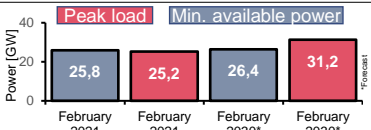
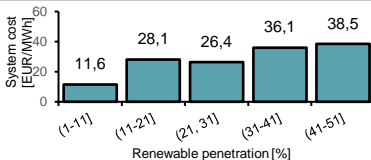
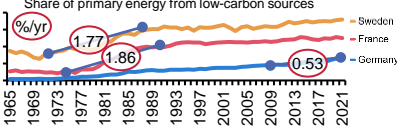
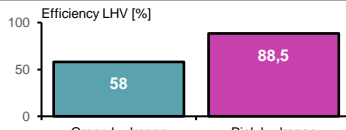
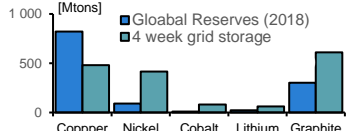
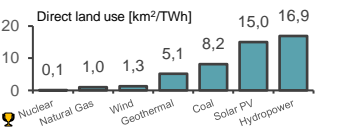
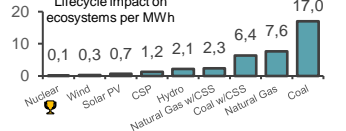
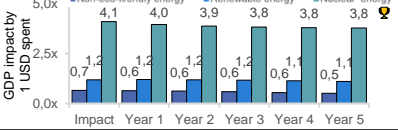


There are several reasons why advanced nuclear should aid the transition to a carbon neutral society, acknowledged by institutions such as MIT, IEA and IPCC:

Reasons	Background	The challenge		What nuclear can provide	Sources
A Available power	One does not only need energy but also power, available when needed.	NVE and Statnett are pointing to a looming power crisis , where peak load can become 4.8 GW higher than available capacity in 2030.		Nuclear provides clean electricity 24/7, ensuring that all its power is available except during shorter plannable periods of maintenance and fuel switching.	Nettavisen.no. "Sjokkrappport fra NVE og Statnett." Buvik, M., et. al. (2022). Norsk og nordisk effektbalanse fram mot 2030.
B Energy system costs	Costs are occurred by generating energy and by integrating it in the energy system.	The more renewables on the grid, the more costly it becomes for the system to integrate them.		According to an MIT study, " <i>flexible nuclear operation lowers power system operating costs, [...], and substantially reduces curtailment of renewables.</i> "	(Jenkins, J. D., et. Al. (2018). The benefits of nuclear flexibility in power system operations with renewable energy. Applied Energy, 222, 872-884.) (Heptonstall, P. J., Gross, R. J. K. (2021). A systematic review of the costs and impacts of integrating variable renewables into power grids. Nature Energy, 6(1), 72-83.)
C Current decarbonized power systems have relied on firm baseload	In the 70s, Sweden and France decarbonized their grid using hydro and nuclear. Germany is struggling with <i>Energiewende</i> . Why not follow a similar path?	A modern society depends on a reliable source of energy. Renewables rely on energy storage. Current global battery capacity can only cover the demand for 1.25 minutes.		Storing large amounts of intermittent energy is difficult and expensive. Covering more of the baseload with nuclear can significantly ease the burden of decarbonization, as done before.	(Batteries won't save us.) OurWorldinData.org. Share of primary energy from low-carbon sources
D Hard to abate sectors	Not only electricity must come from low-carbon sources. The four pillars of civilization; cement, steel, plastics and ammonia must also be decarbonized.	In 2019, the world consumed 4.5 Btons of cement, 1.8 Btons of steel, 370 Mtons of plastics, and 150 Btons of ammonia. Just for the ammonia, 95% of the feedstock, hydrogen, comes from fossil fuels.		Hydrogen can play a vital role in decarbonizing these sectors, and steam electrolysis with nuclear heat provides the highest efficiencies, even better can be achieved by thermochemical water splitting .	(Smil, Vaclav. How the World Really Works: The Science Behind How We Got Here and Where We're Going. Penguin, 2022.) (Pink hydrogen) (Green hydrogen)
E Materials	Wind, solar and electric batteries are material intensive.	There are not enough available materials for current lithium-ion batteries to power an all-electric car fleet, much less the grid storage needed for a 100% renewable world.		Nuclear's material intensity is in the same order as natural gas or coal, well below wind and solar. Nuclear can thus alleviate the need for massive mining operations.	(Michaux, S. P. (2021). Assessment of the Extra Capacity Required of Alternative Energy Electrical Power Systems to Completely Replace Fossil Fuels.)
F Land use	Energy sources require land use for their generation.	Renewable energy sources require a lot of land, often in remote areas with good weather conditions.		The land use of nuclear is miniscule compared to other sources. For instance, the average land use of an entire wind park is 129 km²/TWh, compared to nuclear's 0.13.	(OurWorldinData.org. Land use per energy source.)
G Lifecycle impacts	All energy sources have some impact on nature. It is important to look at the entire lifecycle to assess this impact.	The world is facing a biodiversity crisis. Human activity is reaching further into nature's realm.		Parts of the public are scared by the waste products from nuclear energy, but if we look at the data this fear is exaggerated. Moreover, coal is 1000x more deadly than nuclear, wind and solar.	(UNECE. (2022). Carbon Neutrality in the UNECE Region: Integrated Life-cycle Assessment of Electricity Sources) (OurWorldinData.org. Safest sources of energy)
H Locally anchored jobs boosting GDP	The green transition should also be just. Securing jobs and prosperity.	In Norway alone there are approx. 200k people employed in the fossil industry. How can we create jobs and ensure our standard of living if these jobs are to be mitigated?		1 USD spent on nuclear energy gives an initial 4,1 USD back on GDP. Nuclear provides local, stable and high paying jobs, enabling a just transition for workers.	(Batini, N., et. al. (2022). Building back better: How big are green spending multipliers? Ecological Economics) (USEER. (2020). Wages, Benefits, and Change A Supplemental Report to the Annual U.S. Energy and Employment Report.)