by Gunter Pauli

This is why green projects are not white elephants

Once we look past the false-positives of a petroleum economy, a compelling case can be made for funding green industrialization.

When Javier Morales, then the deputy mayor of the island of El Hierro, part of the Canary Islands region of Spain, asked me to assist in the design of a local economy that one day would be self-sufficient in water and fuel and would stimulate small-scale local industries, it did not take long to propose a strategy based on wind energy, hydropower, and flywheels. The goal was to provide renewable energy and abundant water to stimulate agriculture and local food-processing industries, especially meat, cheese, and yogurt. The total investment for this project at the outset in 1997 was estimated at €67 million. The response from the political and financial world was that if this little island of no more than 10,000 inhabitants required an investment of so much money, then we were out to build a "white elephant." Is that true? Let us look at it from another angle.

At the time, the island spent €8 million a year on the import of diesel fuel to generate electric power. It is interesting that this economic and energy model was considered normal: water and power were expensive, rendering industrialization impossible. However, it does not take an economist to realize that the total expense for the local population for importing the fuel, while assuming major risks, was €80 million over a decade. Also, this money went straight to the oil producers, none of which are based in Spain. So we raised the question: "How can the import of polluting fossil fuels be considered normal, while the redirection of a guaranteed expense by everyone on the island into local renewable sources of energy which plough money back into the economy is considered a white elephant?"

The idea to convert El Hierro into the first water and fuel self-sufficient island turned into a reality. The facility was inaugurated in 2013. Water and power are life, and for centuries this island has suffered from dramatic shortages of both, rendering industrialization impossible. Just imagine the turnaround thanks to renewables: double the amount of water on the island at half the cost. Today, industrial production includes a meat-packing enterprise processing goats and sheep; a cheese and yogurt factory, combined with the processing of fresh fruit; and a winery converting locally grown grapes into wine. The island has high employment rates, and, for the first time in decades, children and grandchildren imagine a future and professions on the island.

Unaware of the consequences

A century ago, the world production of silk hovered at around one million tons per year. Today, output hardly reaches the 100,000-ton level. The arrival of nylon, a synthetic polymer developed by scientists at Dupont de Nemours, introduced the knock-out phase for the natural polymer produced by the mulberry caterpillar (which the English mistakenly call a silkworm). The traditional ecological economist would enter the debate and calculate the amount of carbon emitted by one million tons of petroleum used to produce nylon and compare it with the carbon sequestered in the process of silk making. While this is a correct approach, it is incomplete.

When China embraced the farming of silk 5,000 years ago, the first interest was not the silk, but rather the conversion of savannas into fertile areas. It was quickly noted that the symbiosis of a caterpillar that would devour about 50% of the canopy of the mulberry tree left a rich mix of excrements so nutritious to microorganisms that it triggered the creation of topsoil. An area considered infertile that was planted with mulberry trees would be ready for planting watermelons within a decade. What few people realized is that the caterpillars triggered a soft, unnoticed chemical reaction that fixed carbon into the soil, creating black earth that would continue to serve humanity for centuries. This ecosystem service was the real success of the mulberry–caterpillar symbiosis. Silk was a by-product.

With the arrival of nylon, we not only replaced natural silk with petroleum derivatives at high energy expense; worse, we stopped creating topsoil for the sequestration of organically bound carbon and nitrogen. The lack of continuous cycles of topsoil generation with a blend of minerals and nutrients through the creation of additional ecosystem services led to the mining of carbon and nitrogen up to the point where there is none left. As soon as carbon levels are less than 5% or 6%, farmers are obliged to maintain production by irrigation since carbon-poor soil cannot retain water and by adding synthetic fertilizers and nitrogen since the core feedstock (carbon) is too depleted. This is only viable with the infusion of a massive input of fossil fuels. Silk is natural and resistant and has a useful life of at least three generations or 100 years. Nylon is a typical throw-away product, as symbolized by women's stockings that are in the bin the day minor damage is visible. Nylon is never recycled.

We need to realize that petroleum chemistry is not only about replacing a natural fiber (silk) with a synthetic one (nylon), it is also about replacing a system that cycled carbon with long retention and storage systems into one that leads to the permanent spewing of carbon into the atmosphere due to this throw-away culture. This makes our addiction to petroleum even more debilitating. It is like a drug addict who is not only endangering his/her own life, but destroying the whole social tissue around it by promoting illegal production and trade that enrich a few and leave society with the costs of rehabilitation, violence, and penitentiary services.

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Reverse the system, go green industries

The key question is how to reverse this trend. Silk has unique tensile strength, permits cells to grow on and in it, and is a natural inhibitor of the growth of fungi and specific bacteria. This natural design at the molecular level has been studied in great detail by scientists. It is an amazing reality that unfolds before our eyes: silk can regenerate cartilage and thus avoid knee replacements based on titanium; and silk provides the scaffolding for the regeneration of nerves after trauma, including the potential to allow quadriplegics to walk again.

While these are only small volumes that we can foresee for medical applications, the big market will be in cosmetics where synthetic emulsifiers have become the standard, causing massive marine pollution with microbeads that end up in our food chain. Nondegradable plastic beads in everything from shaving creams for men to emulsifiers in night creams to reduce wrinkles can now be replaced with silk, and that would conservatively require two million tons of silk.

We will only succeed in creating a fossil fuel-free world if we change our system of production and consumption. The case of coffee is one of those obvious examples that surprises many and demonstrates once again how ignorant we are about the opportunities before us and of the magnitude of the damage we cause.

Coffee is a globally traded commodity. An estimated 10 million tons of green coffee travel the world. Who is aware that only 10,000 tons are actually ingested, and a staggering 9.99 million tons are discarded as waste? At best, this leftover from the brewing process is composted, even though we know that between the moment of brewing and the moment of disposal there is vast generation of (once more) methane gas. We all know that agriculture causes major methane emissions. But what we do not know is that many of these emissions could easily be avoided. The coffee-processing industry, from the makers of instant coffee to the chains of coffee shops, has found ecological solutions that unfortunately belong to the same category of "substituting high fat for regular fat, while we know that we cannot have fat."

While the incineration of coffee waste, like so many other forms of agricultural residue, is often presented as a fine substitute for fossil fuels, we forget that the generation of methane gas and carbon emissions cannot be lost to sight. It is not just about burning versus rotting; the whole supply chain requires a fresh approach. The substitution of fossil fuel with coffee leftovers is "doing less bad." But what we need is "doing more good." Here is the logic: coffee is treated either by heat or by inert gases to extract the soluble part that offers either a powder to produce an instant drink or a hot coffee to enjoy. Since the biomass has been pretreated, it is ideal for farming mushrooms. Do we realize that 60% of the cost of mushroom farming is the sterilization of the substrate and that this energy is not required if we use processed coffee grounds on-site?

The case of coffee is just one of the many examples that demonstrate that, with a minor shift in handling and processing, we are able to create energy efficiencies that have not been considered viable. We can farm mushrooms with 60% less energy and no need to transport raw materials. The advantage is that most of these solutions do not require new technologies, complex engineering, or heavy capital investments. These solutions are pragmatic and can be implemented by you and me. The only way that we will succeed in the steering of business toward sustainability is by realizing that it is not difficult, it is different. To quote the legendary Nelson Mandela: "It always seems impossible, until it is done."

Gunter Pauli, an entrepreneur and proponent of green industrialization, is also the author of the best-selling book The Blue Economy. *Follow him on Twitter @MyBlueEconomy.*