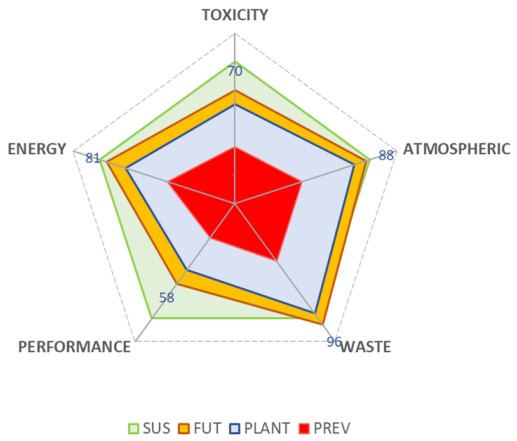
Sustainability at the center of novel technologies development

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As developer of industrial technologies, Casale SA have the sustainability as a mission to reduce the footprint of plants and optimizing the resource utilization. Indeed, in 1986, when sustainability concepts were still very far from the scientific community, Casale SA was already strongly committed in plants revamping [1], which can be shortly described as a way of giving a second and more efficient life to an existing plant. The devotion towards sustainability has accompanied the research and development of new recent technologies; green and blue ammonia [2] are just to two examples where the development of the catalysts is followed by the optimization of the reaction conditions. Within time, also the needed to measure and calculate the sustainability of plants and catalysts has caught the commitment of the company, bringing the consciousness of sustainability to higher level also inside the R&D. Through the use of a dedicated methodology, it is possible to calculate the impact in terms of sustainability footprint of a given process plant or section, still from its development. Sustainability Key performance indicators (SKPIs) value are the outcome of the calculation, but their obtainment passes through different stages. First, is the selection of the dimension that will be taken into account: environmental, economic and social are the most common one and are typically defined as the three pillars of sustainability. Secondly, it is necessary to select the category in which include the SKPIs: energy, catalysts, water consumption, toxicity, wastes etc. Process values (e.g flowrate, energy utilization, chemical composition of a stream etc.) are fundamental to calculate the value of the SKPIs, which are selected among hundreds of possibilities. Finally, the values are added in a comparison scale and are represented in a graphical mode, to make the sustainability level evaluation simpler and faster *(Fig. 1).*



This methodology allows to set the actual benchmark of an existing technology, identifying all its strengths but most importantly its weaknesses. This calculation allows the optimization of the process already at the stage of R&D, thanks to the continuous iteration of the calculation with the process simulation parameters. As outcome, Casale SA is therefore capable of continuously overcome the sustainability limits that have been evidenced and continuously improving the existing technologies, bringing the sustainability the core of the changes.

[1] S. Travis, *Catalysis Today,* **2022**, 387, 4-8
[2] https://www.casale.ch/green-and-blue-solutions/green-and-blue-technologies