Nuclear Insecurities

National Insecurity

Any nuclear power plants (npps) built with Chinese involvement would amount to selling them our national security. [1]

Fuel Supply Insecurity

Any existing or new npps would suffer from increasing insecurity of fuel supply, notably from Russia and Kazachstan. [2]

Physical Insecurity

All fission npps give off 'decay heat' after shutdowns, whether operational or emergency. If a npp loses both the grid connection and the standby generators, the batteries would last only 4 to 8 hours before decay heat causes the reactor cores and spent fuel pools to overheat and all containments to be breached in hours to days. This happened at Fukushima, where three reactors discharged major radioactive releases to the air, land and sea. [3]

The probability of a given radioactive release is assessed by assigning probabilities of failure to each link (e.g. a pump or pipe or valve) in the billions of possible chains of events. However, some threats from hostile states and terrorists, such as airliners, missiles, drones and cyber attacks, were not anticipated when many existing npps were designed. The same may apply to natural disasters, such as earthquakes, storm surges and sea level rise, and to new npps. So not all the chains can be identified and even fewer are considered in practice. Therefore the probability of a major radioactive release is an underestimate, logically unknowable, and must be taken as inevitable. [4] Hence npps suffer fatal physical insecurity from an unknowable number of threats.

Human Insecurity

Chernobyl resulted in fallout over 40% of western Europe, while 2400 km away in the UK, the fallout on hill farms in Scotland and Wales resulted in compensation being paid for 25 years. Fukushima caused the evacuation of some 100,000 citizens, the loss of many livelihoods including farming and fishing, and of up to 8% of Japan for decades. So the human and economic consequences of major radioactive releases are such that the populace experiences life-threatening human insecurity and demands immediate shutdowns of all npps in the country. This happened in Japan after Fukushima, and even five years later, hardly any have been re-started, while the cleanup is expected to take at least forty years.

Energy Insecurity

The magnitude of a 'worst case' release is about 100 times those from Chernobyl and Fukushima. [5] The cost of such a release has been put at about € 6000 billion. [6] [7] This is about three times the UK GDP, but is uninsurable. Yet the size of npps has increased and with clustering (as at Fukushima and proposed for HPC) disasters can involve more than one. Also spent fuel in the cooling pools has been built up, with re-racking, instead of using the more costly off-site dry cask storage and secure underground repositories. So the potential radioactive releases are now even larger. After the next major one anywhere in the world, all npps, whether old or new, incomplete or operating, would become ‘stranded liabilities’ and most likely be shut down immediately, with energy insecurity seen as the lesser of two evils.

Delivery Insecurities

Npps are subject to very limited price competition, due to the cost and time required for regulators to evaluate each design. Also they are very complex constructs, subject to weather and component delays, with no 'learning' from series production to cut cost. Instead they suffer from 'specification creep' during the very long construction times, often due to safety concerns arising after the design and evaluation. Hence most new npps exhibit the delivery insecurities of huge delays and cost overruns. The EPR (as proposed for HPC) at Olkiluoto is nine years late and has doubled in cost, while that at Flamanville is six years late and has tripled in cost.

Capacity Insecurity

Talk of Hinkley Point C (HPC) providing 7% of UK electricity is not a virtue, but 'too many eggs in one basket'. HPC is proposed to comprise 2 x 1600 Mwe npps, but close-coupled, so many 'common-mode' failures could arise. Hence the Short Term Operating Reserve (STOR) would have to be increased to 3,200 MWe. But Dinorwig took 10 years to build and without a STOR of 3200 MWe, any unplanned outage of HPC would subject the GB grid to massive capacity insecurity.

Investment Insecurity

Most countries have long decided against nuclear power. Following Fukushima in 2011, Germany, Italy, and Switzerland, later joined by Belgium and Spain, have also decided against or are phasing it out, showing that other solutions are possible. For Germany, several independent studies show that 100% of electricity could be supplied from renewable energies. [8] The German government appointed an 'Ethics Commission for a Safe Energy Supply'. [9] It accepted their findings and adopted the 'Energiewende' (Energy Transition). My analysis for the UK shows that wind power could supply up to 75% of electricity, with the balance from gas-fired power, before 'Power-to-Gas' long-term storage is required to reach 100% renewable energy. [10] So new supply should be from wind and solar farms which are ethical, sustainable and secure investments, much cheaper to finance and much quicker to deliver. Conversely, npps would suffer massive investment insecurity.

Business Insecurity

Most countries are addressing the energy security and climate change concerns with supply from renewable energies along with demand reduction and electricity savings. The scope for demand reduction in the UK is shown in the Adonis study commissioned by a previous government. [11] For all energy-using products, savings are usually possible until the energy used is about twice the thermodynamic minimum required for each task. An excellent example is lighting, where the savings achieved between incandescent and LED lights is about 90%. Moreover, the UK imports most of it's end-use equipment, appliances and lighting, and much industrial machinery, which is renewed after about 5 to 15 years. The energy use per new unit is decreasing and the electricity demand in the UK is falling. In Germany, energy saving is supported by policy, and electricity demand is expected to fall 50% by 2050. So the grid can be balanced significantly by demand reduction and electricity savings, which are much quicker and cheaper to deliver. Conversely, npps would cause business insecurity with insecure and uncompetitive power and lesser capabilities in the sustainable energy technologies that sell well at home and abroad.

Job Insecurity

Claims that HPC would offer e.g. 25,000 jobs are not a virtue. UK industry is not able to build complete npps, so the imported content would be very high. Most UK jobs would be low-skilled and last less than the construction time, leading to job insecurity. Meanwhile overseas companies such as Siemens are investing in UK manufacture of wind turbines for both home and overseas markets. This reduces the imported content and increases high-skilled UK jobs in manufacture, supply chain, sales and marketing, installation, and operation and maintenance.

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My key documents are supported by extensive evidence bases of references, almost all available online.

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