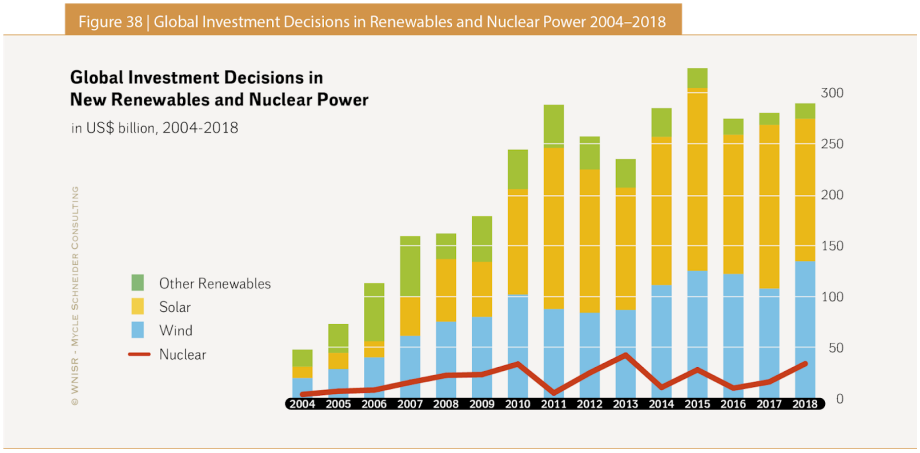
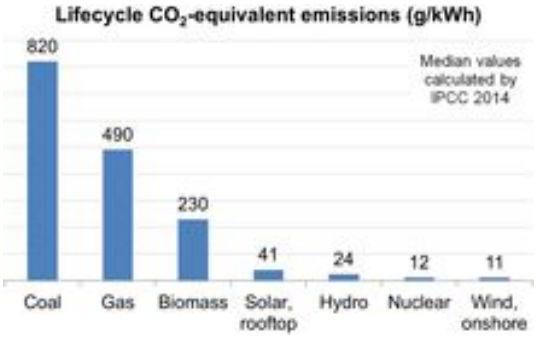
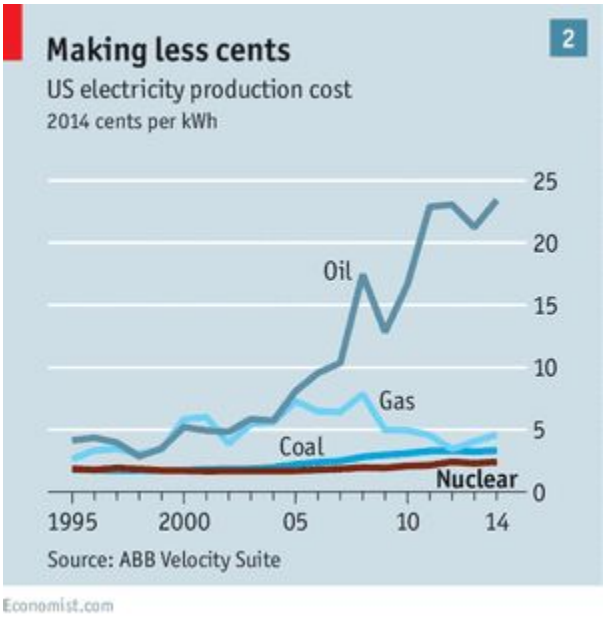
What is the geographical story behind a chosen set or sets of data?



Source 1



Source 2



Source 3

The need to shift humanity's dependence away from fossil fuels for our energy supply has raised a plethora of questions regarding not only what alternative sources ought to be considered, but also how such a shift might be implemented. In this essay I will argue that nuclear energy represents the best alternative energy source available to us at the moment. Improved technology, lower prices and environmental benefits are all reasons that countries should be prioritising their nuclear energy programmes in the decades ahead. The use of nuclear energy is at the heart of the COP-26 2021 aims 'to increase climate ambition, build resilience and lower emissions' and indeed was emphasised in the COP-25 in Madrid, by the International Atomic Energy Agency's Director General, Rafael Grossi, who lauded the need for a greater use of low-carbon nuclear power to ensure the global transition to clean energy.

Nuclear power stations are an effective way to produce energy as they have a low environmental impact. As seen in source 1, the amount of CO2 produced by nuclear energy

is the second lowest after onshore wind farms. At only 12 grams per KWh, it is over 40 times cleaner than natural gas as a source of energy, which is being pushed by many governments as a cleaner alternative to coal. Given that ⅔ of all global greenhouse gas emissions are as a result of burning fossil fuels to produce energy and we have only years left to take major action before we risk facing the most serious consequences of climate change, reviewing the importance that nuclear energy can play seems logical.

Whilst it is generally agreed that a move away from fossil fuels is needed, contention remains regarding the potential of several renewable sources to replace fossil fuels. One of the major advantages of nuclear in this context is the greatly reduced area necessary to produce energy. A typical 1,000-megawatt nuclear facility in the United States requires little more than a mile to operate; this compares to 3 million solar panels which would take up 75 times more space or 430 wind turbines, taking up 360 times as much space. The compact nature of the production of nuclear energy therefore minimises biodiversity losses.

Looking at source 2, part of the reason that the life cycle CO2 emissions for coal are the highest at 820 g/kWh is that the process of mining is hugely energy intensive. A single uranium pellet the size of a peanut produces roughly the same amount of energy as 800kg of coal. Although it is more difficult to dispose of, the waste is produced in such small quantities that even the cost of having to store and dispose of it safely is far less than the damage done to the environment by the mining process. The machinery used to extract the coal and the equipment needed to transport it, significantly increase its carbon footprint.

Whilst there is the risk that nuclear accidents will occur, thus causing environmental damage, it is difficult to argue that even if a disaster did occur that it could ever be worse than the potential impacts of climate change. Whilst increasing investment in nuclear energy would inevitably mean the construction of more power stations, the likelihood of disasters such as Three Mile Island occurring again is low. The leak had no detectable health effects on workers or the public and is one of three major disasters alongside Chernobyl and Fukushima that has occurred in over 17,000 cumulative reactor-years in 33 countries.

As one can see in source 3, the price of oil quadrupled in the decade between 2004 and 2014 and that price hike has continued and will rise further (although offset temporarily by the Coronavirus induced recession). The price of nuclear energy is not likely to rise beyond 2.5 cents per kWh as accessibility is unlikely to become an issue. Stable prices will improve business confidence and build long term resilience within the energy industry. If lower energy prices can be achieved too this will have knockon positive effects, for example, by increasing the sale of green/electric powered cars, thus reducing the carbon footprint of cars worldwide.

Another important reason that governments should more strongly consider adopting nuclear energy as their primary source of power is that it is an effective and predictable alternative to renewable energy sources. One of the inherent flaws of renewable energy sources is that they do not provide constant power. The irregularity with which the sun shines and the wind blows throughout the day and over earth's surface means that the amount of electricity generated changes drastically throughout the day. Only 20% of the global population lives in areas that have levels of solar output that would make the production of electricity most worthwhile. Therefore, solar power will always have to be supplemented by other energy

sources and it simply does not have the capacity to facilitate the large scale and total move we need to make away from fossil fuels towards another source of energy. This leads one to question the rationale behind the data in source 1: investment in solar and wind power has increased over the last 14 years but that in nuclear energy, has not. In fact, solar, experienced a $128 billion dollar increase in funding worldwide - more than triple that experienced by nuclear energy in the same time period.

The final reason that more focus ought to be directed towards nuclear energy is that it is efficient and has the potential to be cost competitive. Even after suffering years of underfunding (as seen in source 1), nuclear energy is still a 1/7 of the cost of oil and still half of the cost of gas to produce (source 2).

If governments around the world really seek not only to slow the impact of climate change, but to also boost the competitiveness of their domestic industries, nuclear represents a massive opportunity for them to do so.

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