



BY THE NUMBERS:

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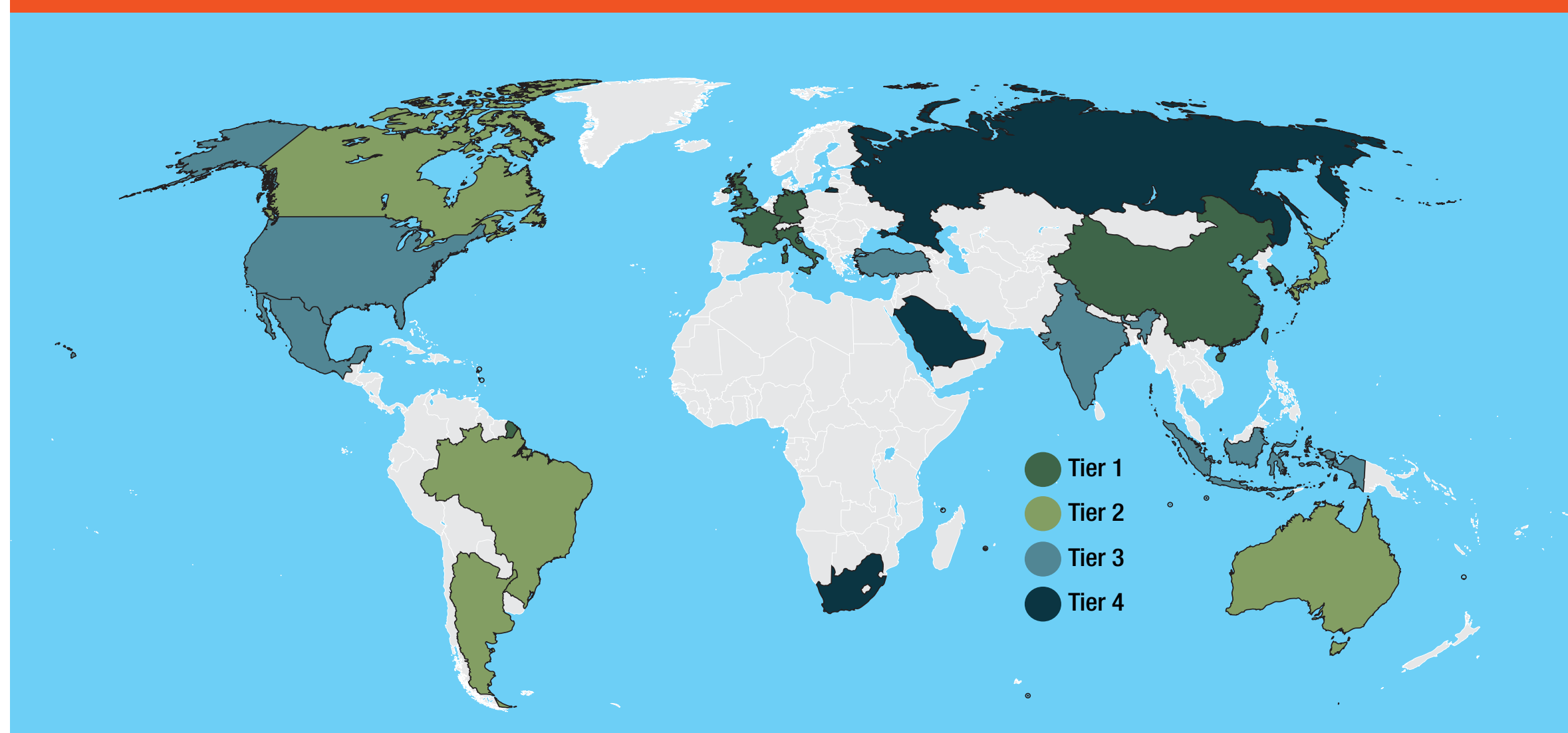
PROCESS HEAT WITHOUT CARBON

Burning coal, gas, or oil is a great way to drive thermal processes. In a zero-emissions economy, industries will need to find alternatives.

A September 2021 report by Bloomberg New Energy Finance, “Hot Spots for Renewable Heat,” looked at the prospects for decarbonizing processes that need heat of less than 400 °C (750 °F) across the so-called G-20 group of large economies, which account for some 80 percent of the demand for low- and medium-temperature industrial processes. The top markets for alternatives to fossil fuels—China, France, Germany, Italy, South Korea, and the United Kingdom—all featured relatively low power prices, favorable regulatory environments, and a robust ecosystem for renewable heat solutions.

The report also examined the pros and cons of four renewable alternatives to fossil fuels. Switching from carbon fuels to these renewable sources to provide industrial heat won’t be easy, but the report contends that the payback would ultimately be worth it.

MOST FAVORABLE G-20 COUNTRIES FOR LOW- TO MEDIUM-TEMPERATURE INDUSTRIAL HEAT DECARBONIZATION



Countries are placed in tiers based on their electric power prices, renewable energy regulatory environments, and the availability of renewable heat solutions.

RENEWABLE HEAT CAN COME FROM DIFFERENT SOURCES

GEOHERMAL	TEMPERATURE	PROS	CONS
Shallow geothermal	Less than 100 °C	Seen as less intrusive and disruptive	Often requires a heat exchanger
Deep geothermal	Up to 350 °C	Can be used in energy-intensive industry	High upfront cost; Region-specific resource
SOLAR THERMAL			
Solar thermal: nonconcentrated	Up to 150 °C	Already used in some applications	Space-intensive; Dependent on climate
Solar thermal: concentrated	Up to 400 °C	Many processes could switch to this technology	Space-intensive; Dependent on climate
ELECTRIFICATION			
Heat pumps	Less than 200 °C	Residential-scale use underway	Limited to low-temperature heat
Electricity	Up to 1,000 °C	Already used in many industrial applications	Uncompetitive where electricity is expensive
BIOENERGY			
Biomass	Up to 500 °C	Can directly replace coal; Many existing applications	Feedstock can be limited in some areas
Biogas	Up to 500 °C	Can use waste as feedstock	Feedstock can be limited in some areas
Biomethane	Up to 1,000 °C	Direct replacement for natural gas	Feedstock can be limited in some areas

Source: BloombergNEF, IEA