

The US has constructed over 50 different commercial reactor designs, which may have diluted the potential learning benefits of repeat building. Although the fleet is all LWRs (and “only” boiling water reactors and pressurized water reactors), reactor designers and customers pursued multiple designs in parallel and created bespoke customizations within designs. For example, the BWR-4 series of reactors had designs that ranged from ~600 MW to over 1300 MW. The lack of standardization extends beyond variations in the nuclear steam supply system (NSSS) vendor, model, and power. The balance of plant, crucial safety systems, structural architecture, and civil engineering design, which account for a large portion of construction costs, were handled by multiple architecture and engineering companies. This resulted in substantial variations in overall plant design and cost, even among plants using the same NSSS design and reactor power, reducing the impact of sequential learning. Standardization of reactor designs is key for decreasing lead times and costs; innovation can, perhaps counterintuitively, lead to higher capital costs and longer lead times.⁸⁹

Figure 21: The US has constructed over 50 different commercial reactor designs⁹⁰

US commercial nuclear reactors by design

Columns show design families, colors show >50 MW differences, box area sized by number of reactors

