



# WPI

# Pilgrim Nuclear Power and Cape Cod Bay

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## Abstract

Pilgrim Nuclear Power station in Plymouth, MA, is the target of much debate, mostly about how dangerous it is for the people of Cape Cod due to some catastrophic event or radioactive leakage. The chance of either happening is incredibly small, but even still the people of Cape Cod voted to close the plant. The real problem is with the local marine wildlife, which pilgrim, like any other power plant, proves to be a constant threat.

## Objectives

- Lower the water use of the plant.
- Decrease the effect of the plant on the local marine ecosystem.
- Gauge public knowledge of nuclear power.
- Educate the public of the pros/cons of the plant, not only on the water, but the air as well.



(benuski, Nuclear Cooling Tower at the William H. Zimmer Power Station)

## Methods/Process

We examined numerous methods of reducing thermal pollution, impingement, and entrainment from the Cape Cod Bay including a closed cycle cooling tower, a wider intake area, and simply shutting the plant down. The only process which made a significant impact on the local Cape Cod ecosystem was the closed cycle cooling tower.

## Background

Nuclear power is a clean alternative to fossil fuel, for the air. For water, nuclear power has the same failings as most fossil fuel plants, such as impingement, entrainment, and thermal pollution. This is because the only real difference between the types of power is how the energy to turn the turbine is created.

A closed-cycle cooling system takes the water that Pilgrim absorbs from the Cape Cod Bay and instead of discharging it back into the source, recycles it through a reactor. The heat in the water that causes thermal pollution is removed and is released into the atmosphere. These closed-cycle towers are designed with materials to "increase the surface area to volume ratio of the water, which in turn maximizes the heat transfer potential" (Closed-Cycle Cooling Systems 2007).



(German, 2013)



(German, 2013)

## Conclusions/Recommendations

- Nuclear power is a clear thermal polluter of the Cape Cod Bay.
- Best possible solution is to install a closed cycle cooling tower.
- Other recommendations include public education on nuclear power, widening the intake area, or at the least polling the local population to gauge awareness on nuclear power.

## Outcomes

- Final solution plan is to build a closed cycle cooling tower.
- This plan would cost .83 billion dollars, but would reduce the amount of water used by the plant by 95-98%.
- Plan has some difficulty in completion due to the fact that the towers have a negative public image.



- Not a threat to the local environment.
- Fish like thermal pollution.
- Travelling screens decrease impingement.
- Does not endanger fish.

- Is a threat to the local environment.
- Changing migration pattern of the right whale.
- Makes no mention of the traveling screen.
- Endangers the fishing industry.

## Acknowledgments

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