



HEALTH
PHYSICS
SOCIETY

NUCLEAR POWER

POSITION STATEMENT OF THE HEALTH PHYSICS SOCIETY*

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The Health Physics Society (HPS) believes that nuclear power in the United States is a safe, reliable, low-carbon energy source. The exposures to radiation and/or radioactive material associated with nuclear power generation—and indeed the entire nuclear fuel cycle—have been effectively managed to ensure the safety of workers, the public, and the environment.*

Nuclear power is safe

- The nuclear energy industry is one of the most heavily regulated commercial enterprises. The Nuclear Regulatory Commission (NRC) has principal responsibility for government oversight. The NRC's mission is to protect public health and safety by ensuring that plants comply with the terms of their licenses as well as all the technical and administrative requirements imposed by the agency.
- The NRC assigns at least two NRC resident inspectors to every US nuclear energy plant, where the inspectors conduct more than 2,000 hours of baseline inspections each year.
- The industry also conducts peer reviews of plant operation through the Institute of Nuclear Power Operations (INPO). An INPO team and industry peers conduct on-site, two-week inspections at each plant once every two years.
- Major studies all conclude that nuclear is an exceptionally safe way to produce electricity on an industrial scale. Nuclear has the lowest number of direct fatalities of any major energy source per kWh of energy produced—over 100 times less than hydro and liquefied natural gas (OECD 2010).

Nuclear power is reliable

- The United States has 98 operating nuclear power reactors in 30 states, operated by 30 different power companies (information as of the time of writing, February 2020).
- Since 2001, these plants have achieved an average capacity factor of over 90%.
- The average capacity factor has risen from 50% in the early 1970s to 70% in 1991, and it passed 90% in 2002, remaining at around this level since.
- In 2018 nuclear power average capacity factor was 92.5%, compared with wind 34.6% (USEIA 2020).

Nuclear power is a low-carbon source of energy

- Nuclear energy provides more than 55% of carbon-free electricity in the United States.
- Lifecycle CO₂ emissions associated with nuclear energy are among the lowest of all forms of electricity generation, like onshore wind (IPCC 2012).
- Electricity generated with nuclear energy avoids the emissions of more than 528 million metric tons of carbon dioxide every year. That is more than the emissions from 113 million passenger vehicles—all the passenger vehicles on the road in the United States.

Nuclear power meets the ICRP’s “Fundamental Principles of Radiological Protection”: i) justification principle, ii) keeping doses as low as reasonably achievable (optimization principle), and iii) ensuring no person receives an unacceptably high dose (the limitation principle)

- The data published by the NRC in NUREG-0713 “Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities” (NRC 2017) provides the following data related to the exposures at US nuclear power plants:
 - The average exposure for workers was 100 mrem (1 mSv)¹ for the 64,761 workers. This is significantly less than natural background radiation.
 - No significant exposures, no overexposures, and no individual record greater than 2 rem (20 mSv).
 - Minimal internal doses—indicating exceptional radioactive material controls.
 - Most of the data indicated that exposures were less than all other industries that use radiation and radioactive materials.
- Nuclear power plants release extremely small levels of radiation. The nuclear industry is responsible for less than 0.1% of the radiation exposure to Americans.

References

Intergovernmental Panel on Climate Change. Renewable energy sources and climate change mitigation. Annex II, Table A.II.4. New York, NY: Cambridge University Press; 2012.

Organization for Economic Cooperation and Development. Comparing nuclear accident risks with those from other energy sources. Paris, France: Nuclear Energy Agency; NEA No. 6861; 2010.

US Energy Information Administration. Electric power monthly with data for November 2019. Washington, DC: USEIA; 182; 2020.

US Nuclear Regulatory Commission. Occupational radiation exposure at commercial nuclear power reactors and other facilities: forty-eighth annual report. Rockville, MD: USNRC; NUREG-0713, vol. 37; 2017.

¹ Note that radiation dose units are given here in mrem and rem (called traditional units) because those are the units used by the Nuclear Regulatory Commission. However, the Health Physics Society has adopted the SI (International System) of units and these are given in parentheses.

*The Health Physics Society is a nonprofit scientific professional organization whose mission is excellence in the science and practice of radiation safety. Since its formation in 1956, the Society has represented the largest radiation safety society in the world, with a membership that includes scientists, safety professionals, physicists, engineers, attorneys, and other professionals from academia, industry, medical institutions, state and federal government, the national laboratories, the military, and other organizations. Society activities include encouraging research in radiation science, developing standards, and disseminating radiation safety information. Society members are involved in understanding, evaluating, and controlling the potential risks from radiation relative to the benefits. Official position statements are prepared and adopted in accordance with standard policies and procedures of the Society. The Society may be contacted at 950 Herndon Parkway, Suite 450, Herndon, VA 20170; phone: 703-790-1745; fax: 703-790-2672; email: HPS@BurkInc.com.