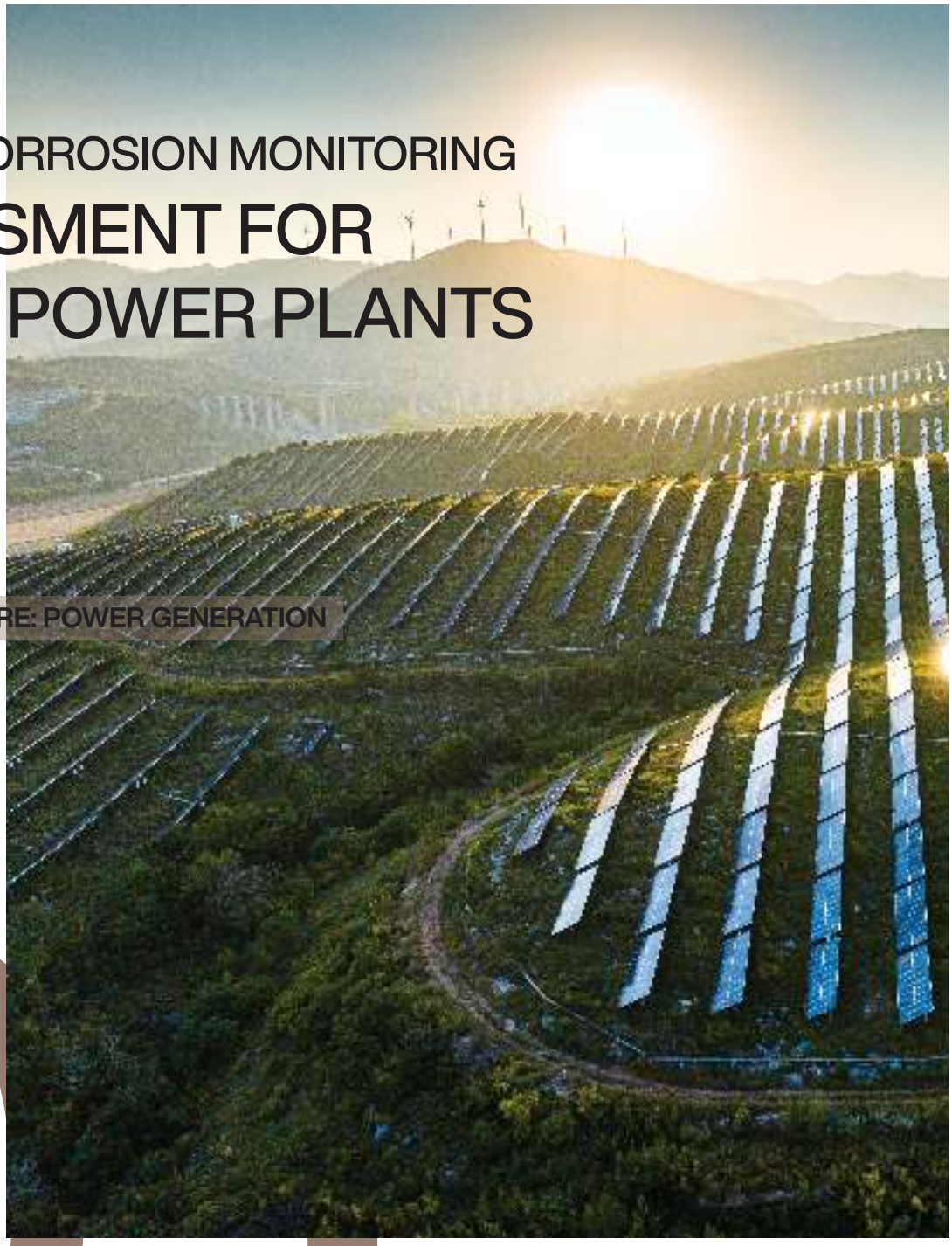
Mett-Bio

EXPERT CORROSION MONITORING

ASSESSMENT FOR SOLAR POWER PLANTS



CORROSION FAILURE: POWER GENERATION

WHY IS CORROSION ASSESSMENT AND MITIGATION REQUIRED?

Corrosion assessment and mitigation are essential in solar power generation plants to ensure operational efficiency, safety, and longevity of the infrastructure. Solar installations are exposed to harsh environmental conditions that accelerate corrosion, which can degrade metal frames, mounting structures, electrical connections, and grounding systems. This degradation leads to energy losses, increased maintenance costs, and potential safety hazards, including electrical faults and fire risks. Implementing corrosion-resistant materials, protective coatings, and regular inspections helps maintain system performance, reduce downtime, and maximize return on investment over the plant's lifecycle.

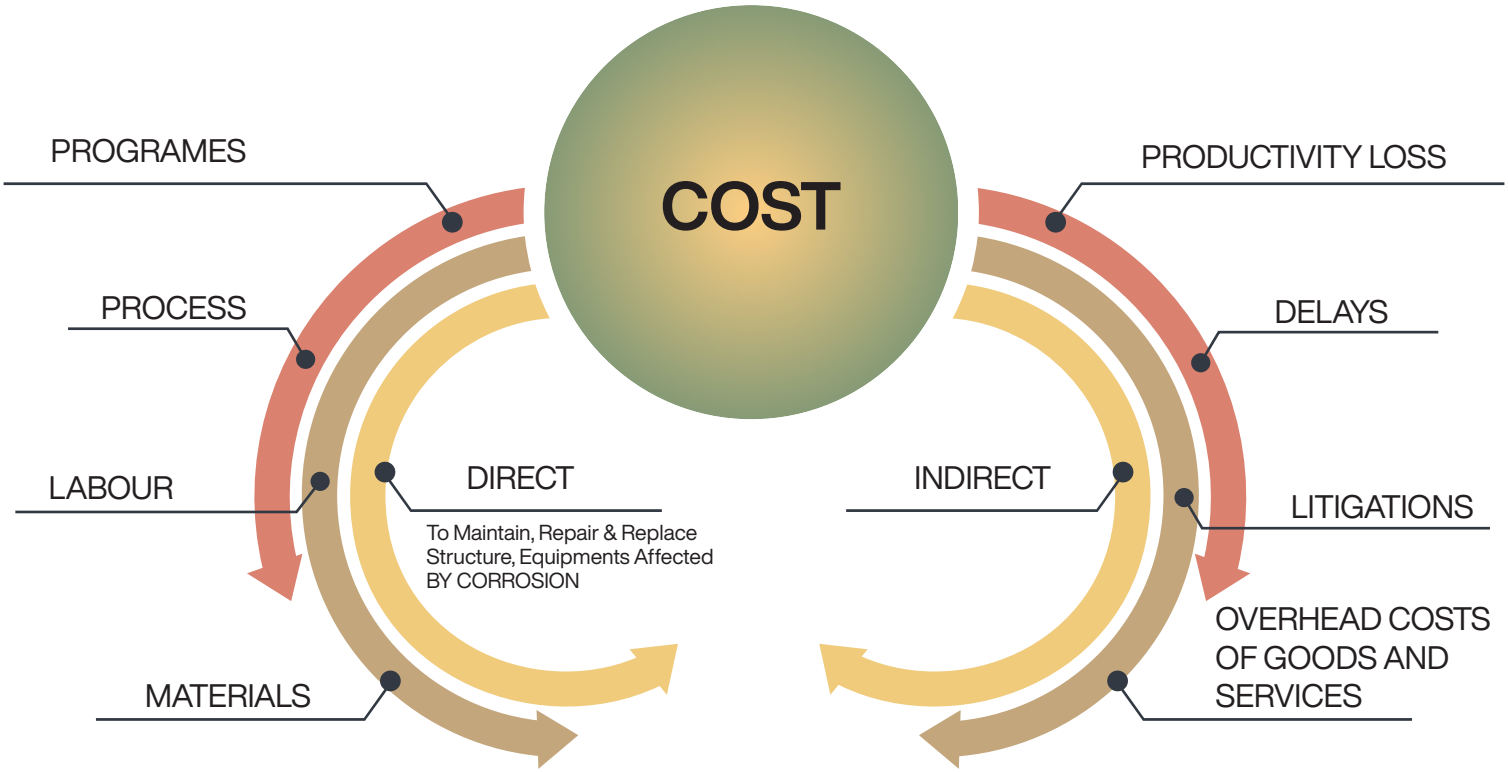
Damages Resulting from Corrosion Loss

Corrosion in solar power plants reduces energy output by increasing resistance in electrical connections and panel frames. It also drives up maintenance and repair costs due to frequent component servicing and replacements.

Corrosion-related failures cause downtime, resulting in lost revenue from interrupted power generation. Additionally, compromised grounding systems and increased fire risks pose safety hazards and potential liability issues.

Corrosion shortens the lifespan of metal structures and equipment, necessitating premature replacements and higher capital expenses. Finally, the need to replace corroded components increases material waste and environmental impact, challenging the plant's sustainability efforts.

COSTS OF CORROSION



$27.7 Billion

Corrosion costs the power industry an estimated $27.7 billion annually, including $6.9 billion for transmission tower and pole maintenance alone, underscoring the critical need for effective corrosion prevention in solar power systems (Materials Performance, 2023)

OUR SERVICES

At METT-BIO, our team of NACE-certified experts offers comprehensive corrosion assessment and mitigation services specifically designed for the solar power industry. Our services cover both the planning and procurement stages as well as ongoing support for existing and aging structures to ensure long-term operational efficiency and safety.

WE PROVIDE A COMPLETE SOLUTION TO COMBAT CORROSION IN SOLAR INSTALLATIONS BY

CORROSION PROTECTION FOR SOLAR ARRAYS AND STRUCTURES

We apply best practices from NACE to protect solar panel frames, mounting structures, and electrical connections from environmental corrosion through optimal materials selection, protective coatings, and tailored maintenance routines.

GROUNDING AND BONDING CORROSION PREVENTION

Ensuring the integrity of grounding systems is critical for safety and performance. We implement NACE-standard protective measures to shield grounding components from corrosion, thereby improving system conductivity and reliability.

CORROSION PREVENTION FOR ELECTRICAL CONNECTIONS

Our experts select and recommend corrosion-resistant connectors, inverters, and junction boxes, guided by NACE standards, to prevent energy loss and reduce fire hazards.

MITIGATING GALVANIC CORROSION IN MIXED METALS

To prevent corrosion between dissimilar metals (such as aluminum, steel, and copper), we follow NACE guidelines on selecting materials and applying protective barriers, ensuring compatibility and durability.

ENVIRONMENT-SPECIFIC SOLUTIONS

For installations in coastal, desert, and high-humidity regions, we customize solutions that meet the unique environmental challenges, using NACE testing methods to simulate local conditions and optimize corrosion resistance.

CORROSION MONITORING

We utilize advanced monitoring methods to assess and manage corrosion rates in large solar arrays, ensuring ongoing asset protection.

PROTECTIVE COATINGS AND MAINTENANCE PLANNING

Using durable, UV-resistant coatings, we ensure that solar infrastructure remains protected against corrosion over time, supported by regular inspection and maintenance planning.

Our Methodology

Our corrosion assessment and mitigation methodology for solar power plants is grounded in industry-leading NACE standards and involves a multi-step process to ensure robust protection. First, we conduct a thorough assessment of environmental and structural factors, identifying high-risk areas for corrosion. We then select compatible preventive solutions, including corrosion-resistant materials, protective coatings, and cathodic protection where needed. Customized inspection plans are developed using advanced techniques like Linear Polarization Resistance (LPR) to monitor corrosion rates over time. Our team designs a maintenance and monitoring strategy, ensuring long-term asset protection and performance optimization, tailored to each plant's unique conditions.

CASE STUDY

valuable clients After seven years, the module mounting structures experienced significant corrosion, compromising their mechanical integrity. Our inspection revealed that approximately 30% of the 3,600 module mounts were severely corroded. Although the project's expected lifespan was 25 years, corrosion issues arose within seven years, reducing the estimated remaining life to just two years. Analysis of historical and current data indicated that the necessary coating thickness for galvanized C-channels had not been properly selected, and the impact of corrosive chloride ions in the environment was overlooked. Additionally, galvanized channels were not evaluated for effectiveness under actual site conditions during procurement. Many concrete piles showed cracking, and reinforcement within them was heavily corroded, likely due to a poor concrete mix and lack of a protective cement coating. Our experts identified the key corrosion factors, recommended suitable coatings to extend the structure's lifespan to the intended 25 years, and developed an inspection plan to maintain structural integrity over this period.