

IAF SPACE POWER SYMPOSIUM (C3)
Wireless Power Transmission Technologies and Application (2)

Author: Mr. Sakit Yarmammadli
Azercosmos, Space Agency of Republic of Azerbaijan, Azerbaijan, sakityarmemmedli96@gmail.com

FROM SPACE TO EARTH: WIRELESS POWER TRANSMISSION TECHNOLOGIES FOR
EARTH-BASED APPLICATIONS

Abstract

Wireless power transmission technologies (WPT) have the potential to transform the way electricity is generated, distributed, and consumed on Earth. With the introduction of space-based solar power (SBSP), it is now possible to harness solar energy in space and wirelessly transmit it to Earth. This paper provides an in-depth examination of WPT technologies and their potential for use in conjunction with SBSP on Earth.

The paper's first section provides an overview of WPT technologies such as magnetic resonance coupling, radio frequency, and laser-based systems. Each technology's benefits and disadvantages are discussed, with an emphasis on efficiency, safety, and environmental impact. The section also discusses the challenges in scaling up WPT for commercial use.

The paper then delves into the potential applications of SBSP on Earth, such as providing energy to remote or off-grid communities, disaster relief efforts, and supplementing existing power grids. The section investigates SBSP's economic and environmental benefits, including its potential to reduce greenhouse gas emissions and mitigate the effects of climate change.

The paper's third section discusses the potential synergies between SBSP and WPT. It investigates how WPT can be used to transmit the energy collected by SBSP in space to Earth, as well as the technical and economic challenges involved. The section also looks into the possibility of using WPT to charge electric vehicles and other devices wirelessly.

Finally, the paper concludes that, while WPT and SBSP hold great promise for providing renewable energy to Earth, significant technical, economic, and regulatory challenges must be addressed. Continued research and development in these areas could result in a plentiful and sustainable source of clean energy for future generations. International collaboration and cooperation, on the other hand, will be required to overcome the complex issues and advance the development of SBSP and WPT technologies. Overall, the potential benefits of WPT and SBSP make them an appealing option for addressing the global energy crisis.