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Chapter

Introductory Chapter: Green Technologies to Improve the Environment on Earth

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1. Introduction

Our planet Earth is suffering devastating effects mostly caused by human footprint. Development of sustainable technologies comes to be, then, vital and could have a positive impact on the environment if green technologies are accessible to everyone in the world.

Lessons learned from the past point out that the development in energy and technology has to consider aspects such as environmental protection, economic development, and equity [1]. Furthermore, the transition to green technologies needs immediate action due to the current urgency. This transition has to be equitable enough to diminish disproportionate negative effects on vulnerable communities.

Following the same logic, free access to scientific publications allows the poorest nations to know and apply green technologies; therefore, the possibilities to efficiently improving the environment on Earth increase.

2. Green technologies: the key of success

Furthermore, the success of green technologies lies on *humility*; Sheila Jasanoff describes those as *technologies of humility*. In her own words, this call for humility "is a prescription to supplement science with the analysis of those aspects of the human condition that science cannot easily illuminate" and also "Humility instructs us to think harder about how to reframe problems so that their ethical dimensions are brought to light" [2, 3].

Ergo, the aim of this book is to humbly compile some of the numerous technologies and techniques applied to improve the environment. Contributions, here presented, describe not only the benefits of technologies and techniques but also the drawbacks and the areas for improvement.

In recent years, the capitalism system has been viewed as a source of social and environmental problems. Companies are perceived to be flourishing at the expense of the broader community. A solution could be the creation of economic value in a way that also generates value for society by addressing its needs and challenges; this is called "shared value." This concept not necessarily means philanthropy not even sustainability; this is now seen as a new way to achieve economic success [4].

From this principle, the concept of *honest broker* makes sense. The honest broker mediates the interrelation between technologists and communities contributing to policymaking and a healthy democracy by using best science [5]. In other words, the honest broker could improve both, human well-being and environmental

conditions, as is clearly depicted by P. Kumar, in the chapter "Role of Social Enterprises in Addressing Energy Poverty: Making the case for refined understanding through theory of Co-Production of Knowledge and theory of Social Capital." Furthermore, this chapter highlights the theory of social capital and its relation with social enterprises as a factor of change to motivate poor communities to adopt and use cleaner energy systems.

Regarding the impact of harmful human activities on soil contamination, there is still a lack of information; this phenomenon is more pronounced in poorest countries and is one of the world's biggest problems invisible to the international community [6]. From the soil pollutants, heavy metals are the most complex and persistent pollutants to remediate in nature; in particular cadmium and lead are the most toxic pollutants; they can affect the kidneys, liver, and lungs. Another harmful element that could be stored in those organs and has been defined as carcinogenic is the arsenic, while mercury can induce changes in human neural and gastric systems and can lead to death [7]. The chapter "Remediation for heavy metal pollution," by S. Gandimathi, explores the prediction of heaving metals using a Kriging model that is here presented.

It is undeniable that a transition to green technologies has to be done; however, mining industry and massive coal plants still exist, and their impact to environmental pollution is colossal. The development of coal industry has entered a high-carbon to low-carbon transitional period, and its direct use and the discharged pollutants will be significantly reduced. Unfortunately, coal used to produce electricity is still a dominant source around the world, and its use is still predicted beyond 2100 [8]. T. Soo Pitso gives, in the chapter entitled "Clean coal technologies adaptability and R&D support for efficiency and sustainability," an overview of clean coal technologies and the principal challenges they face.

Relating to the harmful impact of emissions produced by inherent activities of mining industry and its mitigation by better managing the operations, an interesting example, written by A. Soofastaei, can be read in "The application of artificial intelligence to reduce greenhouse gas emissions in the mining industry."

Likewise population growth, intensified agricultural practices and deforestation also have contributed to increase the concentration of greenhouse gases (GHG) in the atmosphere. An alarming data is reported by the WMO [9] about a record-breaking speed in 2016 of carbon dioxide (CO_2) concentration in the atmosphere; this concentration has attained its highest level in 800,000 years; it is nearly 100 times larger than that one at the end of the last ice age.

Several efforts have been done by researchers in order to diminish GHG, by using, for example, alternative sources like geothermal energy, as depicted by Z. González and A. García in the chapter "Geothermal energy as alternative to reduce atmospheric emissions and supply green energy." They show some results in a case study in Mexico.

Plasma technology is an affordable technique able to treat GHG, and, at the same time, it is possible to obtain clean and energetic gases like hydrogen, at a relatively low power input. This specific technology is described by J. Pacheco, R. Valdivia and M. Pacheco in the chapter "Greenhouse gases reforming and hydrogen upgrading by using warm plasma technology."

Automotive industry is also concerned on the toxic gases attenuation, emphasizing its efforts on the CO_2 diminution [10]. Electric vehicles (EV) are seen as a central alternative to diminish the negative impact on the environment; nevertheless, as it is noticed by A. Santana, their use in Latin American countries has to take additional considerations in order to really have a diminution of GHG. The discussion of these findings is addressed in "EV in Latin American countries."

Pollution deforestation and the climate change have also an immense impact on plant and animal life; in the next few decades, we will lose 20–50% of the earth's

biota [11]; at present, enormous scale extinction of many animal species has been observed [12]. The appropriate use of technology and a closer collaboration of different research fields can benefit the preservation of wildlife as it is described by X. Pacheco in the chapter "How technology can transform wildlife conservation."

As a final point, we also aspire to transmit the idea that every action we take has an impact on the environment, so we must do all we can to prevent it, and most importantly, everything we do should be based on ethical principles. A Mayan greeting summarizes this idea in a few words:

In Lak'ech Ala K'in:

I am you and you are me



D&M.Pacheco, E.Santana

Kids' vision for: Science must signify Life

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