Abundance Is Everything - The Missing Multiplier

Three national electricity benchmarks imply very different global totals. What does a promise of abundance for everyone actually commit us to?

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What happens when we scale our electricity expectations to everyone?

We are getting used to a particular kind of promise.

Artificial intelligence will make work cheaper. Automation will make production easier. Energy will become abundant. Goods and services that once required enormous human effort will become accessible to almost everyone.

I would like that future to exist.

But when someone says that everyone should be able to enjoy the standard of living found in wealthy countries, I want to know what the statement actually requires. The promise becomes much larger when everyone enters the calculation.

The price of a sentence

Consider the statement:

Everyone should be able to live like people in wealthy countries.

There is no single electricity requirement hidden inside that sentence. We have to choose what we mean.

Take three contrasting national benchmarks. In the frozen 2024 dataset used here, annual electricity demand per person was approximately 4,590 kWh in the United Kingdom, 6,177 kWh in Germany and 12,752 kWh in the United States.[1] These are historical examples. Choosing them does not establish which country offers the best life, or how much electricity a good life requires.

Apply each country's per-person figure to the same World population: 8,161,972,574 people in that dataset. The calculation is national kWh per person multiplied by World population, then divided by one billion to express the result in terawatt-hours.

National benchmark	Hypothetical world demand	Multiple of the snapshot's World demand
United Kingdom	37,500 TWh/year	1.21×

National benchmark	Hypothetical world demand	Multiple of the snapshot's World demand
Germany	50,400 TWh/year	1.63×
United States	104,100 TWh/year	3.37×

The comparison uses the same snapshot's 2024 World electricity demand: approximately 30,930 TWh, including source estimates.[1] All calculations use unrounded inputs. The table rounds scenario totals to the nearest 100 TWh and multiples to two decimal places; it does not claim that degree of measurement accuracy.

The difference between the British and American scenarios alone is more than 66,000 TWh per year.

The sentence has no single price. The benchmark is part of the promise.

Before we can assess the scale of the promise, we need to know which benchmark it contains.

What are we actually comparing?

The indicator describes national electricity demand divided by population. Ember defines electricity demand as generation plus net imports; its annual generation accounting aims to use gross generation.[2] Dividing that total by the number of inhabitants does not turn it into a household electricity bill or a measurement of individual well-being.

Electricity flowing across borders is already part of that net-import accounting. The calculation does not estimate electricity embodied in imported goods or reassign manufacturing demand to the people who eventually buy those goods. It also leaves each country's existing mix of activities and technologies inside its average.

The American-to-German ratio therefore tells us about the chosen electricity indicator. It cannot establish an equivalent ratio in quality of life. Nor can the British figure be copied globally and expected to reproduce British living conditions.

These figures leave us with a more useful question: **which services do we want everyone to have, and how much electricity would the systems providing them require?**

The three benchmarks are starting points for that question. They are not universal recipes for prosperity.

Electricity can rise while energy for a service falls

Imagine replacing a petrol vehicle with an electric vehicle, or a gas boiler with a heat pump. The replacement uses electricity to provide a service previously supplied by another fuel.

Electric drive can deliver mobility with less final energy than combustion. A heat pump uses electricity to transfer heat from its surroundings, so the heat delivered can exceed the electrical input. The IEA documents both efficiency advantages.[3][4]

For the same transport or heating service, electricity use can therefore increase while the final energy needed falls. That service-level comparison does not establish that total energy demand across an expanding economy will decline.

A present-day electricity average also leaves out fuels used directly for services such as transport and heating. Holding its electricity figure constant would not automatically provide enough electricity to replace those fuels. Conversely, better equipment or different ways of providing a service could change its electricity requirement.

Historical electricity demand is a useful reference precisely because we can identify what it holds constant. A future scenario would have to specify what changes.

Making the multiplier visible

I built the **Global Electricity Equalizer** to make this first calculation accessible. You can select a national electricity benchmark and see what it implies when applied to the world's population, alongside the dataset's World total.

The tool uses a fixed dataset, with its source hash, coverage information and downloadable calculation records. It does not forecast future demand or estimate the generation infrastructure, grid capacity, storage, materials or investment needed to supply a scenario. It cannot choose a sufficient level of consumption on our behalf.

Explore the Global Electricity Equalizer. (https://hedegreenresearch.com/tid/global-electricity-equalizer/)

Someone may expect future efficiency gains to lower the electricity needed for modern services. Someone else may expect computing, automation and higher material production to increase it. Those assumptions need explicit values, service definitions and evidence before we can compare the resulting futures. The current multiplication does not supply them.

It gives us a place to begin making them visible.

The future we are describing

What if every person had access to modern housing, transport, healthcare, communication, food production and the benefits of advanced automation?

What infrastructure would make that possible? How much electricity would those services require? Could efficiency gains offset growing demand? How would different industrial arrangements change the result?

And would the resulting systems serve the entire global population?

In One Potato at a Time (https://hedegreenresearch.com/articles/one-potato-at-a-time/), I asked how increasingly automated production could become dependable access to food. The question here comes one step earlier: what physical scale are we promising when we describe a future for everyone?

One multiplication cannot settle that future's feasibility. But a universal promise becomes easier to examine when we identify its population, its service expectations and the resources those services depend on.

Abundance Is Everything

Abundance Is Everything is an investigation into the physical and social requirements of a future in which abundance reaches everyone. Electricity is the first measurable example in this series. Food, materials, infrastructure, manufacturing, access and distribution bring further questions.

Some constraints may recede through technological progress. Others may persist or change form. The work is to investigate the conditions under which the promise could become real, while remaining able to find that a proposed route fails.

The Global Electricity Equalizer helps put a scale beside one assumption about the future. We still have to decide what kind of future we mean.

If abundance is for everyone, everyone belongs in the calculation.

— Dennis Hedegreen, trying to see the structure

Sources and calculation scope

[1] Our World in Data, frozen energy snapshot `owid-2026-09-10-2024-v1`, as packaged in the Equalizer's reviewed release. See the pinned observations (https://github.com/DennisHedegreen/global-electricity-equalizer/blob/67030d4415b5f6bdd98008f4c5f8ddc5bb8831bc/data/equalizer-observations.json) and source pins (https://github.com/DennisHedegreen/global-electricity-equalizer/blob/67030d4415b5f6bdd98008f4c5f8ddc5bb8831bc/data/source-pins.json). Electricity demand is Ember-derived; population is the OWID population series. All inputs refer to 2024. The catalog release label and the observation year are separate. The selector covers 196 countries and territories, approximately 99.37% of the snapshot's World population; its World baseline is the source aggregate, rather than a sum of the selectable countries. Full raw-source SHA-256: `238177564d56b21fd40caaf9572ad8f8382421899462c68952294fcce4f2eea9`. These figures use this snapshot throughout; later or earlier report editions can give different historical totals.

[2] Ember, Electricity Data Methodology (https://files.ember-energy.org/public-downloads/ember_electricity_data_methodology.pdf), current v1.6, “Definitions” and “Electricity Generation and Net Imports,” printed pp. 9–10. Consulted 16 November 2026. This is a current definition reference; the numerical inputs above remain the frozen snapshot.

[3] IEA, Electrification (https://www.iea.org/reports/electrification), 22 September 2026, “The Age of Electricity” and “Electrification in end-uses.” Used here for the distinction between final energy and useful services, and the relative efficiency of electric end-use technologies. The article does not adopt the report's future scenarios.

[4] IEA, The Future of Heat Pumps: How a heat pump works (https://www.iea.org/reports/the-future-of-heat-pumps/how-a-heat-pump-works), 2022, opening explanation of heat transfer and electrical input. The article does not assume one performance factor for all heat pumps or operating conditions.

RELATION MEMORY

NEARBY one-potato-at-a-time · Related universal-provision question. This article compares global electricity benchmarks; the food-service argument does not validate those benchmarks as welfare requirements.

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