

# Overview



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## Power Semiconductor Technologies toward 2120

When considering potential concepts for the future, it is good to occasionally cast our eyes far forward into the year 2120 (around a century from now). Electricity poses a challenge to store but generation and conversion is easy—fast forward another century, and electricity will no doubt be the primary source of energy, being converted into various forms throughout our day-to-day lives. In light of this, power electronics and the power semiconductors associated with them will likely play an increasingly important role even 100 years from now.

The development of power semiconductors is intrinsically related to the applications that use them. Yet cost presents the most significant impediment when it comes to innovations that end up transforming society. One way of getting user to accept these costs increases is convenience. Once humans become accustomed to a sense of convenience, we are unable to return to ways prior. Indeed, convenience outweighs costs.

When we take a closer look at desirable positions from the stance of convenience, the following will most likely be possible in 100 years. 1) Flying cars, 2) Electric airplanes, 3) Wireless power supply, 4) Ultra-high-power density power supply systems, 5) Advances to medium and high voltages, 6) Ultra-high-power density actuators, and 7) Space applications.

So, what needs to be accomplished to get to these goals sooner, instead of in 100 years? What will be ideal power semiconductors look like? These are some questions that highlight the importance of backcasting. It is hard enough to find ways of achieving such feats in 10 or 20 years from now, given that various hurdles like cost, standards, corporate relations, politics, and national boundaries exist. Backcasting from a position 50 or 100 years into the future is crucial for the outright pursuit of technology.

I hope people reading this paper take a moment to explore their imagination: “What will things look like 100 years from now?”