Electricity delivery in the Americas and Japan vs most of the rest of the world.

reference world map: https://www.mapsofworld.com/world-map-image.html

NOTE: Most of this won't concern you when travelling and staying in hotels or with friends but if you move to another country you'll need to know some of this especially if you take any of your appliances with you.

Plugs and Sockets, Grounding Configurations, Other Protections

North American and European electrical plugs are like square pegs in round holes—literally. A French (and many other European countries) plug has two round prongs, and the electrical s\ocket has two round holes for a receptacle. But even within Europe you may encounter several electrical plug variations including skinnier or fatter prongs, and recessed or not-recessed outlets. Most plug-adapter kits include what you need, but if you plan on visiting several different countries, make sure you have the right adapters or a multi-plug adapter
https://www.german-way.com/travel-and-tourism/electrical-facts/

Why isn't there a universal standard electric plug?

https://www.worldstandards.eu/electricity/history/why-no-universal-plug/

The reason why the world is now stuck with no less than 15 different styles of plugs and wall outlets, is because many countries preferred to develop a plug of their own, instead of adopting the US standard. In one sense those countries were actually right, though: the wobbly American plugs and their uninsulated prongs are almost prehistoric in terms of design and they are notoriously unsafe.

For decades, the International Electrotechnical Commission (IEC) tried to develop a universal domestic power plug, but time and again political and economic issues threw a spanner in the works. In 1986, the IEC finally presented the universal standard plug (type N) to the world, but unfortunately the initial enthusiasm had dampened. It wasn't until 2007 that Brazil became the first country in the world to adopt type N as its standard wall outlet and plug top. The establishment of type N as the sole standard was motivated by the urge to sort out the motley collection of plugs in use throughout the country.

Many Latin-American, African and Asian countries are still in the same situation that Brazil used to be in. Some of those countries have taken a short-sighted approach by allowing so-called "universal" or "multi-standard" wall outlets to be installed in properties in order to solve the problem, but those often violate basic safety standards. Standardizing on type N (or another safe and preferably widely used earthed plug system such as F, G or I, for that matter) should of course be self-evident. But some countries just never learn. In 2006, Thailand deemed it necessary to develop a whole new power outlet system of its own, albeit compatible with type C, which is currently gradually being phased in.

At the bottom of the web page is a map of plug types used around the world and links to pictures and descriptions of all 15 plug and receptacle types for domestic use. There is also a link to a list of the countries of the world with their respective plug and outlet types, voltage and frequency.

Configurations of Distribution systems (with image of circuits)

Distribution systems around the world have evolved into different forms. The two main designs are North American and European. For both forms, hardware is much the same: conductors, cables, insulators, surge arresters, regulators, and transformers are very similar. Both systems are radial, and voltages and power carrying capabilities are similar.
https://electrical-engineering-portal.com/north-american-versus-european-distribution-systems

Earthing (grounding) systems
https://electrical-engineering-portal.com/types-of-electrical-power-distribution-systems

Portable Transformers

European appliances requiring lower voltage than 220V have built in transformers as do American appliances requiring less than 110V. Laptops, cell phones etc detect voltage and step it down. Desk top computers have a switch on the back to change the transformer settings to use 110V or 220V.

You can buy large and small transformers to use your American appliances in Europe. For small appliances they are small and cheap. For larger ones the transformers will be about half the size of a regular microwave and weigh more.

Most of today's chargers or devices are marked with a notice similar to this: "100-240V, 50/60Hz" – meaning in this case that the device will work with electrical power input from 100 volts to 240 volts, and AC current of 50 or 60 hertz (Hz, cycles per second) because they have a built in transformer.

List of Worldwide AC Voltages & Frequencies
https://www.oaktreeproducts.com/img/product/description/List%20of%20Worldwide%20AC%20Voltages.pdf

Why no standard voltage (has an overview map of every current and voltage used in the world)
https://www.worldstandards.eu/electricity/history/why-no-standard-voltage/

Why do some countries use 120 volts and others use 240v?
The US uses 120 volts because Edison chose 110 volts DC for light bulbs. And that was because he couldn't figure out how to create bulbs running on 220 volts without burning out. But in North America, 120V was chosen in part because 120V was easier to insulate at a time before various plastic (petroleum product) insulation had been invented. Wires were insulated with cloth and oil-impregnated paper, sheathed with lead, or bare - so 120V was easier to insulate than 220V.

The difference between North America and European wiring to the home is in North America only 1 phase (1 of the live wires) goes to plugs and lights in most cases and 2 phases are used for ovens, electric heat, industrial devices, dryer, hot water heater etc. While in Europe every plug has both phases making up 240v at all plugs and lights.

"Why is 60Hz AC used in America?"

"Westinghouse engineers were disposed to adopt 50 cycles, but American arc light carbons then available commercially did not give good results at that frequency and this was an important feature which led them to go higher."

On the other hand, a lower frequency gives you lower motor speeds with fewer motor poles, and back in the early days of electricity, it was more difficult to build a motor with more poles. It also provides for less wear on the motors. This created the parallel 25Hz power system in North America for industrial motors. Some places split the difference and used 40Hz, but in a lot of places we had 50Hz or 60Hz in parallel with 25Hz, and the latter lingered on until the 2000s.

Many different frequencies were used at different times and places in the US and are even today. Louisiana flood pumps still use 30Hz. Some modern aircraft use 400Hz because the higher the frequency, the smaller the transformer thus adding less equipment weight.

When the German company AEG built one of the first European generating facilities,. In addition to the motor poles being fewer with 50Hz its engineers decided to fix the frequency at 50 Hz, because the number 60 did not fit the metric standard unit sequence (1, 2, 5). At that time, AEG had a virtual monopoly and their standard spread to the rest of the continent. Sep 8, 2020

In 1891, Westinghouse engineers in Pittsburgh selected 60 Hz as their new power frequency. That same year, AEG engineers in Berlin selected 50 Hz as their new power frequency. Although much has happened since 1891, these two frequencies remain the principal power frequencies in use worldwide.

http://www.50hz60hz.com/why-different-frequency-voltage-power-supplies-are-used-in-different-countries.html

http://www.50hz60hz.com/which-one-is-better-110v-60hz-vs-220v-50hz.html

Additional references on 60Hz vs 50Hz
The author discusses the origins of 60 Hz as the power frequency now used in the USA. The author covers the work of Charles Scott, Benjamin Lamme and L.B. Stillwell of Westinghouse, the experimental period of 1821 to 1880, the light period from 1880 to 1890, the power period of 1890 to 1925, and the period of systems interconnection from 1925 to 1990. Particular emphasis is given to the development of frequency for lighting systems and of frequency development in the USA, Europe and Japan.
Published in: IEEE Industry Applications Magazine (Volume: 3, Issue: 6
https://ieeexplore.ieee.org/xpl/tocresult.jsp?isnumber=13663, Nov.-Dec. 1997)
https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=2943
The origins of 60-Hz as a power frequency
https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=628099

Extras
https://www.researchgate.net/post/Which-factor-is-most-severe-for-power-system-collapse-Whether-it-is-under-frequency-or-under-voltage

Tesla History
https://teslauniverse.com/nikola-tesla/articles/life-and-times-nikola-tesla

My experiences with electricity in Europe Scroll a third of the way down the web page to October 24, 2015. http://ruthandjohn.com/2015_10.html

http://www.french-property.com/guides/france/utilities/elec\]tricity/tariff/