, Ireland, Estonia and Sweden. It was however clear from the responses that little information about ESTs was specifically available, and that identification and tracking of ESTs without strong guidance would be considered challenging.

Questionnaire	
Name:	*Please specify your first name and last name*
Country:	*Please indicate the country for which you are filling the data*
Title, Institution:	*Please specify your Title and Institution*
Email address:	*Please mention your email address*
Contact number:	*Please mention your contact number*
1. In your technical opinion, is the approach on page 1 feasible?	☐Yes ☐No ☐I do not know *Comments (if any):* Click here to enter text.
2. Does your country have a definition of Environmentally Sound Technologies (ESTs) used either for SDGs or for any other purpose?	☐Yes ☐No ☐Not sure *If you indicated **YES**, please mention the definition in use and also mention the source for this definition below.* Click here to enter text. - *Is this a national definition, or taken from elsewhere (i.e. regional, or international organisation or body)? Please mention.* Click here to enter text.
	If *you indicated **NO**, are there any related definitions being used, please mention the definition and its source:* Click here to enter text.
In the next section, please give us an indication of availability of data in your country to track both a) Total investment in ESTs and b) Financial support to developing countries (reporting either as a receiver or provider).	
Indicator- 1: Total investment in ESTs **Note**: Please consider the Table 1 (below), the variables and breakdowns shown and the time periods in the table. Please answer the following questions (i.e. 3.1-3.6) about which cells in the table would be possible to complete with the information available in your country.	
3.1 For which periodicity, would your country have the data available for this indicator 'Total investment in ESTs'?	☐Annual ☐2 years ☐ 5 years ☐ 10 years ☐ Data not available *Please mention comments (if any):* Click here to enter text.
3.2 From which year, is/will the data be available to report against this indicator in your country?	*Please mention comments (if any):* Click here to enter text.
3.3 *Level of disaggregation*:	☐Yes ☐Maybe ☐No

3.3.1 Does your country have disaggregated data available for 1) goods, 2) services, 3) other forms of support such as capacity development and technical assistance?	*Please mention comments (if any):* Click here to enter text.
3.3.2 Does your country have disaggregated data by sector, activity or technology related to ESTs?	☐Yes ☐Maybe ☐No *Please mention comments (if any):* Click here to enter text. *If you indicated **YES**, please indicate the level of detail available :* ☐Sector Level (Example: Energy) ☐Activity Level (Example: Solar Energy) ☐Technology Level (Example: Photovoltaic cells) *Please mention comments (if any):* Click here to enter text.
3.4 Does your country have data on enabling conditions and capacity building for the uptake of ESTs nationally? Examples of enabling conditions could include: - Supportive legal and policy frameworks and their implementation and enforcement - Institutional strengthening including coordination, clear roles and responsibilities of key entities (government, non-state actors including civil society) - Capacity strengthening of all actors so they can play their roles - Social dialogue including participation of stakeholders	☐Yes ☐Maybe ☐No *Please mention comments (if any):* Click here to enter text. *If **YES**, are there any metrics used to track enabling conditions and capacity development for the uptake of ESTs?* *Please mention comments (if any):* Click here to enter text. *If **NO**, Please mention if there any proxies available (if any):* Click here to enter text. *Please mention comments (if any):* Click here to enter text.
3.5 Which units of measure, in addition to USD value, would be useful and feasible in tracking the uptake of EST nationally?	*Please mention alternative units of measure (if any):* Click here to enter text.
3.6 What kind of information (financial or non-financial) is available to report on the various stages of technology cycle (research and development, demonstration deployment, commercialisation) of ESTs?	*Please mention comments (if any):* Click here to enter text.
Table 1: Please find sample reporting table below.	

		2017	2016	2015	2014	[...]
1	**Total investment in ESTs**					
1a	of which: goods					
1b	of which: services					
1c	of which: other forms of support such as capacity development and technical assistance.					
2	**Total investment in ESTs by sector**					
2a	E.g. energy sector					
	[other sectors]					
3	**Total investment in ESTs by activty**					
3a	E.g. solar energy					
	[other activities]					
4	**Total investment in ESTs by technology**					
4a	e.g Photovoltaic cells					
	[other technologies or subtechnologies					
5	**Enabling conditions**					
5a	Supportive legal and policy frameworks and their implementation and enforcement					
5b	Institutional strengthening including coordination, clear roles and responsibilities of key entities (government, non-state actors including civil society)					
5c	Capacity strengthening of all actors so they can play their roles					
5d	Social dialogue including participation of stakeholders					

Indicator- 2: Financial support to developing countries for the development, transfer, dissemination and diffusion of environmentally sound technologies (reporting either as a receiver or provider)

Does your country have information on the following:

4. Total Amount or percentage of financial assistance received as a beneficiary country for the development, transfer, dissemination and diffusion of environmentally sound technologies?	How feasible is it to obtain this data? ☐Impossible ☐Challenging ☐Somewhat challenging ☐Moderate ☐Already available *Which institutions would need to be consulted to obtain this information? (if any)* *Public institutions:* Click here to enter text. *Private institutions:* Click here to enter text.
5. Total Amount or percentage of financial assistance provided as a donor country for the development, transfer, dissemination and diffusion of environmentally sound technologies?	How feasible is it to obtain this data? ☐Impossible ☐Challenging ☐Somewhat challenging ☐Moderate ☐Already available *Which institutions would need to be consulted to obtain this information? (If any):* *Public institutions:* Click here to enter text. *Private institutions:* Click here to enter text.
6. For which periodicity, would your country have the data	☐Annual ☐2 years ☐ 5 years ☐ 10 years ☐ Data not available *Please mention comments (if any other):* Click here to enter text.

available for this indicator 'Total investment in ESTs'?	
7. From which year, is/will the data be available to report against this indicator in your country?	*Please mention comments (if any):* Click here to enter text.
8. Does your country have disaggregated data on the purpose of 'receiving or providing' related to ESTs? **1. Research, Development and Demonstration** **2. Capacity building and technical assistance** **3. Enabling conditions** **4.Deployment and Diffusion**	How feasible is it to obtain this data? ☐Impossible ☐Challenging ☐Somewhat challenging ☐Moderate ☐Already available *Which institutions would need to be consulted to obtain this information? (if any)* *Public institutions:* Click here to enter text. *Private institutions:* Click here to enter text.
9. Does your country have data on value and weight/units of imports and exports of Environmentally-Sound Technologies?	*Is this Data available?* ☐Yes ☐Maybe ☐No *Which entities in your country would need to be consulted to obtain this information?* *Public institutions:* Click here to enter text. *Private institutions:* Click here to enter text.

Given the challenges in identifying data available in-country, there are a range of different options available for the collection of national data which cover demographics, industrial performance, emissions, from digital records, to surveys, in-person interviews, regulatory compliance etc.

Receptor capacities both within and among countries vary considerably in terms of understanding as well as the ability to process or act upon any guidance that may be provided. It would be helpful if there were a concerted effort to raise awareness and integrate EST goals, objectives and performance measurement horizontally across all SDGs.

At the same time, it is necessary to be practical about what can be achieved in the short term, recognizing that things will continue to evolve and new opportunities for integration will arise as moving forward.

V Factors affecting market for ESTs and uptake

An area which contributes to the complexity of tracking funds dedicated to ESTS is the interaction between global and domestic markets. The bulk of the global EST industry continues to be located in a smaller number of developed and emerging countries which are also the leading EST traders, namely China, the United States, Europe, Japan and Korea. However, while these markets take the lion share of installed EST capacity and trade revenues, developing countries have shown significant growth in trade volumes for ESTs, especially those related to renewable energy.[18] In order to promote ESTs, stimulate increased uptake and continue to grow markets in developing countries, a number of different factors need to be addressed.

The first is a realization that context is critical in the uptake and success of an EST. A technology assessed as environmentally sound in a given country, stage of economic development, or point in time may not be in another. Whether or not this technology can perform well depends on the presence of a supporting infrastructure and the skills and expertise necessary for operation, maintenance and monitoring.

As more information becomes available, as technologies improve and as values and attitudes change, so do the criteria against which we measure the environmental soundness of such technologies. For example, a high-efficiency, combined-cycle gas turbine (CCGT) may be an appropriate choice where a natural gas infrastructure is already in place or where such a technology is currently more affordable than renewable alternatives while also more environmentally sound than traditional coal-based power generation.

The dispatchability of a CCGT power plant may further make it complementary with a growing renewable infrastructure as the low-carbon transition proceeds apace, although it is understood that at some point gas-based power generation will have to give way to cleaner alternatives. This illustrates the importance of choosing options that meet current needs and capacities, while also remaining environmentally sound over the entire operational life cycle. Finally, an important contextual consideration is that economic viability (affordability, securing investment, etc) and social sustainability (employment opportunities, just transition, etc) of the technology are ensured alongside its environmental soundness.

[18] UNEP (2018), Trade in environmentally sound technologies: Implications for Developing Countries. https://wedocs.unep.org/bitstream/handle/20.500.11822/27595/TradeEnvTech.pdf?sequence=1&isAllowed=y

Second, a multitude of actors are involved in the EST market and there is a need for them to be engaged and to understand requirements if transfer to developing country contexts is to be effective and a market is to grow. This transfer is a complex process, in terms of both distance and time. This raises the importance of effective communication between stakeholders, for example between more informal players such as innovators on the one hand and the government on the other, to remove barriers. Such communication draws on information management systems, knowledge management tools and formal and informal networks. It also, critically, depends on communication skills to be trained in a way that enables stakeholders to use the tools available to them and engage with each other in a results-oriented way.

Third, for technology recipients and users – be they governments, utility companies, institutional investors, small and medium-sized businesses or private households – to make informed decisions as to the most environmentally sound technology in a given context, the availability of and access to data is critically important. Decision-useful Information is needed to identify and understand needs and gaps, compare different ESTs, and assess the impact and effectiveness of existing technology applications. While the lack of granular, decision-useful data is a global problem, it is particularly pronounced in developing countries where such data is often unavailable and/or unreliable. The building of skills in data gathering, analysis, management, presentation, verification, standardization and harmonization, impact modelling, as well as risk assessment and management removes uncertainty and is therefore a key aspect of ETS market development, one which forms a critical part of an effective enabling environment.

Fourth, this enabling environment has a number of important facets, including policies that incentivize the adoption of ESTs, for example through fiscal measures such as seed funding and tax deductions or non-fiscal measures such as the setting of specific technology targets and environmental standards or help with the identification and design of bankable EST projects. It also includes market interventions by the government, for example to correct subsidy distortions or disincentivize entrenched industries and processes that have created barriers to the uptake of ESTs.

An effective enabling environment is, further, often characterized by greater coordination and communication among government departments and agencies (to the extent that they exist) with the goal of streamlining and easing the way for investment and presenting international EST transfer efforts with an integrated approach at national and subnational levels. Morocco's joined-up thinking across government to build an inclusive green economy is a good example in this regard.

Policymakers in developing countries can further improve the enabling environment for ESTs through the strengthening of enabling technologies and processes such as micro-finance, phone banking, cloud services and AI. As the M-Pesa example in Kenya shows, mobile payment schemes have proved critical in the roll-out of off-grid solar energy solutions, although these need to be combined with measures to prevent the entrapment of rural populations in unsustainable debt burdens. Finally, an enabling environment also needs to address tariff and non-tariff barriers that continue to hinder the trade and transfer of ESTs.

The table below presents a non-exhaustive overview of some of the key factors influencing the growth of a market in and uptake of ESTs in developing countries.

Factor influencing EST uptake	Potential interventions
Context	Identify what works given domestic circumstances; Support economically, socially and environmentally sound technologies; Build on comparative advantage to develop and maintain market share
Lack of (access to) data	Support gathering of decision-useful, granular data; Data transparency
Lack of relevant skills	Education for sustainability; Building of skills in data gathering and management, impact modelling, as well as risk assessment and management; Technical skills
Lack of enabling infrastructure	Investment in physical (transportation, grid, etc) and digital infrastructure (micro-finance, phone banking, cloud services, AI, etc)
Lack of engagement	Communicate clearly with all stakeholders and raise awareness of environmental, social and economic implications
Lack of supply/ demand	Direct support for R&D and knowledge exchange; Contribution to capital cost of larger projects; Public procurement; Feed-in tariffs, tax credits, loan guarantees

Tariff and non-tariff barriers	Tariff reduction through international and intra-regional trade liberalization; Adjusting domestic standards
Market failures	Pricing carbon to internalize the cost of environmental pollution; Investing in clean innovation and energy efficiency
Policy failures	Eliminating price distortions/ subsidy removal; Enabling market access for new entrants and greater competition
Social sustainability	Reducing structural adjustment costs and unwanted distributional consequences; Retraining for ESTs; ensure buy-in from all parts of society through stakeholder engagement

Broadly stated, advancing and deploying innovative, sustainable solutions to protect and enhance environmental quality and the regenerative capacity of natural ecosystems will require:

- Effective dialogue and new ways of thinking to raise awareness about economic, social and environmental resiliency;
- Participation of companies, industry associations, government agencies and other stakeholders in identifying technology needs, interests and associated data to reliably inform and continuously improve decisions based on appropriate benchmarks and quality-assured performance verification;
- Cooperation with committed public and private organizations that have practical experience in evaluating, using, implementing and financing new innovations;
- Acceptance of technology performance verification within key sectors as a means of reducing risk associated with the adoption of new technologies that meet environmental and sustainability targets.

VI Outline for National Guidance Document

"The Millennium Development Goals (MDG) process shed light on the importance of robust and reliable data for evidence-based decision-making as well as for effectively focusing national development policies and programs."[19] Lessons learned from the follow-up and review process is that information on indicators should primarily be based on data produced by National Statistical Systems. [20]

It is clear that cooperation, coordination and transparency between international organisations and National Statistical Systems (NSS) are of utmost importance in order to provide reliable, high-quality and impartial data for decision-makers. In consequence for the Sustainable Development Goals (SDG) process it is crucial to understand the data flows and reporting structures between national and international organisations and to find a common ground on how to work together in order to have harmonized and comparable statistics and indicators at the national, regional and international level.[21]

Each country will need to take a number of steps to lay the ground for EST transfer and market growth, in order to reap the benefits from developments in this sector.

Needs and capacity assessment

One of the first steps is to identify National Statistics office and other offices which can or do provide data to the National Statistics Office and identify already well-established data reporting mechanisms which could feed into an assessment of finance flowing into ESTs.

A key first step is to establish the current state of the EST industry in country: what is already in place, where are further gaps and needs and what is the potential (resource or otherwise) for further growth?

This includes an identification of the current state of investment in ESTs by source (foreign/domestic), class (debt/equity), purpose (specific technology, domestic market/export) and

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[19] UN Stats (2017) Guidelines and Best Practices on Data Flows and Global Data Reporting https://unstats.un.org/sdgs/files/meetings/iaeg-sdgs-meeting-06/20171108_Draft%20Guidelines%20and%20Best%20Practices%20for%20Global%20SDG%20Data%20Reporting.pdf
[20] ibid
[21] ibid

location (in country). It also requires a clear understanding of legal and regulatory requirements, in terms of both national (and potentially sub-national) laws as well as commitments under international agreements (NDCs and VNRs).

Data collection and validation

In cases where relevant data is unavailable, incomplete or unreliable, it must be gathered and made available to decision makers[22]. This data should be granular and reflect the interconnection of different sectors. For example, data gathered on a biofuel project should not only present the amount of biofuel produced but should also capture where the biomass is coming from. Likewise, an energy project is not just about the number of kWh produced but should also cover data on its water consumption vis-à-vis alternatives, whether it takes away arable land, causes air pollution etc. Key validation methods include documentation of measures taken to avoid and minimize trade-offs including action plans, implementation plans, and monitoring plans.

It is also important to remember that monitoring and validation of generated data will play a vital role in communicating information and building a framework for effective policy making. Key validation methods include documentation of measures taken to avoid and minimise trade-offs including action plans, implementation plans, monitoring plans, etc.

Reporting framework

[22] Key questions to implement data collection and validation include:

What country level data is available and can be used?

What are the additional data (skills) requirements?

Who is responsible for collecting what data?

What's the scale of enquiry (from household efficiency to replacement of a power plant)?

Are there climate models for your country that show areas/regions or topics that are of particular concern, and how is this information fed into planning and investment decisions?

Do donors/ investors require data be made available?

How can data and modelling skills be scaled up quickly and cost-effectively?

An effective reporting framework should begin with in-country identification of the goal to be achieved, and whether or not a specific boundary of environmental improvement can be set according to domestic goals and capacities. Then a decision needs to be made about the scale of the finance to be tracked (component scale, building scale, plant scale, project scale), the sectors to be assessed and whether the finance will be tracked across all interventions, or only against foreign aid and investment.

One of the most important elements of the analysis is to understand what existing avenues for reporting can be used as a basis for initial assessment of ESTs? In aid and climate programmes, for example, there is increasing pressure to provide expected environmental, economic and social implications of new projects to funders and this could provide a useful source of data. In terms of environmental, social and governance reporting, for example, any project with a capital cost of US $10 million or more requires the operator to conform to Equator Principles when raising funds from the private sector (where the financial institution is a signatory).[23]

To date, 99 financial institutions in 37 countries have adopted the Equator Principles and report on their management of social and environmental risk – such reports could provide a baseline dataset. The EPs apply globally, to all industry sectors and to four financial products: 1) Project Finance Advisory Services, 2) Project Finance, 3) Project-Related Corporate Loans, and 4) Bridge Loans.

The growing focus of the investor community on ESG and impact investing is also going to drive forward the availability of data. A voluntary reporting programme, the Global Reporting Initiative (GRI) also has the potential to publicize relevant environmental data from a corporate perspective, as its standard for environmental reporting GRI 300, might prove useful.

GRI's Sustainable Development Goal is to foster inclusive development and sustainable, green, economic growth by empowering decision makers through its sustainability standards and multi-stakeholder network. It plans to do this through 1) strengthening local and international policy around reporting, 2) work towards making reporting relevant all stakeholders, in particular in developing countries, including those stakeholders who are underserved such as small and medium-sized enterprises, community leaders and advocacy groups; 3) capacity building and empowering the beneficiaries and intended users of reported data; and 4) innovation in emerging issues.

[23] https://equator-principles.com/

"The four objectives have two distinctive supporting blocks: GRI Sustainability Reporting Standards, and the wealth of data from the reporting process which GRI plans to liberate through the Sustainability Data Platform"[24]. It has also developed a collaborative initiative by GRI and the United Nations Global Compact, 'Business Reporting on the SDGs' – an Action Platform, which aims to accelerate corporate reporting on the Global Goals.

On the reporting by government, it is also important to identify which SDG's are being supported by the implications of the different impact criteria and assess the extent to which reporting frameworks on a number of criteria can be combined. A review of indicators, methodologies and reporting frameworks should be undertaken, to ensure that 17.7.1 is additive and complementary to existing reporting frameworks.

Stakeholder engagement

Effective stakeholder engagement is critical if there is to be successful EST transfer and market growth. The multitude of actors operating in the public, private and third sectors and across jurisdictions and different levels of decision making, from international to local, mean that a multitude of motivations need to be considered. For example, a national government may pursue ESTs to achieve specific development or environmental goals whereas a private business may do so to grow market share or gain a competitive advantage. Individual consumers, on the other hand, may be principally motivated by concerns over quality of life and affordability. An effective stakeholder engagement process will take these differences into account and involve key players drawing on a range of different tools, from targeted workshops and seminars to broader conferences and information campaigns.

The 2019 Handbook on Preparation of Voluntary National Reviews says, "The participation of stakeholders promotes effective decisions, by giving groups affected by those decisions the opportunity to communicate their needs and interests and support governments in tailoring, implementing and reviewing public policies. Participation and consultation also build ownership of the 2030 Agenda, and therefore contributes to a whole-of society approach to the implementation of the SDGs. The 2030 Agenda calls upon stakeholders to be actively engaged throughout the process of design, implementation, monitoring and review of the 2030 Agenda."[25]

[24] https://www.globalreporting.org/information/current-priorities/sustainable-development/Pages/default.aspx
[25] https://sustainabledevelopment.un.org/content/documents/20872VNR_hanbook_2019_Edition_v2.pdf

In order for the SDGs to be supported and addressed by individual nation states, it is important to bring all different elements of society together. This is even more important when considering the development of new reporting frameworks, as data should be generated from as many different places as possible, in order to support the validation of data and the monitoring of impact. Any reporting framework developed in-country should encourage and deploy a programme for stakeholder engagement – one that can be used to address the informational needs of all SDGs.

For example, while national data and government and industry reporting are central elements of an effective reporting framework, civil society has a critical role to play. The UN Department for Economic and Social Affairs has identified seven benefits of CSO reporting:

- Increased awareness of the SDGs: CSO reporting helps raise the profile of the SDGs among wider civil society, government departments and the general public.
- Alerting authorities to the role of CSOs as data providers: Government departments may not be aware of the role CSOs can play in contributing data on SDG progress. This can encourage the inclusion of CSOs in formal reporting procedures.
- Mutual accountability of states and CSOs: While CSO reporting can prompt governments to take accountability processes more seriously, it also encourages CSOs to be accountable to their partners and those they represent.
- Enhancing cooperation: CSO reporting can make other stakeholders, both national and international, aware of how CSOs are contributing to achieving the SDGs.
- Coordination of global partnerships: By sharing information about organisations contributing to SDG implementation, CSO reporting can help identify who should be included in global SDG partnerships.
- Internal reflection: Reporting on SDG progress can encourage CSOs to reflect on their own contributions to achieving the SDGs.

Reporting on performance under the SDGs is a means to exchange experiences, identify challenges and accelerate implementation.[26] A great deal of research has been done on effective stakeholder engagement and in fact ten key performance indicators (KPIs) have been identified as the most important for construction, an analysis that could be replicated in other areas[27]:

[26] https://sustainabledevelopment.un.org/content/documents/20872VNR_hanbook_2019_Edition_v2.pdf
[27] Goodenough et al (2018) Key Performance Indicators of Stakeholder Management in Construction Projects – International Experts Perspective (RICS)
https://www.researchgate.net/publication/325711486_Key_Performance_Indicators_of_Stakeholder_Management_in_Construction_Projects_International_Experts_Perspective

- Communication effectiveness
- Stakeholder support of project
- Conflict mitigation
- Trust and respect in relationship
- Smooth project facilitation
- Uncertainty and risk mitigation
- Management monitoring and response
- Cost savings
- Better service delivery
- Sustainable lifecycle performance

Communication has been shown to be important in every stakeholder analysis to date. Combine that with management monitoring and response and sustainable lifecycle performance and it becomes clear that the identification of EST use within industry and manufacturing could prove a powerful stakeholder engagement tool. While the member government will be delivering the data to the relevant international agency, there is precedent for encouraging corporate and investors to report such moves themselves.

The 2030 Agenda has a "revitalized partnership for sustainable development at its core, and stakeholders are recognized as valuable partners in implementing the goals and raising public awareness".[28] That means that it is important that policy approaches are combined across silos, embedding environmental assessment into government procurement and policy making so that its considered in disaster planning, foreign policy, urban planning, agricultural planning etc.

[28] https://sustainabledevelopment.un.org/content/documents/20872VNR_hanbook_2019_Edition_v2.pdf