

# Turkey Point 3 & 4 Cooling Tower Retrofit Is Feasible and Cost-Effective<sup>1</sup>

## ***Turkey Point cooling canals have been retrofit***

Turkey Point Nuclear Units 3 and 4 began operation in 1972 and 1973.

Natural gas-fired combined cycle Turkey Point Unit 5 began operation in 2007. Unit 5 was built with a cooling tower. Oil- and gas-fired Units 1 and 2 are retired.

Initially, cooling water for Units 1 and 2 was drawn from Biscayne Bay at an intake point just north of Turkey Point and was discharged back into the Bay via a series of short canals just south of Turkey Point.

The heated discharge resulted in fish kills, reduced benthic seagrass communities, and loss of coral colonies in the vicinity of the discharge.

In 1971 a federal judge issued an order prohibiting FPL from discharging heated water into Biscayne Bay, Card Sound or any other navigable water, due to the biological damage caused by the thermal pollution from the discharge.

Closed-loop cooling water canals were constructed at Turkey Point, in response to the order, to handle all the cooling water needs and process wastewater.

The cooling canal system (CCS) consists of 32 shallow cooling canals, each about 5.2 miles long, through which cooling water flows before returning to the intake system. The CCS provides about 10 square miles of water surface area.

The polluting of Biscayne Bay, threats to the Everglades, and aquifer damage are several reasons that cooling towers are being proposed to replace the CCS.



<sup>1</sup> For more information, see: *Closed Cycle Cooling Tower Feasibility Assessment for Turkey Point Nuclear Units 3 and 4*, July 2016, Powers Engineering. Available at: [http://www.cleanenergy.org/wp-content/uploads/PowersReport\\_on\\_CoolingTowerFeasibility\\_Assessment\\_TurkeyPoint-Nuclear2016.pdf](http://www.cleanenergy.org/wp-content/uploads/PowersReport_on_CoolingTowerFeasibility_Assessment_TurkeyPoint-Nuclear2016.pdf)

## **Palisades Nuclear Plant was retrofitted to cooling towers about the same time**

Another nuclear plant, the 800 MW Palisades Nuclear plant in Michigan, began operation in early 1972 utilizing a once-through cooling system drawing water from Lake Michigan. Subsequently the cooling system was converted to closed-cycle cooling. The retrofit cooling towers became operational in May 1974.<sup>2</sup>

Palisades Nuclear agreed to convert to wet cooling towers, and to make modifications to the radwaste system, as the result of a settlement agreement.<sup>3</sup> The cost of the cooling tower retrofit was \$18.8 million in 1973.<sup>4</sup> Had FPL opted to construct cooling towers for Units 3 & 4 in the early 1970s as Palisades did, there would be no controversy now over environmental damage caused by the CCS and the costs to FPL customers.

## **FPL included cooling towers in design of proposed nuclear Units 6 & 7**

FPL included round mechanical draft wet cooling towers in the design of proposed nuclear Units 6 and 7 at Turkey Point.

## **Retrofit cooling towers for Units 3 & 4 are technically feasible & cost-reasonable**

The approximate capital cost of wet cooling towers, including both Unit 3 & 4, would be in the range of \$220 to \$310 million.

The source of makeup water for the Units 3 & 4 cooling towers would be reclaimed water from the Miami-Dade Water and Sewer Department.

An onsite reclaimed water storage pond would assure cooling tower make-up water supply reliability in the event of temporary reclaimed water supply interruptions.

A zero liquid discharge system would be utilized to treat blowdown from the Units 3 & 4 cooling towers to eliminate wastewater discharges to the environment.

All cooling tower construction activities can proceed with Units 3 & 4 online, with the exception of the final sealing of the CCS canal entrances to isolate circulating water flow. The isolation of CCS canal entrances can be coordinated with a refueling outage, or other periodic planned extended outage, to avoid any forced outage time. Based on other retrofit projects, a 4-year cooling tower timeline from start-to-finish (including permitting) is achievable.

The retrofit cooling towers will remove heat in the circulating cooling water associated with power generation. Some additional heat, in range of 1 to 2 percent of the total, must be removed from cooling water serving onsite safety-related equipment.<sup>5</sup> This is known as the Ultimate Heat Sink (UHS) cooling system.

Either the existing UHS cooling system for Turkey Point Units 3 & 4 can continue to be utilized without modification, or small cooling towers, for instance, can be added for this purpose, as is the practice at some other southeastern nuclear plants, such as the Waterford nuclear plant in Louisiana.

Units 3 & 4 provide about 10 percent of the electricity delivered by FPL. The cost of retail electricity delivered by FPL to customers would increase about 1 percent with the addition of retrofit cooling towers on Units 3 & 4.

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<sup>2</sup> 2002, EPA 316(b) Technical Development Document, p. 4-3.

<sup>3</sup> Ibid.

<sup>4</sup> Ibid, p. 4-5.

<sup>5</sup> International Atomic Energy Agency, *Efficient Water Management in Water Cooled Reactors*, 2012, Figure 5, p. 8.