

A photograph of two large, grey, cylindrical cooling towers of a nuclear power plant. They are set against a backdrop of a green field with tall grasses in the foreground and a line of trees in the middle ground. The sky is a pale, hazy blue. The towers are emitting a small amount of white steam or smoke at the top.

# NUCLEAR ENERGY

The U.S. generates about 19 percent of its electricity from nuclear power. Following a 30-year period in which few new reactors were completed, it is expected that four new units—subsidized by federal loan guarantees, an eight-year production tax credit, and early cost recovery from ratepayers—may come on line in Georgia and South Carolina by 2020. In total, 16 license applications have been made since mid-2007 to build 24 new nuclear reactors. The “nuclear renaissance” forecast in the middle of the last decade has not materialized due to the high capital cost of new plants; the severe 2008-2009 recession followed by sluggish electricity demand growth; low natural gas prices and the prospect of abundant future supplies; the failure to pass climate legislation that would have penalized fossil sources in the energy marketplace; and the increasing availability of cheaper, cleaner renewable energy alternatives.

## I. SELECTED STATUTES

### ■ ATOMIC ENERGY ACT (AEA)

Originally enacted in 1954, and periodically amended, the AEA is the fundamental law governing both civilian and military uses of nuclear materials. On the civilian side, the Act requires that civilian uses of nuclear materials and facilities be licensed, and it empowers the Nuclear Regulatory Commission (NRC) to establish and enforce standards to govern these uses in order to protect health and safety and minimize danger to life or property. Additionally, the law requires hearings be held to address the concerns of parties affected by nuclear licensing. However, NRC hearing rules are substantially more restrictive and complex than necessary and are perceived by state and local governments and ordinary citizens to be barriers to participation and not protective of public safety.

### ■ PRICE-ANDERSON ACT

First passed in 1957, the Price-Anderson Nuclear Industries Indemnity Act provides for additional taxpayer-funded liability coverage for the nuclear industry above that available in the commercial marketplace to each individual reactor operator (this sum is \$375 million in 2011). Under the Act, operators of nuclear reactors jointly commit in the event of a severe accident to contribute to a pool of self-insurance funds (currently set at \$12.6 billion) to provide compensation to the public. If damages exceed the amount in the pool, liability for industry is capped and taxpayers bear the rest of the burden, without limit. Damages from the Fukushima accident, for example, are expected to total at least \$137 billion. The Act was last renewed in 2005 for a 20-year period, and has long been considered critical to the continued functioning of the nuclear power industry, which at its inception involved indeterminate

■ NRDC is not opposed in principle to nuclear power, and acknowledges its beneficial low-carbon attributes in a warming world but we take seriously the significant safety, global security, environmental, and economic risks that use of this technology imposes on society. This demands stringent regulation of the complete nuclear fuel cycle, beginning with the mining and milling of uranium and ending with the final disposal of radioactive wastes. Until these risks are properly mitigated, expanding nuclear power should not be a leading strategy for diversifying America’s energy portfolio and reducing carbon pollution. NRDC favors more practical, economical, and environmentally sustainable approaches to reducing both U.S. and global carbon emissions, focusing on the widest possible implementation of end-use energy-efficiency improvements, and on policies to accelerate the commercialization of clean, flexible, renewable energy technologies.



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risks for which adequate liability insurance could not be purchased in the commercial market. Today this is probably no longer true, but the cost of such massive private nuclear accident liability coverage would be substantial, particularly for older designs that continue to operate with outdated safety systems. The Act thus functions as yet another form of federal subsidy to the nuclear industry.

#### ■ **NUCLEAR WASTE POLICY ACT**

Under the AEA, the federal government, not the nuclear industry, assumes responsibility for the disposal of nuclear waste. Originally passed in 1982, the Waste Act creates a process for establishing a permanent, deep geologic repository for high-level waste and spent nuclear fuel. In 1987 Congress narrowed DOE's repository program to the investigation of one site, the proposed Yucca Mountain site in Nevada. Yucca has been a subject of controversy ever since. In his first term, President Obama elected not to pursue licensing of the site. Instead, the President appointed a bipartisan Blue Ribbon Commission to present findings and recommendations for a consensus path forward to revise the Act. In the meantime, spent nuclear fuel is being held in cooling pools, after which, at some reactor sites, it is transferred to heavy steel and cement "dry casks," and placed in the open on a concrete pad awaiting future shipment to an interim or permanent waste storage facility.

## II. MAJOR CONCERNS

- Electricity from newly-built US nuclear power plants is forecast to be costly: 11–18 cents/kWh at the point it enters the transmission grid. This may be compared to 2–3 cents/kWh for end-use efficiency improvements; 8–12 cents/kWh for wind (before subsidies); 11.5–15 cents/kWh for distributed solar power; 5.7–7.6 cents/kWh for combined cycle natural gas, and 2.6–4 cents/kWh for recovered heat co-generation.
- Nuclear waste disposal remains a hurdle with no licensed path to opening the first long-term geologic repository for safely isolating spent fuel, and major nuclear growth would require either additional expensive and hard-to-establish geologic repositories, or even more expensive and hazardous spent-fuel reprocessing.
- Acute nuclear weapons proliferation concerns arise if plutonium fuel cycles are used, or if uranium enrichment capability spreads under weak international safeguards to additional countries (e.g. Iran) that are not already nuclear weapon states.
- All stages of the nuclear fuel cycle involve potentially harmful, or in some cases disastrous environmental impacts (e.g., Chernobyl, Fukushima). This requires vigorous regulation and significant financial penalties for poor environmental and safety performance to ensure compliance. The NRC is pursuing regulatory initiatives to strengthen reactor safety after the Fukushima accident but implementation has been slow. Current regulation of uranium mining and milling does not provide adequate protections against radioactive and heavy metals contamination nor ensure containment and clean-up of prior contamination.

- The large freshwater water withdrawals required for cooling and massive discharge of heated water damages the already overburdened lakes, rivers, and marine estuaries nuclear plants depend on.
- Climate change in the direction of hotter, drier summers and prolonged droughts spells trouble for reactors that rely primarily on cheaper once-through condensers or evaporative water-cooling.
- Nuclear power offers little prospect of increasing "energy independence." The bulk of world uranium resources are located outside the United States, and the market for nuclear fuel cycle services is global. While domestically mined and milled uranium would not necessarily find its way into US reactors, the harmful environmental impacts of these activities would be felt here.

## III. UPCOMING ISSUES

#### ■ **NUCLEAR WASTE**

The Secretary of Energy's Blue Ribbon Commission (BRC) issued its report last year and called for a phased, negotiated federal-state process predicated on achieving informed local consent to the siting, construction and operation of interim and then permanent storage facilities, based on scientifically valid and enforceable environment, safety and health standards. Congress must write new legislation to address nuclear waste disposal. In the last Congress, S.3469, *The Nuclear Waste Administration Act of 2012*, introduced by Senator Bingaman, takes both the BRC's recommendations as well as sound scientific findings into account as it attempts to address the need for a permanent geologic repository. Among other objectives, the bill establishes an independent agency, the Nuclear Waste Administration, to provide for the permanent disposal of nuclear waste, prescribes guidelines for nuclear waste facilities and candidate repository sites, directs the EPA to adopt generally applicable standards to protect the environment from offsite releases from radioactive material in geological repositories and directs the NRC to amend its regulations governing the licensing of geological repositories to make them consistent with comparable EPA standards.

#### ■ **NUCLEAR SAFETY**

The continuing safety of the aging and technologically obsolescent nuclear fleet, which is now beginning to exceed its originally licensed term of 40 years via 20-year "license extensions," is of the utmost concern, particularly as these aging nuclear units, in need of modernization, seek to remain economically competitive with natural gas, wind, and other low-carbon energy resources, setting up a potentially dangerous tension between public safety and continuing commercial viability. A top responsibility for Congress is ensuring that the NRC adequately fulfills its statutory mandate to protect the public from the risks of a severe nuclear accident, which mandate includes allowing state and local governments and affected citizens to pursue their safety concerns in adjudicatory public hearings as mandated by the Atomic Energy Act.