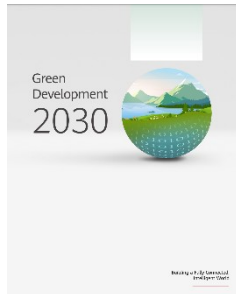


Digital Infrastructure & Energy Efficiency

By Jim Harris

By 2030, digital infrastructure will be 100 times more energy efficient.



At the Huawei Global Analyst Summit 2022, Huawei released its [Green Development 2030](#) report. ICT demand and use will grow 100-fold by 2030: general computing will increase 10-fold while AI computing power will increase 500-fold.

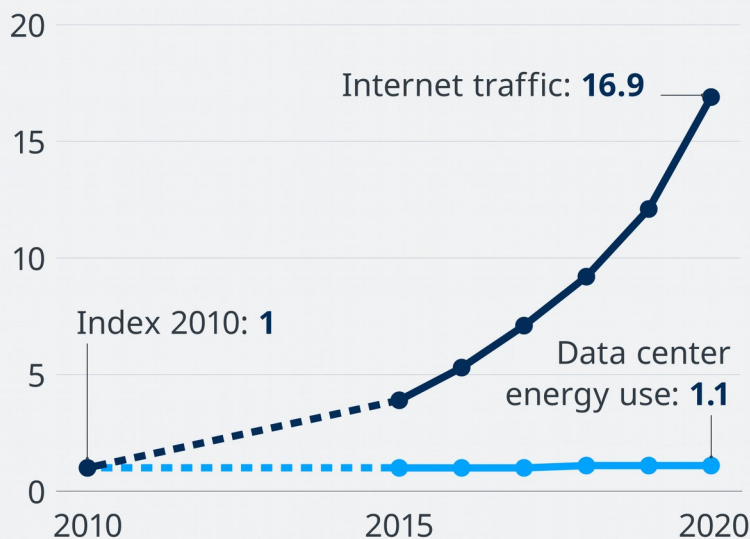
Due to climate crisis, CO₂ emissions must be constrained and cut, so technologists are challenged to make ICT 100 times more energy efficient by 2030.

Good News

If you're thinking, "It's impossible to improve the energy efficiency of technology 100-fold," look at the improvements from 2010-2020:

Global trends in internet traffic and data center energy use

Internet traffic and data center energy use compared to 2010



Internet traffic grew 1,600% from 2010 to 2020, yet data centre energy use barely increased at all (see graph).

Energy efficiency improvements for servers, storage devices, network switches and data centre infrastructure, have kept electricity use flat despite exponential increases in demand.

Image source <https://www.dw.com/en/data-centers-energy-consumption-steady-despite-big-growth-because-of-increasing-efficiency/a-60444548>



Source: IEA

Global data centres used 200-250 TWh of electricity in 2020, about 1% of global electricity demand; this, however, excludes energy used for cryptocurrency mining, which was ~100 TWh in 2020.

Shift to Hyperscale Has Increased Efficiency

There has been a profound shift in IT from traditional company owned data centers to the cloud and hyperscale cloud providers. Hyperscale computing data centers have been designed with efficiency in mind so are far more energy efficient.

Energy demand in data centers worldwide from 2015 to 2021

(in terawatt hours)

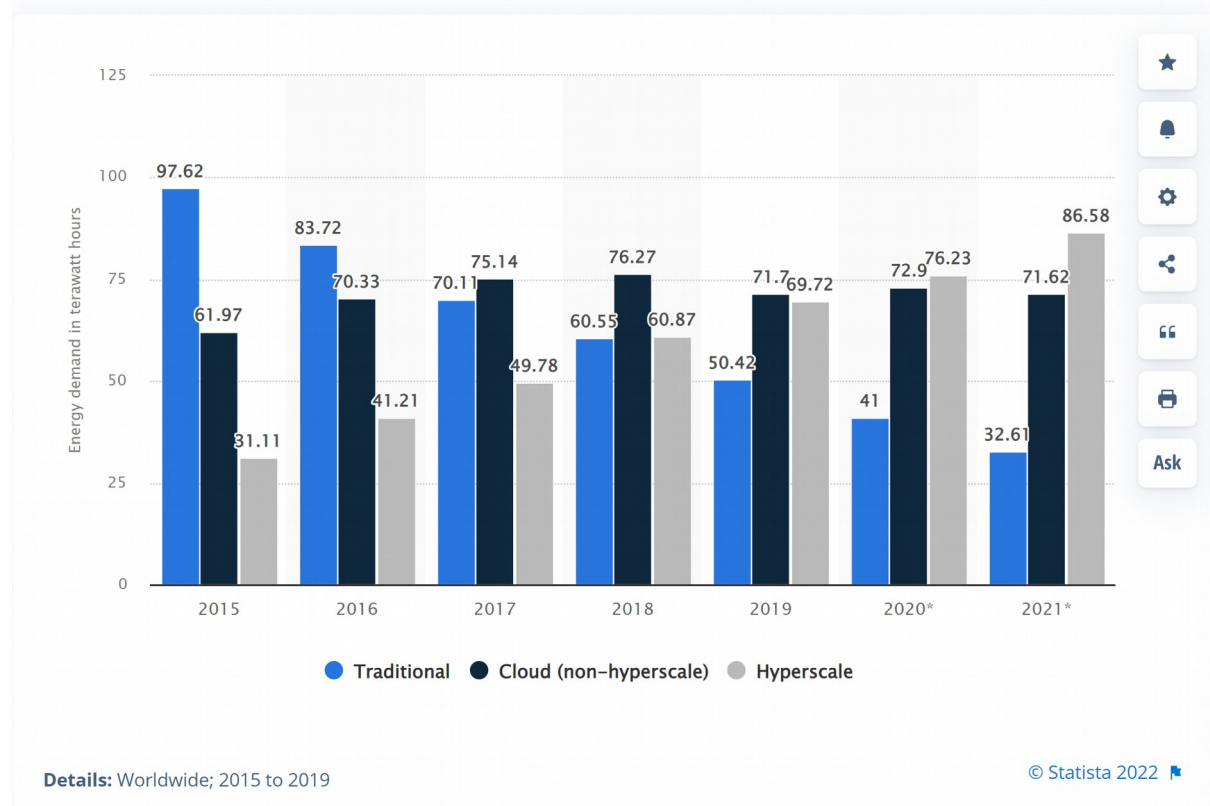


Image source: <https://www.statista.com/statistics/186992/global-derived-electricity-consumption-in-data-centers-and-telecoms/>

Digitalization Enables Decarbonization

Technology is the key to increasing efficiency and reducing carbon emissions in other industries. While the ICT will account for less than 2% of carbon emissions globally in 2030, it will be essential in increasing efficiency in other industries, enabling them to lower their CO₂ emissions by 20%, according to analysis by Global Enabling Sustainability Initiative (GeSI).

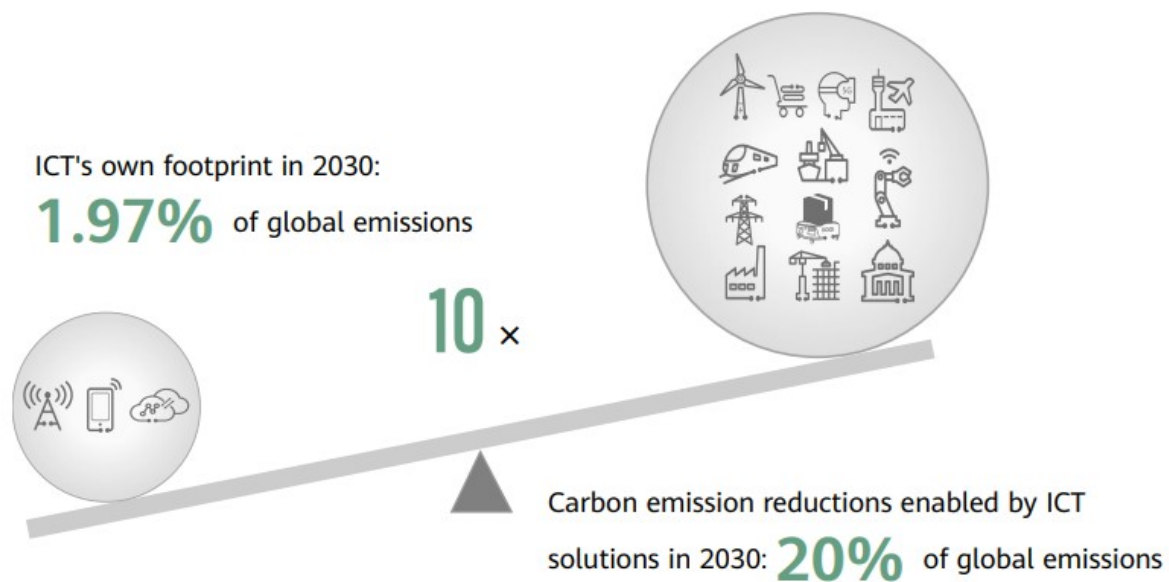
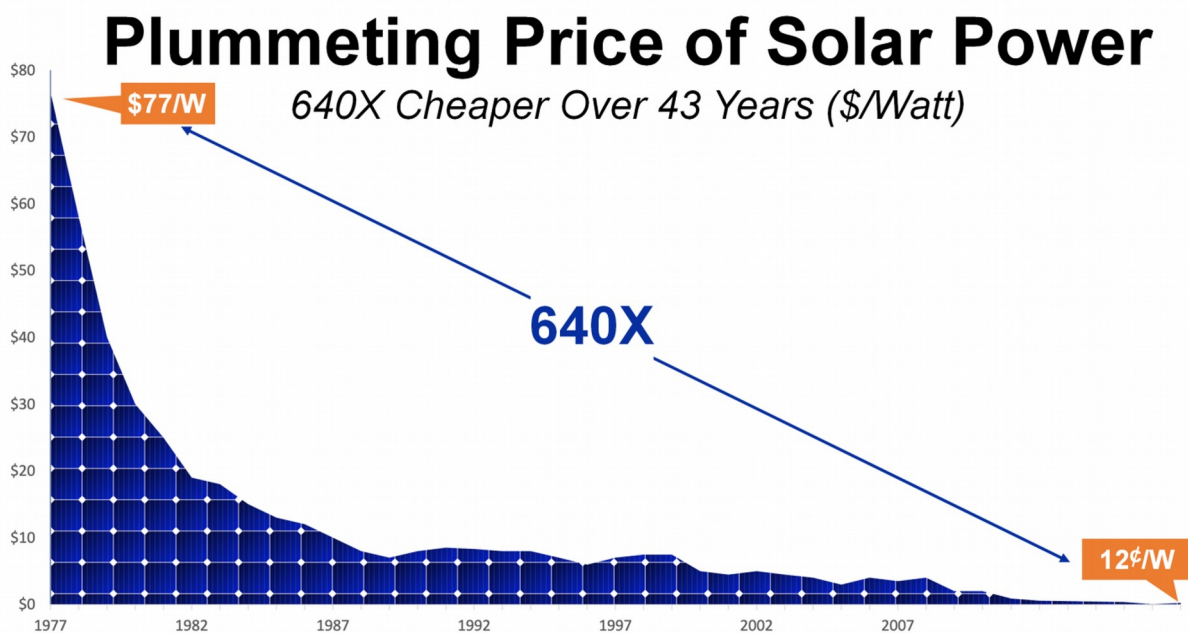


Image source: Green Development 2030

Three Prong Strategy

- 1) Improving the energy efficiency of digital infrastructure 100-fold
- 2) Expanding renewable energy sources
- 3) Enabling green development and digitalization across industries

Declining Cost of Renewable Energy



Sources: Bloomberg New Energy Finance, National Renewable Laboratories, Freeing Energy

Moore's Law posited by Gordon Moore in 1965 that the number of transistors on a CPU would double every 18-24 months while remaining at a constant price point. This can apply to any technology.

Wright's Law: that for every cumulative doubling of units produced there will be a constant percentage cost decrease. It's also known as the learning curve.

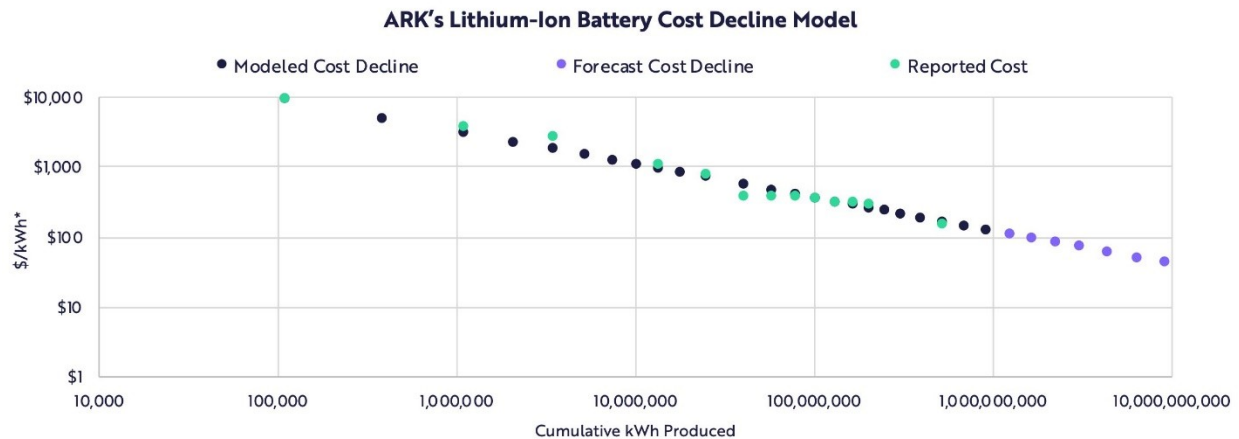


Image source: <https://twitter.com/skorusARK/status/1309225391723294721/photo/1>

Moore's Law and Wright's Law are driving the relentless and inevitable improvements in technology and energy efficiency and the declining cost curves for solar power and battery storage.

Huawei predicts that energy storage will grow 20X from 17GW in 2020 to 358GW in 2030.

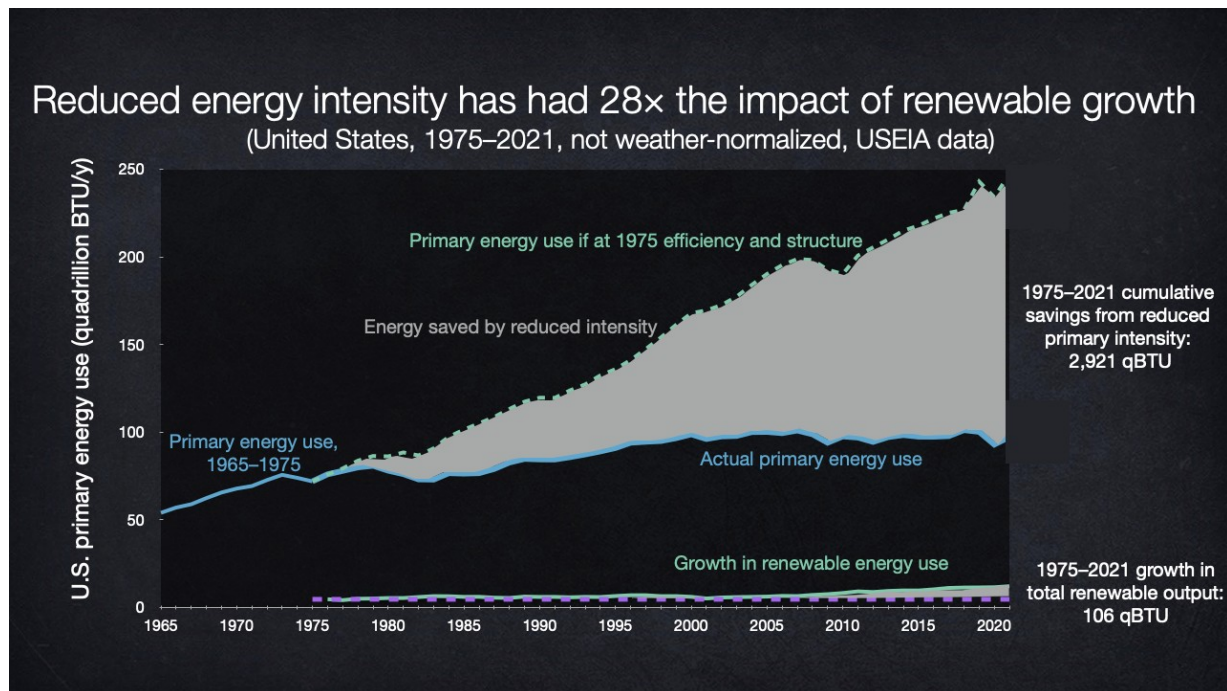
The exponential increase in solar and wind will be coupled with an exponential increase in storage technology to balance the grid.

Huawei's Smart PV technology is integrated into the Qinghai Solar Park a 2.2GW plant (the largest in the world) that is generating 5 billion kWh/year. The insight is "using bits to manage watts."

Biggest Source of New Energy?

What is the biggest source of new energy in America since 1975? The answer will surprise you. It's energy efficiency!

If the US had the same energy intensity of 1975 (energy to GDP), the nation would require 2.5 times more energy, notes Amory Lovin's, the Founder of the Rocky Mountain Institute (RMI) and America's leading energy efficiency guru. Energy efficiency should be the first focus. Lovins estimates that holistic, integrated design thinking of systems could cut energy use by an additional 66 to 75%.

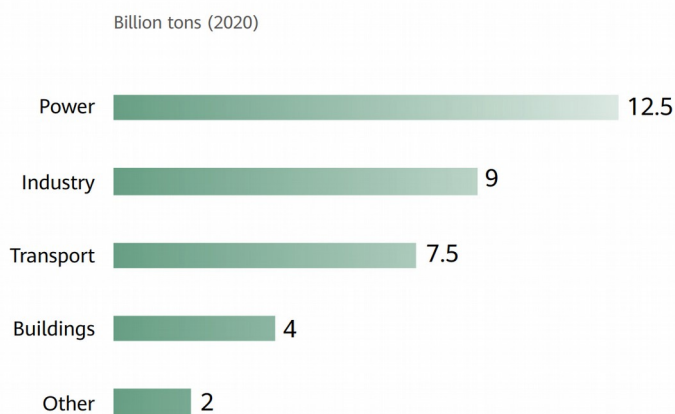


Source: Amory Lovins & Rocky Mountain Institute

Tackling the Challenge Head On

Global carbon emissions were 35 billion tons in 2020. Four sectors (power, industrial, transportation and buildings) represent 94% of all emissions:

Global carbon emissions by sector



Source: IEA and BP's Energy Outlook

Digital technology can help these sectors cut carbon emissions by up to 40% in these four sectors, according to *Green Development 2030*.

Jim Harris is a futurist & professional speaker. On Twitter, [@JimHarris](https://twitter.com/JimHarris) was the most influential personal account for CES 2022. You can email him at jim@jimharris.com