

# 2021 GSK Environmental Supplier Awards Winner

Winner of the Primary Manufacturing category



## About the company

- Sai Life Sciences is a full-service CRO-CDMO (contract research, development and manufacturing organisation) that works with innovator pharmaceutical and biotech companies globally to accelerate the discovery, development and manufacture of complex small molecules.
- It has around 2,200 employees and R&D / Manufacturing facilities in Hyderabad (India), Boston (USA), Manchester (UK) and Bidar (India).

## About the project - Green Chemistry Principles during Process Development

Sai aims to identify opportunities for environmental protection and conservation in projects from the design and development phase. With this objective, Sai adopted green chemistry principles during the process development of every mid-late phase project that they work on.

Green chemistry principles help to understand resource consumption, generation of waste and efficiency of processes during the development stage and where to focus to achieve conservation. To provide a framework for Sai's efforts and to estimate the 'greenness' of each process, they developed an in-house computational model, the *Greenness Index*, that can assess projects on water conservation, resource conservation, solvent management, and waste management. This composite metric is computed using several attributes across atom & mass efficiency, e-factor, water conservation, waste minimisation, resource conservation, and greenness of solvents used, among others. These indicators are tracked and monitored by process development teams and included as part of technical packages. The percentage change in the *Greenness Index* between pre and post development process is considered as the measure of improvement.

To further encourage the adoption of green chemistry principles, Sai initiated an internal awards programme, which recognises teams that develop the greenest processes. Initiated in 2020, the *Green Process of the Year Award* is given to the team which shows the most significant improvement in *Greenness Index* during development. Over the past two years, they have had seven teams and 30 projects being nominated for the awards. The three best projects are awarded each year. The introduction of green chemistry thinking, the *Greenness Index* and *Green Process of the Year Award* has ensured that the sustainability of the manufacturing processes used by Sai is built in "by design" and resulted in significant savings in water and solvent consumption and waste generation.



## Environmental achievements

The project provides embedded sustainable working principles that will impact multiple projects for Sai moving towards greener manufacturing. For example:

### Case Study 1: Green Process of the Year 2020

- 93% reduction in specific water consumption (~6.5 million litres of water saved per annum at peak manufacturing volume)
- 96% reduction in specific solvent consumption (~8,800 metric tonnes of solvent saved per annum at peak manufacturing volume)
- Avoided use of tetrahydrofuran, dichloromethane, chloroform and acetic acid.

### Case Study 2: Green Process of the Year 2021

- 85% reduction in specific water consumption (unable to estimate absolute impact as early phase development candidate with unknown commercial volume)
- 82% reduction in specific solvent consumption
- Avoided use of dichloromethane.