Global Journal of
Technology & Optimization

Santos, Global J Technol Optim 2016, 7:2
DOI: 10.4172/2229-8711.1000e110

Editorial Open Access

Aligning the Most Advanced Technology With Green Engineering Principles – Can We Turn Back in Time?

Rui Galhano dos Santos*

CERENA-Centre for Natural Resources and the Environment, Instituto Superior Técnico, Av. Rovisco Pais, 1049-001 Lisboa, Portugal

Corresponding author: Rui Galhano dos Santo, CERENA-Centre for Natural Resources and the Environment, Instituto Superior Técnico, Av. Rovisco Pais, 1049-001 Lisboa, Portugal, Tel: 351218417000; Email: rmglopes@ist.utl.pt

Received: Jun 30, 2016; **Accepted:** Jul 15, 2016; **Published:** Jul 19, 2016

Abstract

This manuscript was written as a reflection on what direction, in my opinion, we should go in the future. Can we achieve a better and sustainable world? Is it too late to mitigate the human footprint on Earth? This paper is not meant to a tool for anything but rather a topic for an inner self-discussion when to consider which course to take towards the future.

Keywords: Sandestin; Green; Principles; Sustainable; Mitigation; Environmental

Editorial

"Can we turn back the time?" Of course, we cannot, easy answer. What if the question was read or understood from another point of view, like, "Can we turn back to the world encountered when we became the Human species that we are? Can we start all over again? Can we make this a world a better place for us and next generations?" Actually, the question is almost the same; even if we cannot go back in time, at least turn the clock around, maybe we can recover part of that world, retaining all the commodities and comfort that we are used to.

First of all, this is only an opinion, in particular, mine. I do not want to sound too self-assured, self-centered or to blame anyone. I want to leave an explicit remark that this editorial is only an idea, in which I believe we all have already thought but rarely or never discussed it in our daily lives with our co-workers, lab mates, and bench partners, what-so-ever. And, even those who did so, how many of them actually put it into practice right away or simply have, thought they could start to practice it in the day after.

Well, if we compare the evolution of knowledge, specifically, in chemistry, it can be compared to driving a long, straight and endless road, with nothing ahead but with some high bumps. Now imagine that there is no speeding limits, no limitations what-so-ever, with an endless tank full of gas, and you are driving no maintenance 4.0 V8 TDI motor car. For so many years, our elders, to whom we owe all that we now know and have learned and to whom we must be so grateful, for all the barriers they have brought down for us, with a lot fewer resources compared to those that we now have at our disposition. They drove that car for us, at high speed, and discovered a whole new world for us. They gave us the tools that we needed to comprehend our surroundings. They make us believe that we can overcome and that we can go beyond the boundaries that we sometimes think that are not transposable. They have proven almost every theory without any means, merely because they believed in them, some of them even died for their beliefs. However, they drove that car the best they could and know how to, without looking back in the rearview mirror because that was the other part of the unknown, the part they did not, or in most cases could not predict. Only later we began to notice those side effects, and, actually, only a few decades ago we start wanted to face and realize the outcome of such evolution. This is not a blaming exercise or something like that, is exactly the other way around. Still, like everything in life, everything has a price, and has we certainly know we have to pay it, there are no free lunches. Moreover, after any "pleasant meal," we all must clean the mess we left, don't we? So now, much more than our job, is our duty as scientists to roll up your sleeves and start cleaning the mess that their journey left behind to give us the best of them and to teach us the best they could, and what a great job they have done.

Green chemistry, green engineering concepts are not new. However, in fact, for instance, do we really know the nine principles established and define during a week in May 2003, when about 65 engineers and scientists were gathered at the Sandestin Resort in Florida for the first meeting on Green Engineering? (Table 1).

Sandestin Declaration [1]
1. Engineer processes and products holistically, use systems analysis and integrate environmental impact assessment tools.
2. Conserve and improve natural ecosystems while protecting human health and well-being.
3. Use life-cycle thinking in all engineering activities.
4. Ensure that all material and energy inputs and outputs are as inherently safe and benign as possible
5. Minimize depletion of natural resources.
6. Strive to prevent waste.
7. Develop and apply engineering solutions, while being cognizant of local geography, aspirations and cultures.
8. Create engineering solutions beyond current or dominant technologies; improve, innovate and invent (technologies) to achieve sustainability.
9. Actively engage communities and stakeholders in development of engineering solutions.

Table 1: Sandestin declaration.

Later those principles would become known as the Sandestin Declaration [1]. Do we know all the 12 Principles Green Engineering? [2] (Table 2).

The 12 Principles of Green Engineering [2]
1. Inherent rather than circumstantial
2. Prevention rather than treatment
3. Design for separation
4. Maximize mass, energy, space, and time efficiency
5. Output-pulled versus input-pushed
6. Conserve complexity
7. Durability rather than immortality
8. Meet need, minimize excess
9. Minimize material diversity
10. Integrate local material and energy flows
11. Design for commercial afterlife
12. Renewable rather than depleting

Table 2: The 12 principles of green engineering.

Now is the time for us to take the steering wheel of that car and practice those principles, by applying them to the new procedures that we develop or plan and to improve or modify those in use to make the world a "greener" place (first of all, maybe we should change that powerful engine to a less polluting one, possibly for an electric motor, for example). In every and single one of the projects that will be designed and developed, we must, first of all, think about the consequences for the environment before putting it into to practice, despite the costs. Financial issues cannot be the excuse to damage the environment. Sometimes when revisiting the Nobel Prizes Laureates list, we may think how do they achieve that, in some cases with such simple approaches or ideas but completely outside of the box, seeing some things that nobody saw or looked for (I am sure we all did that!). We also felt that we will never be as great as they were, just remember that with simple but assertive plans, we can make a difference as they did, even if it's not worth a plane ticket to Stockholm. There is still a lot to be discovered, especially how to re-use the residues of humanity and turn them into added-value products, in the field of sustainability, bio refineries, up-cycling materials, new bur clean energy sources. Although the most important measure to be taken after taking control of the car, is pulling over and carefully plan the rest of the ride or even make a U-turn. Right now a significant part of our mission is to mitigate and resolve the harmful that have been inflicted on the environment before returning with both hands on the wheel to that bumpy road, driving steady on full throttle into the future.

We have and must get our world back as it was at least as some decades ago. So let's start right now by reflecting and teaching the principles of green engineering, adopting those principles to the procedures in use and by designing and projecting new technologies obeying those rules, at all costs, no matter what.

References

1. Abraham MA, Nguyen N (2003) Management principles of sustainable industrial chemistry: In: Genserik L. L. Reniers, Kenneth Sörensen, Karl Vrancken (eds.) Environ Prog 22: 233–236.
2. Anastas PT, Zimmerman JB (2003) Design through the 12 principles of green engineering. Environ Sci Technol 37: 94–101.