OPPORTUNITY #11

WHAT IF AFFORDABLE ELECTRICITY IS UNIVERSAL?

POWER WITHOUT LIMITS

Transporting energy without loss, linking populations and industries everywhere

WHY IT MATTERS TODAY

Global electricity consumption has more than doubled in the past 30 years to over 22,000 TWh.[100] This trend will continue, especially as close to 250 million electric passenger vehicles may be on the roads by 2030[101] and up to half of industrial processes become electrified.[102]

Even though 90% of the world has access to electricity,[103] it is still unevenly distributed.[104] Similarly, while average losses in the transmission and distribution of electrical power range from 5% to 18%[105] globally, other areas in the world can lose up to 60%[106] of energy transmitted in their cities or communities. Widespread access to dependable, environmentally friendly, low-cost electricity is a critical enabler of growth and prosperity.

In the Middle East, energy consumption has increased five times in the past 30 years to over 1,020 TWh.[107] Compared to output and also unevenly distributed, the World Bank reported an average loss of 13.5% in electric power transmission and distribution in the Middle East and North Africa in 2014.[108] In the absence of more recent numbers, and taking a global average of 11.5% for transmission and distribution loss, the Middle East may lose up to 140 TWh of electricity generated per year, close to the 131 TWh annual electrical consumption in the United Arab Emirates.[109] The Dubai Water & Electricity Authority (DEWA) reported an average loss of 3.3% in the first half of 2021.[110]

THE OPPORTUNITY TOMORROW

The phenomenon of superconductivity was discovered over a hundred years ago, in 1911, by Heike Kamerlingh Onnes in Leiden, Germany.[111] It denotes a lack of electrical resistance in certain materials at certain temperatures and has been used in technologies such as magnetic resonance imaging (MRI).[112]

SECTORS

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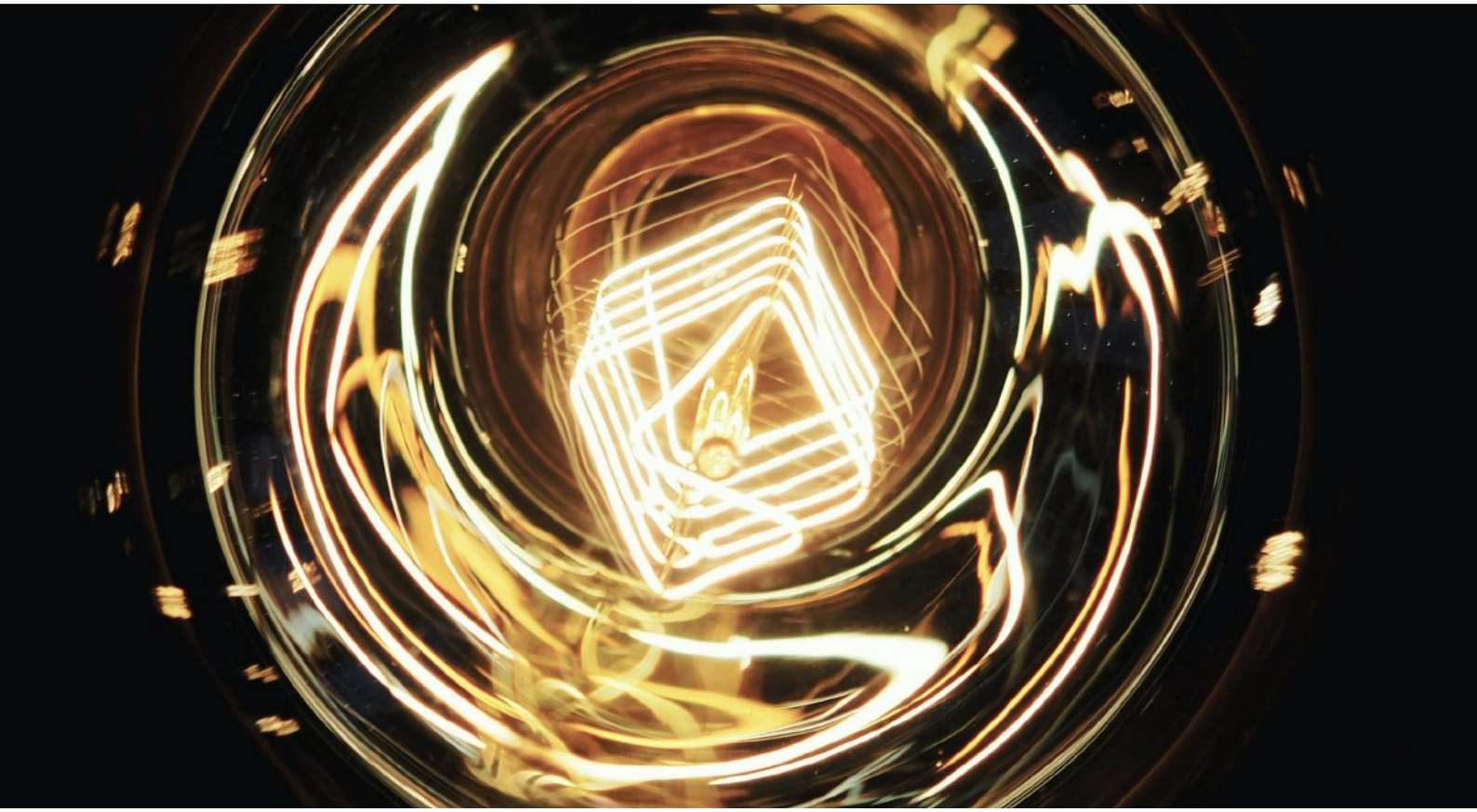

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1,020TWh

New superconducting bismuth-based[113] and other materials that can transport energy with no loss promise to make energy production and distribution far more efficient. Superconducting wires are already central to advances in nuclear fusion technologies that are likely to accelerate commercial applications.[114] Use of efficient superconducting cables in the future will allow more people around the world to be connected to electricity grids and enable businesses to locate their premises close to energy generation sources.

BENEFITS

Lower global energy costs and more efficient use of resources would increase the quality of life, reduce pollution and boost economic growth in regions that currently lack energy capacity. Advances in superconducting technology will mean that lower voltage current can be transmitted and less real estate space would be required for unsightly pylons or electrical current-converting sub-stations.

RISKS

There is potential for a winner-takes-all dynamic in superconducting technology to limit the benefits of breakthroughs. The concentration of power transmission could also increase the potential impact of attacks or outages.