

The True Cost of Global Energy

By Dr. Alex Lidow, CEO, Efficient Power Conversion

EPC's mission is to make GaN power devices that are higher performance and lower cost compared to silicon. GaN devices increase power density, improve efficiency and enable new applications and with the rising cost of energy globally, it is no surprise that the adoption rate of our GaN devices is accelerating dramatically.

Developing economies are struggling to build energy infrastructure to support industry and bring power to far flung villages. At the same time, industrialized economies are straining to balance conflicting demands for more power while decreasing the environmental impact. Finding ways to meet rising demand for energy without plundering natural resources, poses one of our greatest global challenges and provides one of our greatest opportunities to impact sustainability.

There are multiple costs associated with energy. These costs include the cost of generation, distribution, storage, conversion, consumption, and cleanup. Each of these costs varies with the type of energy and the way it is used.

The cost of generating electricity varies widely from fossil fuels to renewable sources such as wind and solar, or nuclear fission. The cost of distribution and storage for each of these is also vastly different. For example, the cost of storage for renewables can be high when there is no sunshine or wind.



The cost of conversion is also very different for fossil fuels compared with electricity supplied to a server farm. This is an area where wide bandgap (WBG) semiconductors can have a significant impact. The higher speed, lower production cost, smaller size, and lower resistances contribute to better electricity utilization but also to changing topologies that can result in huge savings.

The cost of consuming fuels also differs greatly depending upon the specific usage and is another area where WBG semiconductors can have an impact. Our customers have shown that by using GaN we can save about 30% of the energy used by power supplies and about 20% of the energy produced by more efficient solar panels.

Finally, the cost of cleanup and reclamation of electricity can dramatically impact the total "cost of ownership." For example, the cleanup of the environment from coal usage is worse than natural gas, and solar panels are better than gasoline backup generators. The reclamation of all the electrical equipment we have also needs to be accounted for. Consider the costs associated with recycling vs landfills. Is there a better way to recycle and neutralize the environmental impact of all the electrical gadgets that we have come to consider as almost disposable? The cost of cleanup is frequently not adequately factored into the total cost as it is deferred into the future and creates artificially low costs for certain types of energy that might have higher cleanup costs than others.

Distorting the true cost of the energy we consume can lead to poor choices that have long-term adverse impacts. Factoring in the true cost of energy will promote energy choices that are the most environmentally and socially responsible. Energy efficiency can directly increase global standards of living and the emergence of wide bandgap semiconductors can contribute significantly. Wide band gap semiconductors, particularly GaN will save a large amount of our energy consumption and make way for an improved global standard of living and a cleaner environment.

Alex Lidow will be delivering the GaN Keynote at Bodo's Wideband Gap event on 30th November 2023 where he will discuss 'GaN IC Roadmaps for Motor Drives, DC-DC Converters, and Lidar Systems'.

About the Author

Alex Lidow is CEO and co-founder of Efficient Power Conversion Corporation (EPC). Since 1977 Dr. Lidow has been dedicated to making power conversion more efficient upon the belief that this will reduce the harm to our environment from energy production and consumption.

In order to pursue this mission, in 1977 he joined International Rectifier as an R&D engineer. In 1978 he co-invented the HEXFET power MOSFET, a power transistor that launched the modern power conversion market and displaced the aging bipolar transistor. Royalties from these patents brought in more than \$900M over the years, and International Rectifier, prior to being acquired was the largest producer of power MOSFETs in the world. Over the 30 years Dr. Lidow was at IRF, his responsibilities grew. He progressed to the head of R&D, head of manufacturing, head of sales and marketing, and finally CEO for 12 years.

Dr. Lidow holds many patents in power semiconductor technology, including basic patents in power MOSFETs as well as in GaN FETs. He has authored numerous publications on related subjects, and recently co-authored the first textbook on GaN transistors, "GaN Transistors for Efficient Power Conversion", now in its third edition published by John Wiley and Sons.

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