CLAIMS

What is claimed is:

1. A cooling method comprising:

sensing a first temperature at a first location in a fluid circuit;

determining whether the first temperature is greater than a first predetermined temperature;

if the first temperature is not greater than the first predetermined temperature, cooling the fluid using ambient air;

if the first temperature is greater than the first predetermined temperature, cooling the fluid using the ambient air and a refrigeration circuit;

sensing a dry bulb temperature of the ambient air;

sensing a second temperature at a second location in the fluid circuit;

determining whether the sensed dry bulb temperature is greater than the sensed second temperature;

if the sensed dry bulb temperature is greater than the sensed second temperature, cooling fluid flowing through the fluid circuit using the refrigeration circuit;

determining whether fan power is greater than a predetermined power;

if the fan power is not greater than the predetermined power, cooling the fluid flowing through the fluid circuit using the ambient air; and

if the fan power is greater than the first predetermined temperature, cooling the fluid using the ambient air and the refrigeration circuit.

2. A cooling method comprising:

sensing a first temperature at a first location in a fluid circuit;

determining whether the first temperature is greater than a first predetermined temperature;

if the first temperature is not greater than the first predetermined temperature, cooling the fluid using ambient air;

if the first temperature is greater than the first predetermined temperature, cooling the fluid using the ambient air and a refrigeration circuit;

sensing a dry bulb temperature of the ambient air;

sensing a second temperature at a second location in the fluid circuit;

determining whether the sensed dry bulb temperature is greater than the sensed second temperature;

if the sensed dry bulb temperature is greater than the sensed second temperature, cooling fluid flowing through the fluid circuit using the refrigeration circuit;

sensing a wet bulb temperature of the ambient air;

determining whether the sensed wet bulb temperature is less than a predetermined wet bulb temperature;

if the sensed wet bulb temperature is less than a predetermined wet bulb temperature, cooling the fluid flowing through the fluid circuit using the ambient air; and

if the sensed wet bulb temperature is not less than a predetermined wet bulb temperature, cooling the fluid using the ambient air and the refrigeration circuit.

3. The cooling method of claim 1, further comprising:

sensing the dry bulb temperature of the ambient air;

sensing the second temperature at the second location in the fluid circuit;

determining whether the sensed dry bulb temperature is less than the sensed second temperature minus a predetermined number of degrees;

if the sensed dry bulb temperature is not less than the sensed second temperature, cooling the fluid flowing through the fluid circuit using the refrigeration circuit; and

if the sensed dry bulb temperature is less than the sensed second temperature, cooling the fluid flowing through the fluid circuit using the ambient air and the refrigeration circuit.

4. A cooling method comprising:

sensing a dry bulb temperature and a wet bulb temperature of ambient air;

operating a fluid cooler and a chiller according to one of the following modes based on the sensed dry bulb temperature and sensed wet bulb temperature of the ambient air:

a free cooling dry operational mode in which a fluid circuit of the fluid cooler is cooled by ambient air, if the sensed wet bulb temperature is less than a predetermined wet bulb temperature;

a free cooling wet operational mode in which the fluid circuit of the fluid cooler is cooled by ambient air that has been cooled by wet media, if the sensed wet bulb temperature is less than a predetermined wet bulb temperature and the sensed dry bulb temperature is greater than a predetermined dry bulb temperature;

a partial free cooling dry operational mode in which the fluid circuit is cooled by ambient air and by a refrigerant circuit, if a fluid circuit temperature is greater than a fluid circuit temperature setpoint;

a partial free cooling wet operational mode in which the fluid circuit is cooled by a refrigerant circuit and by ambient air that has been cooled by wet media, if a fluid circuit temperature is greater than a fluid circuit temperature setpoint and the sensed dry bulb temperature is greater than the predetermined dry bulb temperature;

a mechanical cooling dry operational mode in which the fluid circuit is cooled by the refrigerant circuit, if the sensed dry bulb temperature is greater than a fluid circuit temperature; and

a mechanical cooling wet operational mode in which the fluid circuit is cooled by the refrigerant circuit and a heat exchanger of the refrigerant circuit is in thermal communication with ambient air that has been cooled by wet media, if the sensed dry bulb temperature is greater than the fluid circuit temperature and the sensed dry bulb temperature is greater than the predetermined dry bulb temperature.