

Editorial

Towards Total Lighting: Expanding the Frontiers of Sustainable Development

Antonio Peña-García 

Research Group “Lighting Technology for Safety and Sustainability”; Department of Civil Engineering, University of Granada, 18071 Granada, Spain; pgarcia@ugr.es

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Sustainable development has traditionally focused on actions related to the consumption of resources and the waste produced by this consumption. Thus, the exponential growth of transport, commerce, and industry leads to very high consumption of raw materials and fossil fuels, and has put their availability at risk for future generations, especially for those people living in the more impoverished regions of the world. At the same time, uncontrolled development pollutes our atmosphere, soil, rivers, and oceans. This pollution seriously damages health and has a negative impact on the climate. It would thus seem that uncontrolled progress is a serious threat to sustainable development.

Nevertheless, it is also true that the growth and progress of transport, commerce, or industry are essential. Only in this way can new products be developed, and distances and prices be reduced, thus ensuring access to necessary goods and services for people throughout the world. Consequently, progress in itself is neither evil nor dangerous. Nevertheless, for it to be positive, it should be “smart” and controlled to some degree. Otherwise, it could very well lead to a paradoxical inconsistency between significant advances and regressions in physical and mental health, well-being, and fair access to all kinds of resources.

In this context, it seems natural to focus on minimizing consumption and waste from all the perspectives but, in spite of the remarkable achievements, an excessively direct approach to this problem is invariably confronted with technological, legal, and ethical barriers.

However, if the problem is also addressed from other perspectives, a wider conception of sustainable development is possible. Even though optimizing consumption and waste must always be a major concern, it is also feasible to add other elements that would influence individuals and communities to act in such way that development can be intrinsically more sustainable without titanic efforts or draconian policies.

In this regard, lighting can and should play a major role in sustainable development since it is undoubtedly one of those additional elements that will help to assure the availability of resources for future generations. However, it is not a question of just any kind of lighting, and certainly not lighting whose only purpose is to consume a minimum quantity of energy without any consideration for the well-being and happiness of consumers. This lighting is smart lighting in its wisest sense, or what can be called total lighting.

We might well ask ourselves about the exact nature of total lighting and its components. For many years, my research has focused on discovering the core elements of this concept. This has not been an easy task. My long quest for the answer was one of the factors that caused me to accept the kind invitation of MDPI to be the Guest Editor of this Special Issue, entitled “Lighting at the Frontiers of Sustainable Development”. Its main objective is to explore and examine different perspectives on lighting that, either directly or transversally, can lead to a more sustainable use of resources and create new opportunities for humankind.

In recent years, we have learned that different kinds of lighting can enhance or decrease alertness, sleepiness, aggressiveness, and efficacy. Today we know that recovery from certain diseases and mood enhancement in victims of violence can be significantly improved by modulating the wavelength distribution and intensity matrix of luminaries. This means lighting could also be used to improve well-being and productivity by saving, for example, on days of hospitalization as well as on the consumption of a wide range of other resources.

Many years after the hue-heat hypothesis was first proposed, it is now generally accepted that perceived temperature and thermal comfort are closely related to lighting conditions. This means that the smart modulation of the spectral distribution of lighting in houses, workplaces, hotels, etc., where there is a large consumption of heating, ventilation, and air conditioning (HVAC), can yield considerable savings in energy (cooling or heating) consumption with a significant reduction in financial costs and greenhouse gas emissions. This modulation of spectral distribution, which in the past used to be very complicated, is now quite simple in the LED era. It is not only a question of finding the most efficient type of HVAC installation, but also of using light to obtain optimal results. The question is whether governments should protect the environment by forcing people to be cold or hot, or by simply making lighting control devices mandatory. This is one way of promoting sustainable development without demanding great sacrifices from consumers.

Sustainable development is also a factor in a person's attachment to their culture and native land. When traditions disappear, younger generations are no longer willing to be farmers and work the soil. For this reason, they leave their villages and move to large cities to look for jobs. Besides increasing urban pollution, this type of migration causes unhappiness because life is often harsher in these new surroundings. This situation is even more dramatic in developing countries with soaring population growth. Although governments throughout the world continue to search for strategies to encourage people to remain in rural environments, their efforts have met with little success. Today it is known that effective lighting can foster sustainable agriculture, especially in greenhouses. It is also known how to illuminate monuments and cultural heritage and the fact that good lighting can improve well-being in all kinds of professions, including the traditional ones.

These topics as well as a wide variety of others are addressed in this Special Issue, which demonstrates that lighting within the perspective of total lighting can expand the frontiers of sustainable development. I must congratulate the authors and reviewers for their outstanding work, and thank the editors, assistants, and all the staff of MDPI for the quality of their work. No doubt it is their merit that the journal *Sustainability* in general, and this Special Issue in particular, will become an important reference for an ever-growing community of scientists, professionals, and members of the public interested in lighting as a total matter.

Conflicts of Interest: The author declares no conflict of interest.



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