

Success Story

EMPOWERING SOLAR CELL MANUFACTURING WITH SUSTAINABLE WATER SOLUTIONS

Solar photovoltaic cells are rapidly becoming a more prominent and critical part of our renewable energy future. Gradiant works closely with industry-leading manufacturers to solve their water and wastewater challenges, innovating novel solutions, optimizing capital scope, and minimizing operational costs.

The Challenge

One of India’s largest companies sought Gradiant to support a new solar photovoltaic (PV) cell and module manufacturing. In recent years, solar renewable energy has grown from a niche market of small-scale applications to a mainstream electricity source. This site has been integral to a national goal of sourcing 45% of India’s power from non-fossil fuel sources. The production of solar cells generates complex wastewater from rinse acid and alkaline process streams, as well as burnbox effluent. These streams contain high levels of ammonia, fluoride, silica, ammonia, and TDS, which necessitates complex yet optimized solutions to ensure adequate treatment for reuse. They also required fluoride concentrations to fall below two ppm to comply with Minimum and Zero Liquid Discharge (MLD, ZLD) requirements.

The Solution

Gradiant is delivering a high recovery RO Infinity (ROI) system, and pretreatment and ultrafiltration (UF) to the client for an industrial wastewater and recycling solution. The integrated facility will treat the complicated wastewater streams from solar PV manufacturing to allow for recycling and reuse in their upstream processes, helping our client minimize their water footprint and meet sustainability goals.



Renewable Energy



India

Location:	Tamil Nadu, India
End User:	One of India’s largest companies’ Solar PV Manufacturing business
Solution:	Industrial Wastewater & Recycling
Industry:	Renewable Energy
Feedwater Source:	Process Wastewater (rinse and process streams), Burnbox Effluent (high ammonia)
Technologies:	ROI, Selective Contaminant Extraction (SCE), CURE Chemicals
Capacity:	8,100 m ³ /day
Commissioning:	2024
Delivery Model:	Design-Build, Commissioning, Operate & Maintain (O&M)

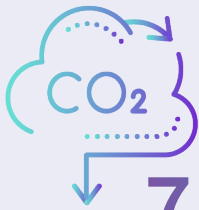
4 GW

PV Cell & Module
Manufacturing
Facility



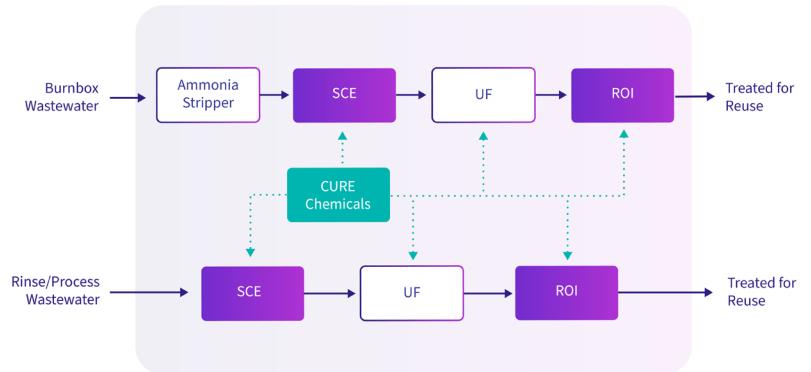
Up to
85%
Recovery of
wastewater for
beneficial reuse
on-site

Up to
6,885
m3/day in
freshwater
savings



71,500
metric tons CO2
offset from PV
cells & modules

Gradiant created two flowsheets for the process and burnbox effluent streams, combining selective contaminant extraction (SCE) and RO Infinity (ROI) technologies for both ammonia and fluoride removal, as well as treating water that is reused on-site. Gradiant is also providing chemicals and O&M services to ensure consistent and reliable operations.



The Benefits

By taking a value engineering approach early in the project, the Gradiant team was able to fast-track a viable solution for the customer. The client recognized this was a significant feat given the complex waste streams and a compressed project timeframe, which could only have been achieved through simplifying startup, commissioning, and ongoing operations for the client as part of an integrated solution.

The ROI system will recover up to 85% of the wastewater for on-site use and achieve ZLD limits. The future-proofed design will also increase plant capacity as the customer innovates new products and creates additional waste streams.



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