



The **Calvert Cliffs Nuclear Power Plant** (CCNPP) is a nuclear power plant located on the western shores of the Chesapeake Bay in Lusby, Calvert County, Maryland.

The plant is one of the largest employers in Calvert County, Maryland. The company pays a significant amount in taxes and fees to Calvert County to the extent that the local government rarely suffers budget issues -- especially in contrast to surrounding counties.

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## Ownership

The plant is owned by Constellation Energy Group, Inc. (NYSE: CEG).

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## Overview

The plant has two 2700 megawatt thermal (MWth) Combustion Engineering Generation II, two loop pressurized water reactors. Each generating plant (CCNPP 1&2) produces approximately 850 megawatt electrical (MWe) net or 900 MWe gross. Each plant's electrical load consume approximately 50 MWe. These are saturated steam plants (non-superheated) and are approximately 33% efficient (ratio of 900 MWe gross/2700 MWth core). Only the exhaust of the single High Pressure Main Turbine is slightly superheated by a two stage reheater before delivering the superheated steam in parallel to the three Low Pressure Turbines. Unit 1 uses a General Electric designed main turbine and generator. Unit 2 uses a Westinghouse designed main turbine and generator. Almost two thirds of the heat produced by the reactor is returned to the bay which is its heat-sink for cooling.

In 2000, the Nuclear Regulatory Commission extended the license of the plant for 20 additional years, making Calvert Cliffs the first nuclear plant in the United States to receive such an extension. President George W. Bush visited the plant in June 2005, the first time a president had visited a nuclear power plant in nearly three decades.

## Proposed Expansion - Unit 3

Constellation Energy Group, Inc. (NYSE: CEG), owner of Calvert Cliffs, announced it would like to build a new advanced US-Evolutionary Power Reactor (US-EPR) at this site using the services of UniStar Nuclear Energy. UniStar Nuclear Energy, a Delaware limited liability company, is jointly owned by Constellation Energy (CEG) and Electricite de France (EdF), the builder and supplier of nuclear power plants in Europe. This proposed single nuclear unit will produce approximately twice the energy of each individual existing plant.

An environmental report, the first principle component of a Combined Construction and Operating License application to build the UniStar EPR, was submitted to the US Nuclear Regulatory Commission (NRC) by UniStar on 13 July 2007. The other main component would be a safety analysis.<sup>[1]</sup>

On July 31, 2007 Constellation Energy filed an application to the NRC to review its plans to build a new nuclear power plant, Calvert Cliffs Nuclear Power Plant 3 (CCNPP 3) based on the AREVA U.S. Evolutionary Power Reactor<sup>[2]</sup> (US-EPR), Generation III+<sup>[3]</sup>, four loop pressurized water reactor. This is the first application made in the US in almost 30 years. The CCNPP 3 reactor will be rated at 4590 MW thermal/1710 MW electrical gross. Plant loads will be approximately 110 Mwe, thus the net generation is 1600 MWe net. Plant thermal efficiency will be approximately 36% (ratio of 1710 MWe to 4590 MWth).

The plant will be located south of the existing CCNPP 1&2 and will be set back from the shoreline. Although only a single unit, its power plant footprint will be almost 2 times the size of the twin units CCNPP 1&2. It will have a closed-loop cooling system using a single hybrid mechanical draft cooling tower. It will incorporate plume abatement (no visible water vapor plume). Units 1&2 use an open-cycle heat dissipation system (no cooling towers). Two thirds of the heat produced by the Unit 3 reactor will be released to the atmosphere via the cooling tower. This also is a saturated steam plant with a Main Steam Turbine (one high pressure turbine in tandem with three low pressure turbines) and a Main Generator design similar to Unit 1 & 2. ALSTOM will supply the Main Steam Turbine and Main Generator.

Units 1 and 2 and their support facilities use a well water system for their potable water supply. It consists of five wells that pump water from the second highest aquifer, the Aquia Aquifer, at the minus 400-500 foot below sea level elevation. The State of Maryland limits daily usage for these five wells to 450,000 gallons per day (gpd). Actual daily usage averages 225,000 gpd.

Unique to Unit 3 will be a desalination plant to produce potable water using reverse osmosis. The desalination plant will produce up to 1,250,000 gallon of potable water per day for Unit 3 and supporting facilities with total dissolved solids (TDS) less than 400 parts per million (ppm). The source for the desalination plant will be the brackish bay water from the makeup supply to the circulating water system. The TDS for the brackish bay water runs 10,000-15,000 ppm. The potable water will be distributed as makeup water for the demineralized water system, miscellaneous potable water services, fire protection and source water for the four ultimate heatsink cooling towers used during normal shutdown and power operation.

On November 13, 2007, Unistar Nuclear Energy and UniStar Nuclear Operations, which is a wholly-owned subsidiary of UniStar Nuclear Operations, filed an application for a certificate of public convenience and necessity with the Maryland Public Service Commission for authority to construct CCNPP 3. This application, which is being considered in Case Number 9127, includes a schedule showing plant construction being completed in July 2015 and commercial operation in December 2015.

On January 29, 2008, Constellation Energy announced that its partial construction and operating license (COL) for the proposed Unit 3 has been docketed by the U.S. Nuclear Regulatory Commission (NRC). This means that the NRC has determined the application is technically correct and ready for detailed review. Constellation announced it may begin ground breaking prior to the applications final approval by the NRC provided a federal loan guarantee by the U.S. Department of Energy (DOE) is assured. A final decision by Constellation to start construction will not take place for 12-18 months or mid-2009.

## Public Safety and Security

After the attacks on Sept. 11, 2001, the visitor's center was closed to the public. Since that time, VIP visits to the facility typically restrict the media from attending, such as during a visit by Sen. Benjamin L. Cardin on Dec. 3, 2007.[4]

Evacuation sirens are located in Calvert and St. Mary's counties. One key evacuation route is down MD Route 4 and across the two-lane Governor Thomas Johnson Bridge into St. Mary's County. Some skeptics doubt the critical evacuation area can be cleared in the time specified by the operator and local governments.

- Evacuation information by St. Mary's County government
- Evacuation information by St. Mary's County Dept. of Public Safety

## Proposed Sale to Berkshire Hathaway

On Sept. 18, 2008, MidAmerican Energy Holdings Company and Constellation Energy announced they reached a tentative agreement in which MidAmerican would purchase all of the outstanding shares of Constellation Energy for a cash consideration of approximately \$4.7 billion, or \$26.50 per share. The companies expected to enter into a definitive merger agreement by close of business, Sept. 19. Upon signing a definitive merger agreement, Constellation Energy would issue \$1 billion of preferred equity yielding 8 percent to MidAmerican. [5]

MidAmerican is a component of Berkshire Hathaway, a holding company founded and managed by the infamous Warren Buffet.

On Wednesday, Dec. 3, 2008, Electricite de France SA -- France's state-owned power company -- bid \$4.5 billion for just a portion of Constellation's business -- the nuclear plants.[6] This bid is only \$200 million less than MidAmerican's bid for the *entire* company.

## Miscellaneous information

- Unit 1 went into commercial service in 1975 and Unit 2 in 1977. The total cost of the two units was approximately 766 million USD.
- The estimated cost of the new proposed unit will be around 4 billion USD. It is estimated that it will take 8 years to place the unit into service.[7]

- Unit 1 had its two steam generators replaced in 2002.
- Unit 2 had its two steam generators replaced in 2003.
- Unit 1 had its reactor vessel closure head replaced in 2006.
- Unit 2 had its reactor vessel closure head replaced in 2007.

## Fishing around the power plant

The water around the plant is a very popular place for anglers. Unit 1&2 each takes in bay water (from the fenced-in area) to cool its steam driven turbine condensers plus other bay water cooled primary and secondary system heat exchangers. The bay water is pumped out at a nominal flow rate of 1.2 million gallons per minute (75,000 L/s) per unit (Unit 1 and 2) for each steam turbine condenser. The water is returned to the bay being no more than 12 °F (6.7 °C) warmer than the bay water. Unlike many other nuclear power plants, Calvert Cliffs did not have to utilize water cooling towers to return the hot water to its original temperature, structures which are often associated with nuclear power plants. The warmer water encourages faster growth (relative to the surrounding area) of the small shellfish, plankton, and others at the base of the food chain. These attract the larger fish which are in turn sought after by the anglers. However, as the water comes out very quickly and creates a sort of artificial rip current, it can be a dangerous place to fish.

CCNPP 3 will only need about 10% of the bay cooling water volume needed for Unit 1 and 2 combined. The increase in fish and shellfish impingement and entrainment will be less than 3.5% over Unit 1 and 2 existing conditions.

## Notes

1. ? "[NRC: First part of first COL application in](#)". World Nuclear News (2007-07-26). Retrieved on 2008-01-06.
2. ? "[EPR: the first generation III+ reactor currently under construction](#)". AREVA NP (2008-01-04). Retrieved on 2008-01-09.
3. ? "[EPR: Generation III+ Performance Fact Sheet](#)". AREVA NP (2008-01-04). Retrieved on 2008-01-09.
4. ? <http://somd.com/news/headlines/2007/6847.shtml>
5. ? <http://ir.constellation.com/releasedetail.cfm?ReleaseID=335425>
6. ? <http://finance.yahoo.com/news/French-power-company-in-hunt-apf-13740742.html>
7. ? Pelton, Tom (2007-12-25). "[Nuclear power has new shape](#)". The Baltimore Sun. Retrieved on 2008-01-06.

## References

- "Case Number: 9127 IN THE MATTER OF THE APPLICATION OF UNISTAR NUCLEAR ENERGY, LLC AND UNISTAR NUCLEAR OPERATING SERVICES, LLC FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY TO CONSTRUCT A NUCLEAR POWER PLANT AT CALVERT CLIFFS IN CALVERT COUNTY, MARYLAND". Maryland Public Service Commission (2007-11-13). Retrieved on 2008-01-06.

## External links

- [Official website](#)
- [UniStar Nuclear website](#)
- [DoE page on Calvert Cliffs](#)
- [U.S. EPR Description \(PDF\)](#)