

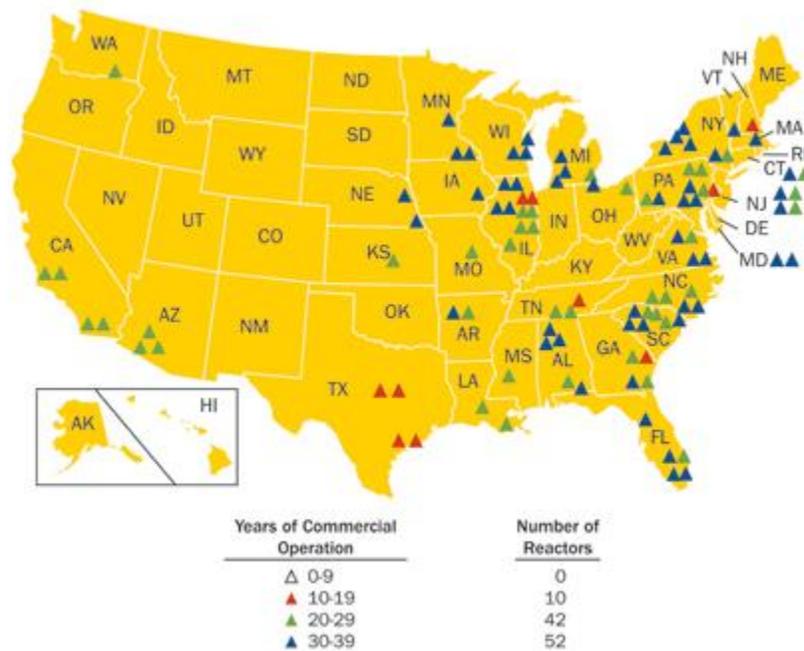
# NUCLEAR POWER PLANTS AND SIGNIFICANCE OF PRESSURIZED WATER REACTORS

## Nuclear Power Plants

### United States

The United States currently has 104 nuclear power plants. Of those, only 69 are pressurized water reactors and the remaining are boiling water reactors (BWR). Combined, they produce 19.3% of its power from nuclear power. These power plants also have a high level of performance. There are extension of reactor lifetimes from 40 to 60 years taking place with is enhancing the economic competitiveness of plants. In the United States, the industry envisages substantial new nuclear capacity by 2020 and several regulatory initiatives are preparing the way for new orders.

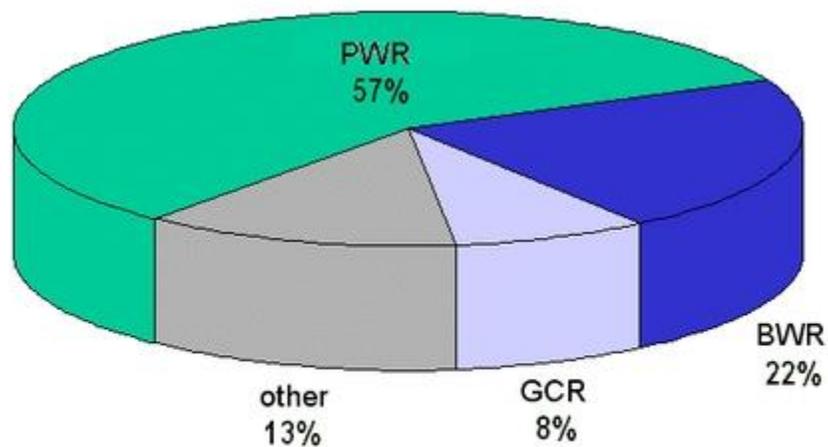
**U.S. Commercial Nuclear Power Reactors—Years of Operation**



Source: U.S. Nuclear Regulatory Commission

## Worldwide

There are currently 439 nuclear power plants. Of those, 57% are pressurized water reactors, 22% are boiling water reactors, 8% are gas cooled reactors, and 13% are other reactors. 15% of the world energy production is nuclear. 30 countries are occupying the 439 nuclear power plants. As of August 2008 there are 39 power plants under construction. The International Atomic Energy Agency has significantly increased its projection of world nuclear generating capacity. It now anticipates at least 60 new plants in the next 15 years, making 450 to 690 GWe in place in 2030 - very much more than projected in 2000 and 21% to 85% more than actually operating in 2008. The change is based on specific plans and actions in a number of countries, including China, India, Russia, Finland and France, coupled with the changed outlook due to the Kyoto Protocol. This would give nuclear power a 17% share in electricity production in 2020. The fastest growth is in Asia.



# Significance of PWRs

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## Past

Pressurized water reactors have been around for over 50 years. The first nuclear power plant that was built in the United States was the Shippingport Atomic Power Station. It was designed as a PWR. It went critical on December 2, 1957. The Shippingport Power Station was operated for Duquesne Light for 25 years. PWRs were a generation II design that evolved into a generation III design that include better safe guards and new design technology. Many of the generation II and generation III designs, which are still in operation today, have paved the way for future designs.

## Present Day

With nearly 1/6 of the world power and 1/5 of the United States power coming from nuclear power, the current infrastructure for electrical power depends on nuclear power for much of its power supply. Over 1/2 of all nuclear power is created from nuclear reactors that are designed as PWRs. These designs have a strong hold on the present nuclear power industry and look to grow in numbers in the near future. Many of the nuclear power plants that are currently being constructed by Westinghouse and Areva are PWR designs. These designs are hopefully going to be implemented in many places in the future.

## Future

Currently, Westinghouse is working on a generation III+ design, the AP 1000. Its design, based on the prior AP 600, will use new, up to date technology, and also use a completely new interface in the control room. This generation III+ design has great importance as we wait to welcome the generation IV design. There is no set time table for the introduction of the generation IV design and no guarantee that this design will be safe or economical, but it is hoped to be the future of the industry. Until the generation IV design makes more

significant progress, the nuclear industry will work at making strides to improve on prior designs and create a generation III+ model.

Nuclear power as a whole, and specifically PWRs, have a very bright future in both the United States and world wide. While the United States has yet to begin reprocessing nuclear fuel, other countries have accepted this idea and use reprocessed fuel in PWRs. Recycling nuclear fuel is a positive. Less fuel needs to be mined when you reprocess the fuel that has already been mined. It also is a very good way to control nuclear waste. With less waste, less space is needed to store used, radioactive material. Nuclear power and PWRs have great sustainability as nuclear fuel will ultimately become a renewable resource once reprocessing can be refined.

Source : <http://me1065.wikidot.com/pressurized-water-reactors>