

Forum: Environment Committee

Issue: Improving sustainable forest management

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Introduction

Sustainable forest management, according to the Food and Agriculture Organization of the United Nations is defined as, “The aim of sustainable forest management (SFM) is to ensure that forests supply goods and services to meet both present-day and future needs and contribute to the sustainable development of communities” (FAO 1). The concept of sustainable forests involves the legal, environmental, and economic aspects of the issue. Additionally, it not only takes into consideration the production of goods, but the balance of carbon emissions, biodiversity, and the conservation of bodies of water. The concept of SFM seeks the balance between human needs, and environmental needs, and economic needs in both the short and long term. In an ever-evolving world, many nations fail to implement legislation for the safeguarding of forests and the prioritization of SFM. Although there are several aspects that encompass the sustainable management of forest management, this report seeks to address infertile forestal lands, invasive species, and the balance of greenhouse gas emissions and reforestation.

First of all, the fertilization of infertile land is an issue which must be addressed in terms of sustainable forest management. The irresponsible disposal of toxic waste in forestal lands, and the effects of several industries such as mining have severe effects on the soil quality in forests. This is why it is important to not only regulate the invasive industries which have repercussions on forestal lands, but also implement measures to fertilize the already affected areas. This way, reforestation can be put into practice, avoiding future repetition of the issue.

Next, the moderation of invasive species is crucial when addressing SFM. Invasive species not only generate extreme competitiveness between the native plants, but also completely unbalance the ecosystem as a whole. Both plants and animals are severely affected due to the strong interconnections that exist within the food chain. If one of the factors stops fulfilling its place, the dependent factors are also affected, which is why it is important to moderate the invasive species.

Lastly, the balance of carbon sequestration and forests are essential for the climate aspect of the ecosystem. According to Boston University, “30 percent of carbon emissions from burning fossil fuels are taken in by forests” (1). This demonstrates the significant impact forests and trees have on the balance of greenhouse gas emissions. This is why it is important to find solutions for balanced reforestation regarding the environmental consequences.

There are several aspects that must be taken into consideration, the economic, ethical, and

environmental aspects that forests influence in our modern day society. The most relevant aspects and issues sustainable forest management has confronted include battling contaminated soil, invasive species, and keeping its significant role in carbon sequestration. This is why the manner must be taken into consideration urgently, and solutions must be implemented as soon as possible.

Definition of Key Terms

Fertilization

“The action of spreading a natural or chemical substance on land or plants, in order to make the plants grow well” (Cambridge Dictionary 1).

Forest tenure

“The right – statutory or customary -- that determines who can use, manage, control, or transfer forest lands and resources such as wood or the multitude of non-wood forest products (NWFPs). Forest tenure defines for how long, and under what conditions these rights are held” (FAO 1).

Invasive species

“Invasive plants are harmful non-native trees, shrubs, and herbaceous plants that are spread by global trade, human and animal transport, and gardening” (Invasive Species Centre 1).

Contaminated land

“Land that has a hazardous substance in or on it that - has significant adverse effects on the environment; or. is reasonably likely to have significant adverse effects on the environment” (Ministry for the Environment 1).

Toxic waste

“Unwanted chemicals that are the result of manufacturing or industry and that are poisonous to living things” (Merriam-Webster 1).

Greenhouse gasses

“Gasses in the earth's atmosphere that trap heat. During the day, the sun shines through the atmosphere, warming the earth's surface. At night the earth's surface cools, releasing heat back into the air. But some of the heat is trapped by the greenhouse gasses in the atmosphere” (National Grid Group 1).

Deforestation

“Deforestation is the purposeful clearing of forested land” (National Geographic).

Reforestation

“Reforestation, the conversion of previously forested land back to forest. Reforestation is an essential part of the ecological restoration of wild forests and is also used for more heavily managed lands, such as those used for paper production or timber. While a reforested area may not be as biologically productive or biodiverse as the original forest, reforestation has a number of economic and ecological benefits” (Britannica 1).

Afforestation

“The act or process of establishing a forest, especially on land not previously forested”

(Merriam-Webster 1).

Phytoremediation

“Phytoremediation uses plants to clean up contaminated environments. Plants can help clean up many types of contaminants including metals, pesticides, explosives, and oil” (A cCitizen’s Guide to Phytoremediation 1). Additionally, it uses hyperaccumulators which can tolerate and accumulate specific substances.

Bioremediation

“Bioremediation uses microorganisms to degrade organic contaminants in soil, groundwater, sludge, and solids. The microorganisms break down contaminants by using them as an energy source or metabolizing them with an energy source” (CLU-IN 1).

Background Information

Sustainable Forest Management has become a newly implemented and defined term by the United Nations, however there are several aspects that must be considered for “sustainable” forests. Sustainable forests refer to those which can provide for the current needs humankind seeks to fulfill, while also planning for the future use of forestal lands. There are several United Nations organizations which are centered around the proper management of forests such as the Food and Agriculture Organization of the United Nations (FAO), which defined the term of Sustainable forest management (SFM). There are several issues that root from this issue such as the environmental, ethical, and economic repercussions which is why several organs from the United Nations attempt to address the issue. Regarding the environmental issues, the United Nations Framework Convention on Climate Change has recently incorporated the REDD+, an extension on the management of forests due to their recently recognized importance within the journey towards reducing the global emissions of greenhouse gasses. The UNFCCC Warsaw Framework for REDD+ (Reducing Emissions from Deforestation and Forest Degradation) is able to address forest degradation and deforestation in relation to carbon emissions, and in that way prevent climate change through the conservation, protection, and proper management of forests. Additionally, the UNFCCC Decision on Agriculture (COP 23, 2017) addresses the importance of protecting agriculture and enhancing forest resilience in harsh environmental and human created conditions. The United Nations Environmental Programme attempts to address the restoration of ecosystems as a whole through the UN Decade on Ecosystem Restoration (2021-2030). Although it is not solely focused on forestal maintenance, it involves the protection of biodiversity and highlights the importance of forests in the reduction of the carbon footprint. Furthermore the United Nations General Assembly (UNGA) defined the Sustainable Development Goals or the SDG’s, at the United Nations Conference on Sustainable Development in 2012 in Rio de Janeiro. Out of these goals, number 13 specifically addresses climate action which is directed with the proper maintenance of

forests. Also, number 15 addresses life on land. Since forests are a home for several different species and communities of people, they are a primary aspect considered within this goal. Even though there are several projects and organizations which address the issue, there are a variety of aspects which must be considered, this is why this report is focused on three specific sections of Sustainable forest management (SFM).

Sub-topic 1: Measures to promote fertilization in contaminated soil and the prevention of irresponsible release of toxic residues

Contaminated soil directly affects the growth and maintenance of forests. The contamination of soil not only has repercussions on health but severely affects the growth of forests. Not only are forests affected, but the agricultural industry as well. Toxicified food ends up on the plates of several people who then have severe repercussions. The main toxic inputs in soil include excess application of herbicides and fertilizers, discharge of industrial waste into soil, and rupture of storage tanks which are below soil, among others. The main pollutants found in soil include pesticides, solvents, petroleum hydrocarbons, and heavy metals. First, petroleum hydrocarbons, according to NIH (National Institute of Health), “reduce the rate of photosynthesis, and the amount of reduction varies with the type and amount of oil and with the plant species” (NIH 2). Reducing the rate of photosynthesis directly affects the development of forests since the growth process is slower. Additionally, the reduction of photosynthesis means there is less absorption of carbon dioxide meaning the reduction of the carbon emissions and greenhouse gas sequestration. This reduction means that the forest is not able to fulfill the environmental needs of humankind, which goes against Sustainable Forest Management.

Sub-topic 2: The removal and moderation regarding invasive plant species and their repercussion on environmental unbalance

There are several reasons why invasive species enter the forestal ecosystem, however the industrial reason is the most common. According to Our World in Data, “Agriculture accounts for 70-80% of tropical deforestation” (1). This is why the regulation of this industry must be taken into consideration when addressing the issue. According to the same article, “The Global Forest Watch programme categorizes forest loss drivers based on permanent deforestation – the conversion of forest to another land use – and degradation (which includes logging of tree plantations and wildfires). ‘Commodity-driven deforestation’ – which includes some activities such as mining but is predominantly agricultural commodities – totaled 5.4 million hectares in 2019” (Endnote 3). This demonstrates the substantial amount of forest degradation which comes with agricultural practices. According to the US Forest Service, “In our urban forests, non-native species can cause loss of tree canopy, and associated impacts on stormwater runoff, heating/cooling costs and quality of human life” (1). It is important to take into consideration this issue since the unbalance of the ecosystem results in competitiveness for resources. Invasive and native species are in a constant race for sunlight, water, and soil nutrients making the native plant prone to extinction. What occurs with this is a chain, the death of one plant

results in the loss of food for an animal or insect which then must migrate into a new ecosystem. This is a simple example of how forest ecosystems are completely unbalanced by invasive species, which then no longer allows them to provide for human needs.

Sub-topic 3: Implementing efficient reforestation to balance the rising of greenhouse gas emissions

According to Boston University, “Forests actually store more carbon dioxide than they release...about 30 percent of carbon emissions from burning fossil fuels are taken in by forests, an effect called the terrestrial carbon sink” (Boston University 1). This demonstrates the role that forests play in the balance of carbon emissions and the importance of conserving these green areas. It is important to balance the economic needs that deforestation is used to fulfill such as mining, industrial settlements, and others. There are several countries which seek to decrease carbon emissions by introducing financial credits to those who seek to protect and reforest. According to Carbon Credits, “Forest carbon offsets involve a process where a forest, at risk of being chopped down or for other purposes, is protected in exchange for payment” (5). This is an example of incentivizing reforestation to balance the human carbon footprint.

Major Countries and Organizations Involved

C&I Criteria and Indicators for Sustainable Forest Management in Europe

This project is a branch of the Forest Europe programme coordinated by the Europe Forest Institute, with the support of several European countries. The project aims to “Analyze the implementation of criteria and indicators for sustainable forest management in the 46 FOREST EUROPE signatory states. Strengthen the process and use of criteria and indicators, not only as a tool for monitoring and reporting, but also for policy making at national and European level” (CI SFM 3). This way regulation for sustainable forests based on specific criteria is possible, facilitating the status and progress of each European nation upon the issue. In Addition to its 46 signing nations, it receives aid from the following entities: German Federal Ministry of Food, UNECE (Agriculture and Consumer Protection (BMELV), United Nations Economic Commission for Europe), FAO (Food and Agriculture Organization of the United Nations), among others. Together, the CI SFM (C&I Criteria and Indicators for Sustainable Forest Management in Europe) seeks three main objectives:

1. “A state of the art report
2. Regional workshops and a pan-European Forum,
3. A final summary report, including recommendations to the implementing countries and the C&I process” (CI SFM 5).

Bulgaria

Bulgaria is a clear case of soil contamination due to industrial air masses which introduce

pollutants into forestal regions. According to UNECE (United Nations Economic Commission for Europe), "The contamination of soils has local character in problematic "ecological regions", where all its components are subject to special monitoring and control. The total area of the land polluted over the MAC amounts to 43 660 ha" (Contaminated soils in Bulgaria – state and problems 7). The same report states the heavy concentration of metallic components as well as metalloids in forestal areas.

Additionally, according to the book *Soil Contamination in Forest and Industrial Regions of Bulgaria*, "The content of heavy metals in soils, pasture grasses and medicinal plants from two National Parks—Central Balkan and Pirin, as well as from two Natural Parks—Bulgarka and Strandzha" (Tzvetkova et al. 1). This exemplifies the impact of said contamination on natural resources and forestal lands which must urgently be addressed.

United States of America

The United States of America has one of the largest rates of invasive plant species in the world. According to the U.S. Forest Service, "Invasive species have contributed to the decline of 42% of U.S. endangered and threatened species, and for 18% of U.S. endangered or threatened species" (United States Forest Service 3). It is important to take into consideration this unbalance of the environment since the principles of sustainable forest management (SFM) seek the protection of forests not only in the short term, but also in the long term. The introduction of invasive species results in a competition for resources within the different types of plants resulting in the extinction of those native to the area. Additionally the chronic unbalance of the ecosystem is severely dangerous to the dependent species in the area. According to National Geographic, "The ecosystem would be forced to radically change, allowing new and possibly invasive species to populate the habitat" (*Role of Keystone Species in an Ecosystem* 2). Sustainability is based upon the ability to maintain a stable system, and this environmental phenomenon would affect the entire relationship of the ecosystem, resulting in potential climate catastrophe.

FAO (Food and Agriculture Organization of the United Nations)

The United Nations FAO works aligned with the values and principles set forth in Chapter 11 of Agenda 21, adopted in 1992 United Nations Conference on Environment and Development in Rio de Janeiro. It has implemented several projects to improve the adoption of measures promoting sustainable forest management as a whole. Examples include: Forest Law Enforcement, Governance and Trade (FLEGT), Reducing Emissions from Deforestation and Forest Degradation (REDD+), and Forest and Farm Facility (FFF). Additionally, location specific projects are also lead by the organization, some include "Sustainable management of forests in mountain and valley areas in Uzbekistan" (GCP /UZB/004/GFF), "Mainstreaming biodiversity conservation, SFM and carbon sink enhancement into Mongolia's productive forest landscapes" (GCP /MON/008/GFF).

China

In the year 2000 China has newly implemented China the Natural Forest Conservation Program

(NFCP) to ensure the proper conservation and protection of forests and the sustainable management of these lands. There have been several cases of threatening situations to forestal lands including introduced infections and diseases. For example, China has suffered with various complications in the ambit of SFM. First of all, the plague of “Pine Cancer” which rooted in the United States and made its way to China. The destruction and infection of forestal lands due to the introduction of new species of pine trees. This example shows some of the challenges China has confronted regarding SFM, and why the implementation of projects such as the Natural Forest conservation Program (NFCP).

UNFF

The United Nations Forum on Forests is a subsidiary section of the Department of Social and Economic Affairs. It has a set of goals for the improvement of forest maintenance and care. One of its targets is to increase forest expansion by 3% worldwide by 2030, the equivalent of over twice the size of France. Alongside an extensive agenda, the program seeks to address SFM with 3 related resolutions including:

- General Assembly Resolution 71/285: United Nations Strategic Plan for Forests 2017–2030 A/RES/71/285
- ECOSOC Resolution 2017/4: United Nations Strategic Plan for Forests 2017–2030 and quadrennial programme of work of the United Nations Forum on Forests for the period 2017–2020 E/RES/2017/4
- Report of the Special Session of the UN Forum on Forests (20 January 2017) E/CN.18/SS/2017/2

Timeline of Events

Date (start - end)	Name	Description
June, (3rd - 14th), 1992	Rio de Janeiro 1992 Earth Summit	The United Nations Conference on Environment and Development (UNCED) led the summit which resulted in the adoption of Agenda 21. This way, the principles of SFM (sustainable forest management) were defined.
September/August, (26 August - 4 September), 2002	World Summit on Sustainable Development (WSSD), Johannesburg Summit	The international summit held in South Africa highlighted the importance of implementing policies to increase sustainable development as a whole. Additionally, it stresses the importance of sustainable climate management and forest management to administrate natural resources in a conscious manner.
May, 2003	EU's FLEGT Action Plan	FLEGT otherwise known as “Forest Law Enforcement, Governance and Trade” created its first European action plan to reduce illegal logging and promote legal, ethical and sustainable forest

		management policies. Additionally it focused on promoting the legal and regulated trade of timber.
December, (17-20), 2007	International Conference on Sustainable Forest Management and Poverty Alleviation: Roles of traditional forest-related knowledge	Conference organized by the United Nation's Forest Research Organization, and held in China hoping to enforce the Millennium Development Goals as well as Sustainable Forest Management.
June, (20-22), 2012	2012: Rio+20 and The Future We Want	During this conference several nations and NGOs met to reinforce and secure measures and improvements for sustainable development as a whole. Within the final document emitted point 193 states the importance of sustainable forest management. Additionally, in the section of forests, the paper urges the implementation of policies to enforce legal and ethical practices.
September (18-19), 2012	Creation of the SDG's (Sustainable Development Goals)	The creation of the Sustainable Development Goals refers to a set of 17 goals which the United Nations alongside the international community seek to comply with until 2030. Goals 13 (Climate Action) and 15, (Life on Land) address the importance of conserving forests which is directly related to sustainable forest management.
April, 2017	ECOSOC Resolution 2017/4 (E/RES/2017/4) (Publication of the "GLOBAL FOREST GOALS AND TARGETS OF THE UN STRATEGIC PLAN FOR FORESTS 2030")	During this resolution the ECOSOC defined the targets and strategic plan for the global forest goals of 2030. Global Forest Management Goal 4.1 states, "Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation". As well as Goal 6.3 which states, "Cross-sectoral coordination and cooperation to promote sustainable forest management and halt deforestation and forest degradation are significantly enhanced at all levels". This way the targets are able to specifically address SFM.
2017-2030	ECOSOC Resolution 2017/4: United Nations Strategic Plan for Forests 2017–2030 and quadrennial programme of work of the United Nations Forum on Forests for the period 2017–2020 E/RES/2017/4	The quadrennial programme of work in the Forum of Forests seeks to establish a strategic plan for the proper care of forests. It seeks to manage the ethical, economic, and environmental implications of forests and find a proper way of sustaining them. Through international collaboration, the goals seek to establish the safeguarding of forests, guided by SFM.

Relevant UN Treaties and Events

- Declaration on the Critical Economic Situation in Africa, 3 December 1984 (A/RES/39/29).
- The Rio Declaration on Environment and Development, 14 June 1992 (A/CONF.151/5)
- United Nations Forum on Forests (UNFF) Establishment, October 2000, (2000/35)
- United Nations Declaration on Sustainable Development (Rio+20), 22 June 2012 (A/RES/66/288)
- ECOSOC Resolution 2017/4: United Nations Strategic Plan for Forests 2017–2030 and quadrennial programme of work of the United Nations Forum on Forests for the period 2017–2020 (E/RES/2017/4)
- General Assembly Resolution 71/285: United Nations Strategic Plan for Forests 2017–2030 (A/RES/71/285)

Previous Attempts to solve the Issue

There are several projects that attempt to enforce sustainable forest management. Many of which are led by the Food and Agriculture Organization of the United Nations. These include, “Sustainable forest management to enhance the resilience of forests to climate change” which focuses on the sequestration of carbon emissions as well as the protection of biodiversity in 4 provinces in China. Additionally, the program seeks to enforce reforestation and in that way promote the implementation of policies which support sustainable forest management. Another solution proposed by the FAO is “Integrated National Monitoring and Assessment System on Forest Ecosystems (SIMEF) in Support of Policies, Regulations and SFM Practices Incorporating REDD+ and Biodiversity Conservation in Forest Ecosystems”, a global initiative specifically targeted towards the role of forests in the balance of carbon emissions, and the protection of biodiversity. It attempts to regulate the policies and efforts towards achieving these goals within sustainable development, strongly aligned to the United Nations Framework Convention on Climate Change and the REDD+.

Sub-topic 1: Measures to promote fertilization in contaminated soil and the prevention of irresponsible release of toxic residues

Within African countries there have been several projects implementing phytoremediation due to the high level of pollutants in the soil. The principal source of soil pollution in these countries is mining, and the challenge is finding a balance between the conservation of forest lands, and the mining industry. According to Science Direct, “there are more than 30 known hyperaccumulator plant species in the Central African Copperbelt” (3.1). These species are used for the accumulation of toxic residues into soil, and in this way balance the mining industry and the conservation of forest lands.

Sub-topic 2: The removal and moderation regarding invasive plant species and their repercussion on environmental unbalance

A clear example of invasive plant species is in China where North American Pine's were introduced in the late 1900s. These plantations began to experience Pinewood nematode (PWN), also known as pine cancer due to the genetic modifications which occurred to the species while growing in a new environment. The Chinese State Forestry Administration designated the following measures to resolve the issue:

- “timely removal of trees killed by OVN, by a designated well-trained PWM control team;
- chemical treatment of PWN infected logs and stumps. The treatments include: infested trees being covered and fumigated, infected log piles being fumigated with methyl bromide or heat-treated. Fumigated logs are then burned or chipped, or processed for plywood, pulpwood, fibreboard, panelboard or used for producing charcoal;
- control of the vector beetle by bait-trapping, biological control by parasite (*Scleroderma guani*), chemical control including spraying crowns of trees with pesticides during the time of adult flight, to eradicate the beetles before they can infect more trees; and
- replanting PWN infested stands with non-PWM host trees after cutting” (FAO 9).

This process of heat and fumigation of PWN infected species has demonstrated significant improvements in the area. According to the Food and Agriculture Organization of the United Nations, “The area of the PWN infestations was reduced by some 6 000 hectares in 2002” (FAO 11). This demonstrates the effectiveness of the solution to reduce the repercussions of invasive plant species.

Sub-topic 3: Implementing efficient reforestation to balance the rising of greenhouse gas emissions

A United Nations Department of Economic and Social Affairs, implemented the Eden Reforestation Projects which are a set of programmes seeking to increase wages for low income villagers who work in reforestation. This way, the incentivization of reforestation takes place throughout the economic reward. This experienced project has demonstrated proper results since according to the United Nations Department on Social Economic Affairs, “Eden Projects uses local knowledge as well as best practices learned over time from the over 200 million trees it has planted” (UN Department on Social Economic Affairs 3).

Possible Solutions

Sub-topic 1: Measures to promote fertilization in contaminated soil and the prevention of irresponsible release of toxic residues

In order to address this issue both the prevention and post-fertilization must be taken into

consideration. Regarding the prevention, strict regulatory measures must be proposed. Controlling the toxic residues left by industrial establishments and ensuring they are properly disposed is an essential aspect of the issue. Implementing laws and regulations to properly control industrial caused soil contamination must be taken into consideration. On the other hand, to properly monitor progress regarding the contamination of soil, it is crucial to test for quality constantly. This way, the level of toxicity can be defined, progress can be identified, and sanctions can be imposed on those who fail to comply with the established regulations.

Contrastingly, it is crucial to address lands with already contaminated soils. Many ways of fertilizing said spaces include phytoremediation which is the fertilization of land using plants that remove the contaminants and stabilize the components within the samples. This way, plants are able to clear the pollutants while preventing the spread of these. There are many nations which have implemented the use of this strategy such as the United States, France, China, Spain, among others. It is an inexpensive alternative in comparison to others, and is more natural than artificial actors being introduced. Although it has been deemed successful in several cases, it is a slow process which can result as a drawback given the urgency of the situation in several countries. Additionally, phytoremediation is a delicate process in which the newly contaminated plants must be properly disposed of, if not the concentrated contaminants may spread into new spaces. Additionally, phytoremediation is a very specific solution which is not inclusive to all situations of soil contamination, the pH levels, nutrients, and climate conditions all contribute to the viability and effectiveness of the process. This is why it may not be as viable in every situation.

Sub-topic 2: The removal and moderation regarding invasive plant species and their repercussion on environmental unbalance

Invasive species are severely harming the unbalance of the ecosystem. The number one cause of introduced non-native and invasive species is due to human behavior and industrial motives. In order to resolve the issue, the identification of the invasive species is crucial. With rapid response and identification programs the early detection of the species is essential to avoid further spreading. In order to extinguish invasive species, common solutions include the use of herbicides which are toxic substances that help destroy unwanted vegetation. However, herbicides can destroy the micro organisms within soil which can become a long term issue when attempting to reforest an area.

Another viable solution is the regulation of industries which introduce new species of wood. For example, pinnus and eucalyptus are the most important introduced plant species into the forest related industries. These dominant species attempt to control and survive in their new environments, killing any type of species or plant which may result as an inconvenience for them. This is why the moderation and regulation of industries related to these dangerous species must be controlled. Depending on the area and if it is a protected area with native and endangered species, the integration and settlement of these industries should not be permitted.

Sub-topic 3: Implementing efficient reforestation to balance the rising of greenhouse gas emissions

In order to create an efficient balance of the forests and the greenhouse gasses and carbon print which is emitted, there must be a regulation and control of the actual emissions, and the level of forest absorption. Firstly, it is important to highlight that not all nations have the same amount of green spaces in comparison to their carbon emissions, however a goal number or percentage of forest carbon absorption must be determined. Once there is a goal amount of forest land defined, it is less complex to manage progress towards that goal, and understand the status of reaching proper sustainable forest management (SFM). Some solutions to improve reforestation and the maintenance of forests include financial incentives, where carbon credits can be implemented. This way, nations can reward companies which promote or fund reforestation programs. Additionally, companies which seek green work ethics, reducing their emissions of greenhouse gasses or keeping said emissions under a certain threshold should also be rewarded. This way, the balance of forests and greenhouse gas emissions is incentivized, and the private sector will be pushed towards working for a greener future.

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