

IMPLEMENTING THE GREEN ENERGY TRANSITION

What Would It Take?

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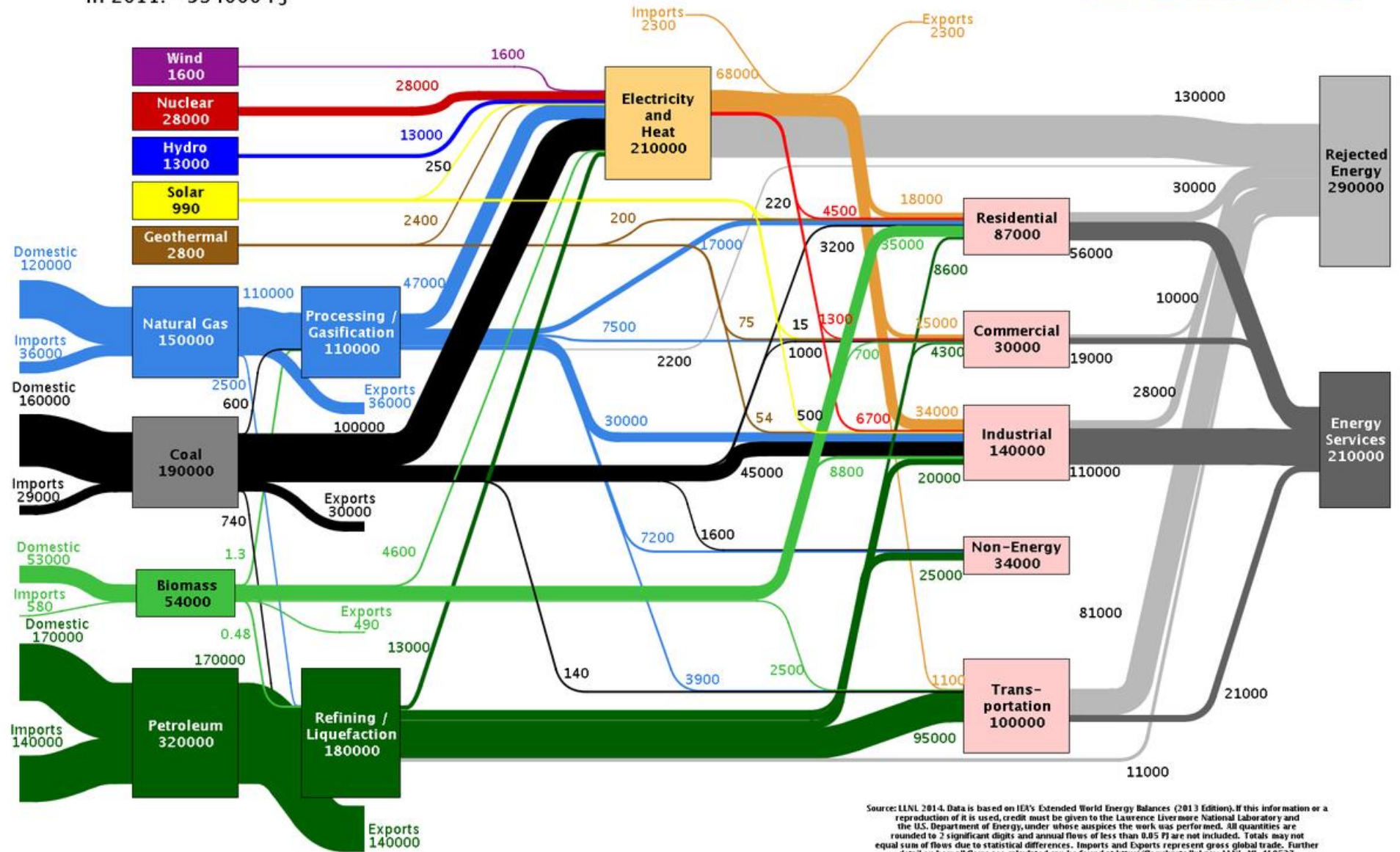
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A Transition Like No Other

- Transforming a global economy that is much larger than energy transitions of the past
- Driven by policy, not economics
- The green energy transition needs to be complete
- To impact climate, it must be carried out globally
- The speed that is promised is unprecedented

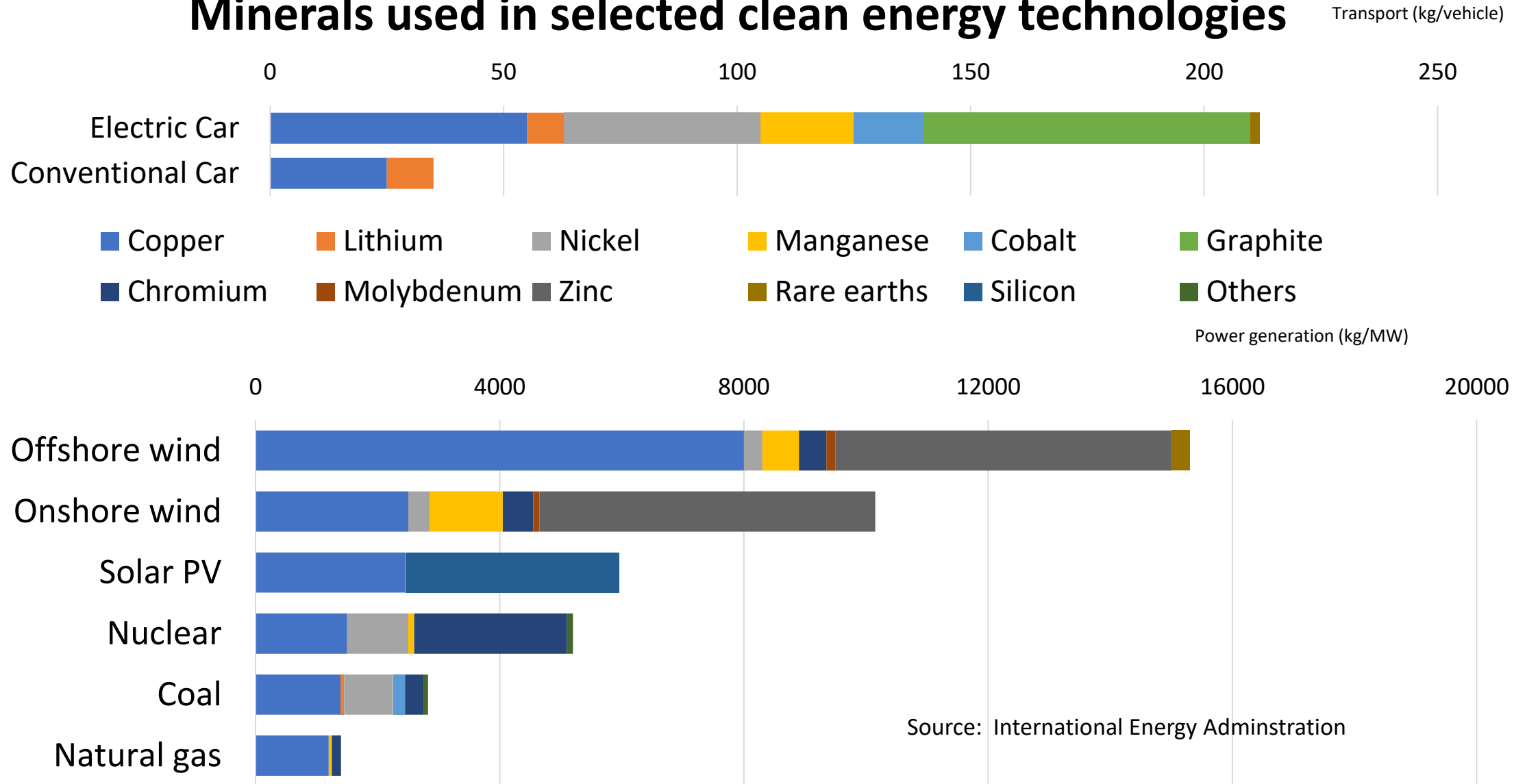
The Flow of Global Energy in 2011

World Energy Flow in 2011: ~534000 PJ



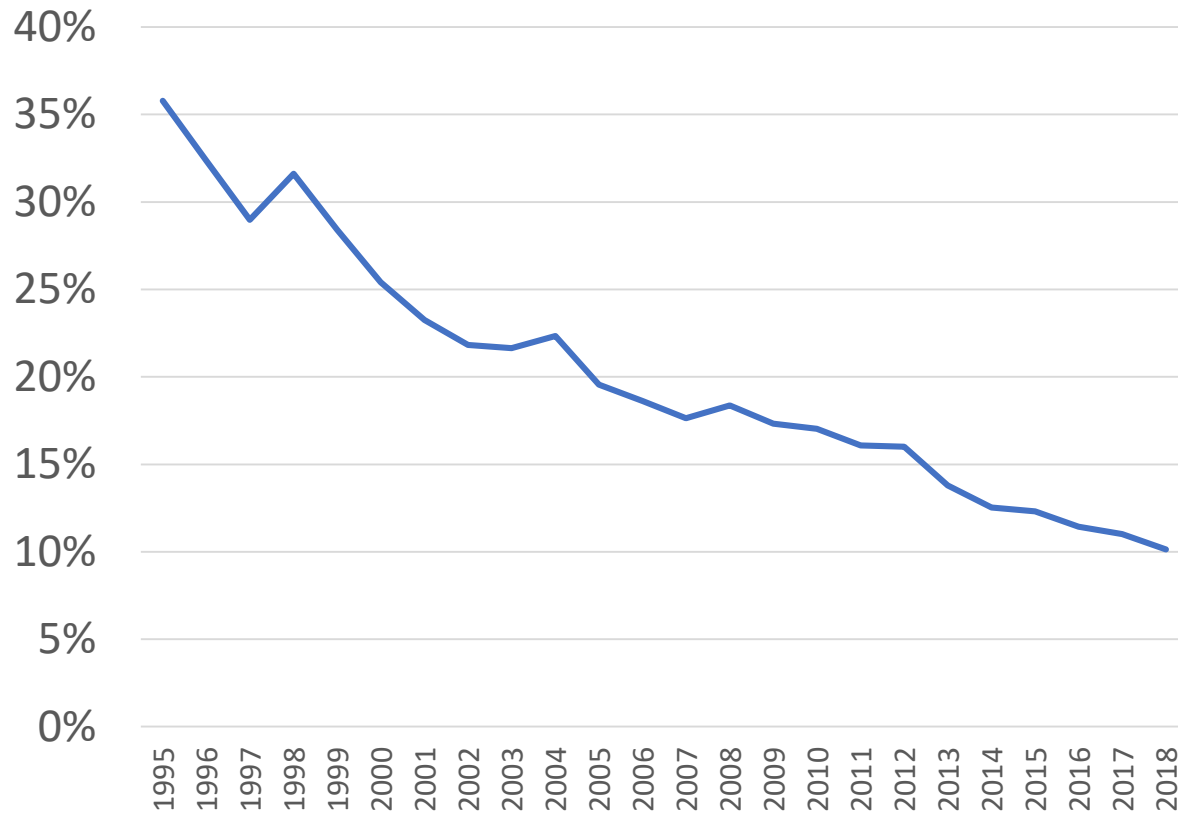
Source: LLNL 2014. Data is based on IEA's Extended World Energy Balances (2013 Edition). If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the U.S. Department of Energy, under whose auspices the work was performed. All quantities are rounded to 2 significant digits and annual flows of less than 0.05 PJ are not included. Totals may not equal sum of flows due to statistical differences. Imports and Exports represent gross global trade. Further detail on how all flows are calculated can be found at <http://flowcharts.llnl.gov>. LLNL-MI-410527.

Minerals used in selected clean energy technologies



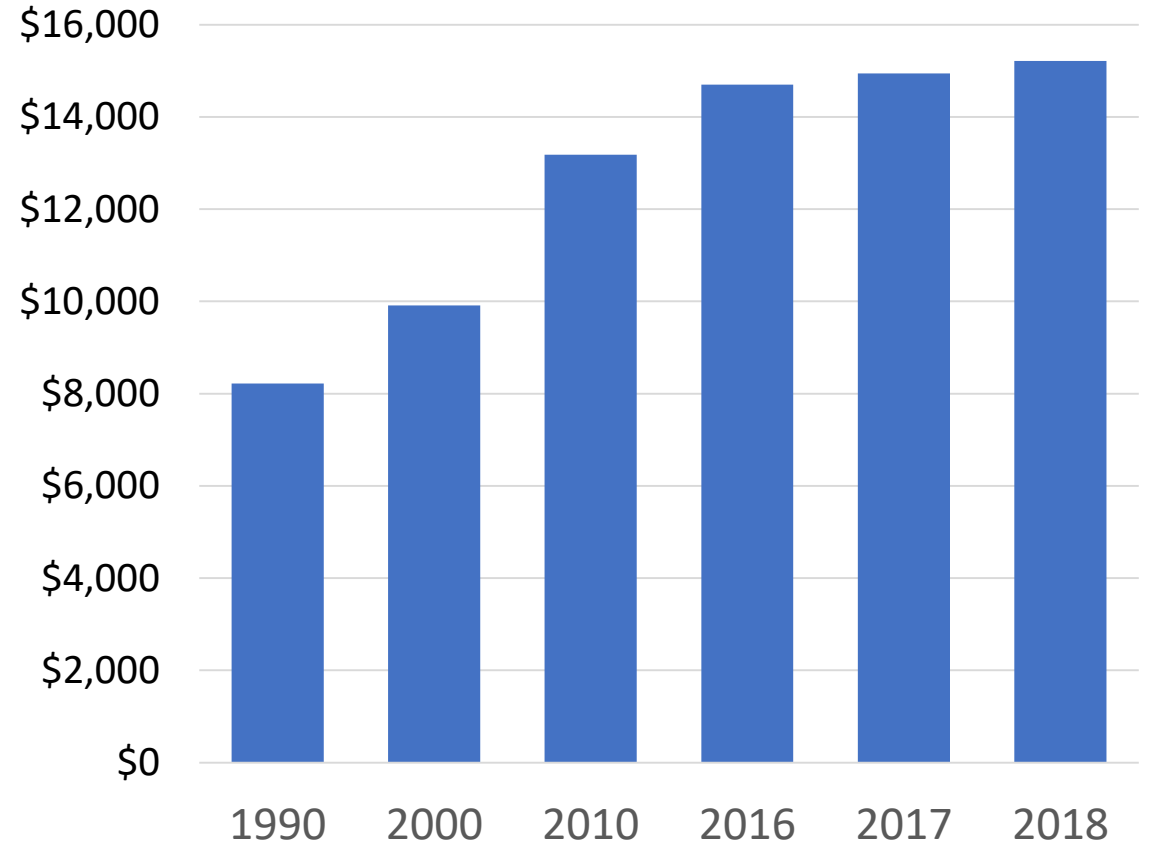
The Industrialization That is Reshaping the World Requires Energy

Percent of World Population in Extreme Poverty



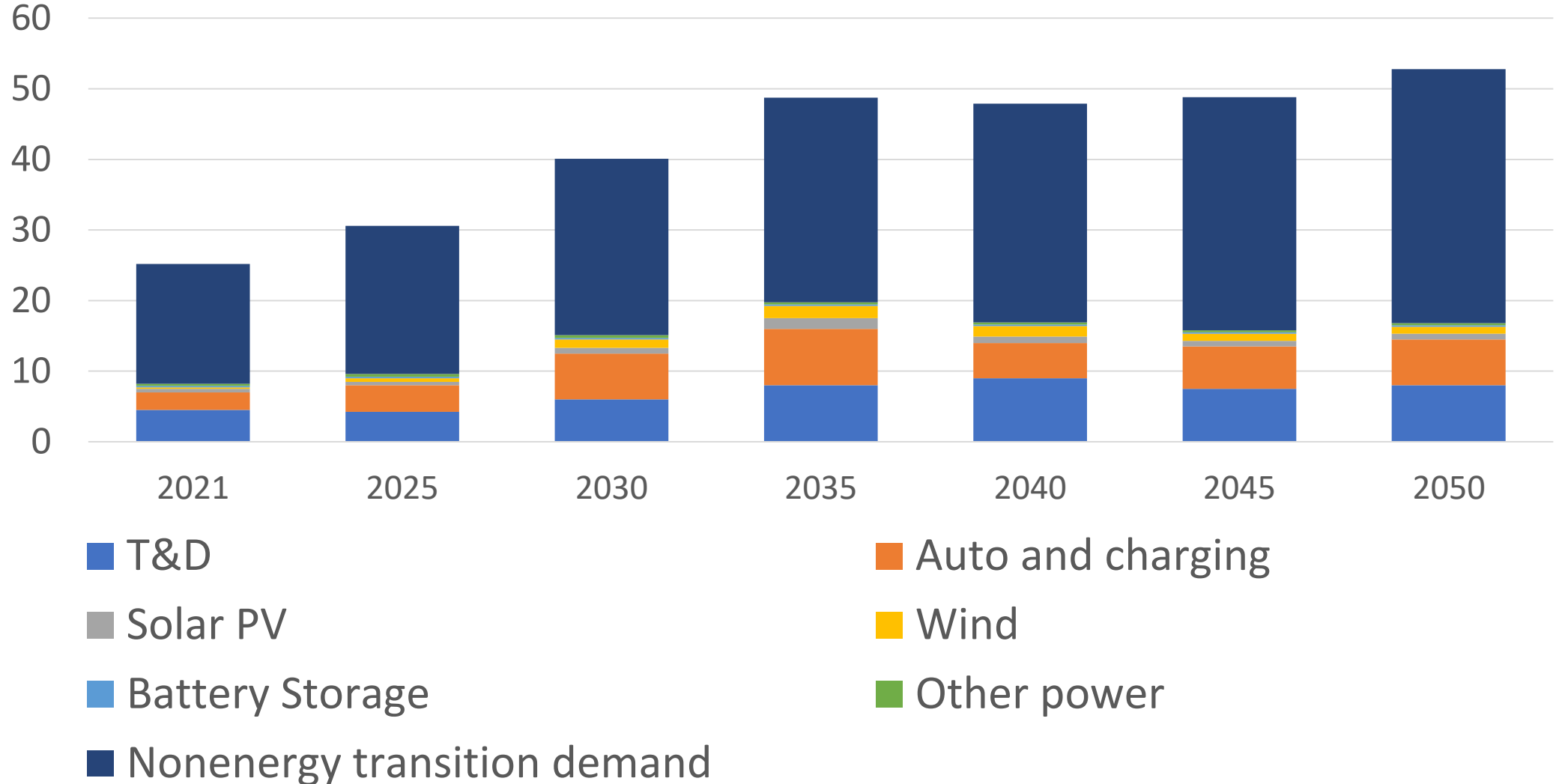
GDP Per Capita

2011 US Dollars



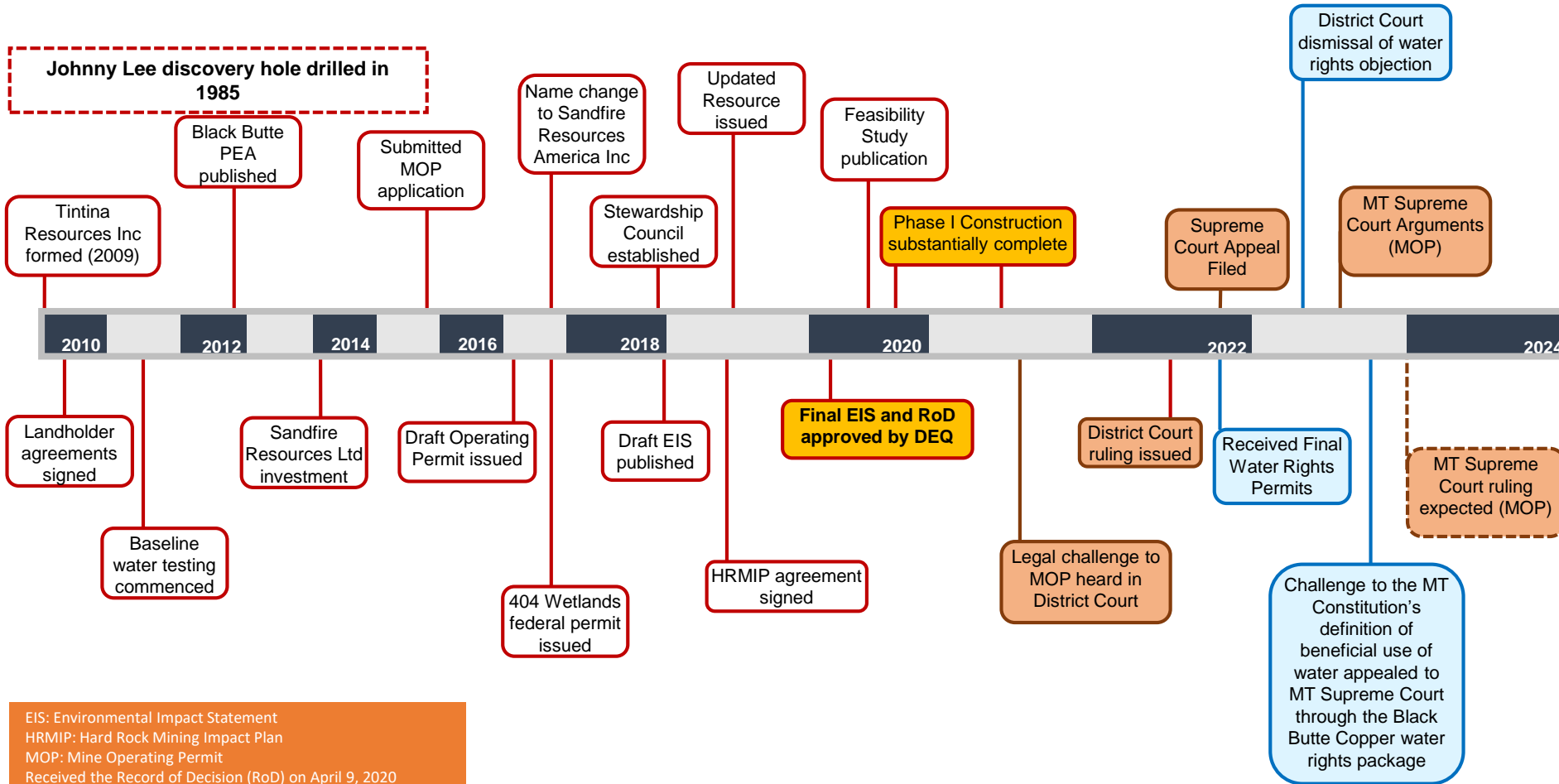
Global refined copper usage, 2021-2050

Millions of metric tons



Source: S&P Global

Permitting Timeline



EIS: Environmental Impact Statement
 HRMIP: Hard Rock Mining Impact Plan
 MOP: Mine Operating Permit
 Received the Record of Decision (RoD) on April 9, 2020

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