

Forest and photonics, Koli, 10th October, 2018

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Dear Ladies and Gentlemen,

I am really honoured to open this year's **Forest and Photonics** Conference.

I would like to start my intervention with a quote from Albert Einstein who as you know won the Nobel Prize for discovering that light was composed of discrete particles: **photons** (*however, Einstein did not name photons, it was Gilbert Lewis in 1929*). However, the quote, is not related to quantum physics, but I believe it can make us reflect indirectly on the underlying goal of our event. Einstein said that **“we cannot solve our present problems with the same thinking we had when created them”**.

In my view, **the use of Photonics in forestry**, can trigger new thinking as basis for transformational change. Change that we urgently need to address the unprecedented environmental and global problems that we are facing. Why?

Well, because after more than 100 years on relying on a fossil-based economy, we have arrived to a tipping point, the world has become too big for our planet. This should not be a surprise, since from a thermodynamics perspective, the Industrial revolution resulted in a very fundamental change in our economic system, as we moved from an open economic system powered by the sun, to a close economic system powered by finite fossil resources, internal to the system. And French Physicist, Sadi Carnot, who formulated the second law of thermodynamics 200 years ago, explained what happen with free energy in a closed system: it results in entropy, disorder and irreversibility. This is what has happened in our fossil-based economy, it has delivered unprecedented economic growth as well as social and technological progress but it has also resulted in the largest environmental problems in human history. In fact, we have change the climate of our planet for the first time in history and we are crossing its resilience boundaries due to the loss of biodiversity and the degradation of our natural resources.

Having arrived to this tipping point, as Albert Einstein said, we need new thinking as basis for a new economic paradigm. A new economic paradigm where prosperity takes place within the renewable boundaries of our planet as powered by the sun. A paradigm where renewable energy and renewable materials become the basis for a sustainable economy. Renewable materials are only possible based on renewable biological resources and this is why the bioeconomy should be a prosperity engine of the new economic paradigm. However, it is important to remember that biological resources are renewable but not infinite. This is why their use and transformation should be intelligent, efficient and above all sustainable. That is what a circular bioeconomy should ensure!. Furthermore, in a rapidly changing environment, we also need to ensure the resilience of our biological resources to climate change. Therefore, enhancing biodiversity should be recognised as a priority investment for a long-term bioeconomy. This also explains why the bioeconomy paradigm, above all is an opportunity to address the past failure of our economy to value nature, to value our natural capital. The bioeconomy is an opportunity to build a new and synergistic relationship between economy and ecology. And in building such new paradigm based on a synergistic relationship between ecology and economy, our forests offer the greatest potential and should play a central role. because they are the most important biological infrastructure in our planet: they are the main

terrestrial carbon sink and main terrestrial source of oxygen, water and biodiversity. But they are also the main source of non-food and non-feed renewable biological resources that can be transformed in a new range of renewable and sustainable solutions that can replace fossil ones in sectors like plastics, construction and textiles.

So the potential of forests and forestry to address problems like the climate change or as basis for sustainable development, is clear, but still we need to unlock such potential! And this is why **Photonics technology** is so important. **Photonics can be the catalyst. I mentioned before that a bioeconomy to succeed requires that we use and transform our biological resources in an intelligent, efficient and sustainable way. Photonics technology is key to make that happen. Today we will see good examples, but first of all photonics in forestry is important in order to gain a new level of understanding of the functioning of our forest systems under climate change and in connection to biodiversity questions. Second, photonics will help develop advanced tools to manage our forests in a precise and intelligent manner, and third photonics can also help process forest resources more efficiently and transform them into a new generation of sustainable materials and solutions. Therefore, the use of photonics in forestry can bring the necessary light to unlock the potential of our forests.**

Brian Arthur: “Our deepest hope as humans lies in technology; but our deepest trust lies in nature.” Forest and Photonics connects both technology and nature so that we can trust our hopes for a better future...

Thank you and enjoy the seminar!