ABSTRACT

As the United States leaves the Paris Agreement, and with the current interest to push forward more fossil fuel energy sources, the need to articulate the impact of expanding these energy sources on precious water reserves becomes imperative. In this seminar we will demonstrate that nearly 50 percent of US water is employed for cooling of power plants in the United States. Thus, wind energy can indeed be a major solution in our water crisis. This dependence on water for energy is a problem that exacerbates when availability is constrained due to drought, as different sectors (human consumption, agricultural irrigation, industrial use power generation) must compete for the limited water resources. Here, we demonstrate that drought-prone areas have strong potential for both solar and wind energy, which are two of the least water-dependent power generation methods.

In the second part of the seminar, I will articulate how a new engineered bio-inspired micro-surface (see figure below) could be employed for wind energy applications. Our experimental results from an index-matched facility provide evidence that this bio-inspired surface delays separation contrary to typical rough surfaces (sand grain roughness), mosquitoes or other debris. This bio-inspired surface produces an effective slip velocity near the wall region leading to higher flow velocity; even when compare to a smooth surface.

Bio: Prior to joining Purdue University as the Kenninger Chair Professor of Renewable Energy & Power Systems, Luciano was the inaugural Center Director of the National Wind Resource Center and the Don-Kay-Clay Cash Distinguished Engineering Chair in Wind Energy at Texas Tech University. For many years he was Professor at Rensselaer Polytechnic Institute in the Mechanical & Aerospace Department. His areas of research interest include: turbulence, renewable energy and bioengineering. He has published over 100 publications, edited several books on renewable energy and co-authored several patents (e.g., energy, health care, etc.). Some of his awards include: Fellow ASME, the NASA Faculty Fellowship, the Martin Luther King Faculty Award, the Robert T. Knapp Award Best Paper Award from the ASME, the Best Paper Award from the Journal of Renewable Energy, the Best Paper Award from IEEE, and the Rensselaer Faculty Award (twice). He gave several keynotes lectures, plenary lecture, and distinguished lectures on wind energy. Currently, he serves as Associate Editor of Wind Engineering & Science, and serves in various scientific committees on renewable energy in Europe. For his contributions and impacts on inclusiveness he received in 2016 the McDonald Mentoring Award from ASME, and was nominated for a Presidential Award given by the President of the USA.