

# INTRODUCTION

Nicolas Renard - Executive Director, Veolia Institute



To innovate or not to innovate, that is the question. And the answer is: innovate or disappear. This is the modern world's iron law, a world where innovation has become a culture, an ethical imperative, the condition for a business to survive.

Innovation can be disruptive or incremental, with enormous cumulative impacts. It can be open, frugal, clean, economic, social, and much more. Innovation has many faces. It never stops flowing, reconfiguring every human activity with its constant movement. It also drives ecological transformation, helping humanity rise to the critical environmental challenges of the 21st century.

And this innovation effort has delivered major successes. Examples include aircraft emissions per passenger-kilometer which have fallen almost threefold in the past 30 years; the emergence of zero liquid discharge and zero water intake factories, thanks to recycled process water; waste-sorting robots using technologies based on neural networks to boost sorting quality and, therefore, recycling; sensors able to instantly detect leaks in drinking water networks in large cities that cover many thousands of kilometers of water pipes; systems that recover calories from wastewater to heat swimming pools or housing, and hydroponic and aeroponic agriculture.

But innovation, even green innovation, has its blind spots and is often ambivalent. For a long time the focus was on low-carbon solutions, overlooking other core issues such as biodiversity erosion, natural resource scarcity, soil exhaustion, and so on. Although there is evidence at the global level of a decoupling of the link between growth in CO<sub>2</sub> emissions and growth in GDP, the same cannot be said for the volumes of raw materials used.<sup>1</sup> All too often, innovation either simply transfers pollution to other sectors of the economy, or fails to allow for effects at scale. What environmental impact will electric vehicles have once there are one billion of them on the roads?

We must not use innovation's weaknesses, limits or biases as excuses to abandon our efforts. No innovation is ever mature at the outset. But innovation must change because the world has changed. We can no longer ignore secondary effects since, once an innovation becomes mainstream, those effects will be far from secondary. This is why "technological discernment",

to borrow a phrase from France's Academy of Technologies, is important in making sure that the right tech is promoted, rather than simply focusing on high tech or low tech.

So, what criteria have to be met to ensure that innovation is constructive and fully aligned with genuine ecological transformation? Innovation's positive impacts must not be wiped out by the rebound effect. It should not relocate pollution or postpone harmful consequences. It must be more than just partially beneficial in ecological terms. Innovation must deliver solutions that are acceptable and affordable for all, including low-income citizens. It must be rolled out at speed: faced with the climate crisis, we must stop taking decisions based on cost-efficiency when what counts now is speed-efficiency. And finally, we must ensure innovation combines technological, social and economic progress.

How can we foster innovations that meet these criteria? How can we make innovation "better"? Although by no means exhaustive, several interesting ideas are emerging:

- Systematically carrying out complete lifecycle analyses of new solutions, and accounting for future at-scale effects in the event of mass adoption;

- Leaving space for "creative disagreement", combined with a genuine right to fail. "Natural innovation is so dazzling because it has no fear of mistakes";<sup>2</sup>

- Successfully navigating innovation's critical phases, particularly the so-called valley of death, the period during the scaling-up process when subsidies fall, risks rise and investors begin to question a project's profitability;

- Creating the ecosystems needed to encourage innovations to flourish and spread (third places, innovation labs, clusters, etc.). Managing innovations also involves managing the ecosystems that generate and propagate them.

Using like-for-like technologies, we will never achieve carbon neutrality, we will never limit raw material scarcity, and we will never slow down the loss of biodiversity. Neither will we achieve these goals if we continue with the same structures and types of behaviors that are dominant today. Solutions that ramp up efficiency are not enough; we also have to change our behaviors and economic structures so they become more frugal. Ecological transformation demands new ideas, new technologies, new economic models, and new ways of behaving. But not only that: it also demands committed new leaders and new leadership to champion it.

*Ecological transformation demands new ideas, new technologies, new economic models, new ways of behaving. But it also demands committed new leaders to champion it*

<sup>1</sup> Pierre Veltz, *Bifurcations*, Éditions de l'aube, October 2022.

<sup>2</sup> Idriss Aberkane, *Le Point*, September 13, 2018.

