



# Williams Applied Products

What if you could offer a truly unique and proven system - designed to provide a superior HVAC solution - to a significant and highly interested market segment.

Would you be interested?





# Williams Applied Products

What if the concept not only offered reduced capital costs and impressive energy efficiency, but came with a 10-year track record of success.

Would you aggressively pursue it?





# Williams Applied Products

Introducing...

**The IPS - Integrated Piping System**

The *“affordable green”*

hydronic heating and cooling solution!

 **WILLIAMS**

# Integrated Piping System

What do these types of buildings have in common?

- They all have bathrooms, kitchens and/or utility rooms.
- They all have 3 pipes and drains already installed.



Hotel/Motel



Assisted Living



Dormitories



Apartments

# Integrated Piping System

*What if...we could take advantage of the existing piping infrastructure and domestic hot/cold water *already* in the building to satisfy the heating and cooling requirement.*

*With IPS...we can!  
Safely and effectively.*



Hotel/Motel



Assisted Living

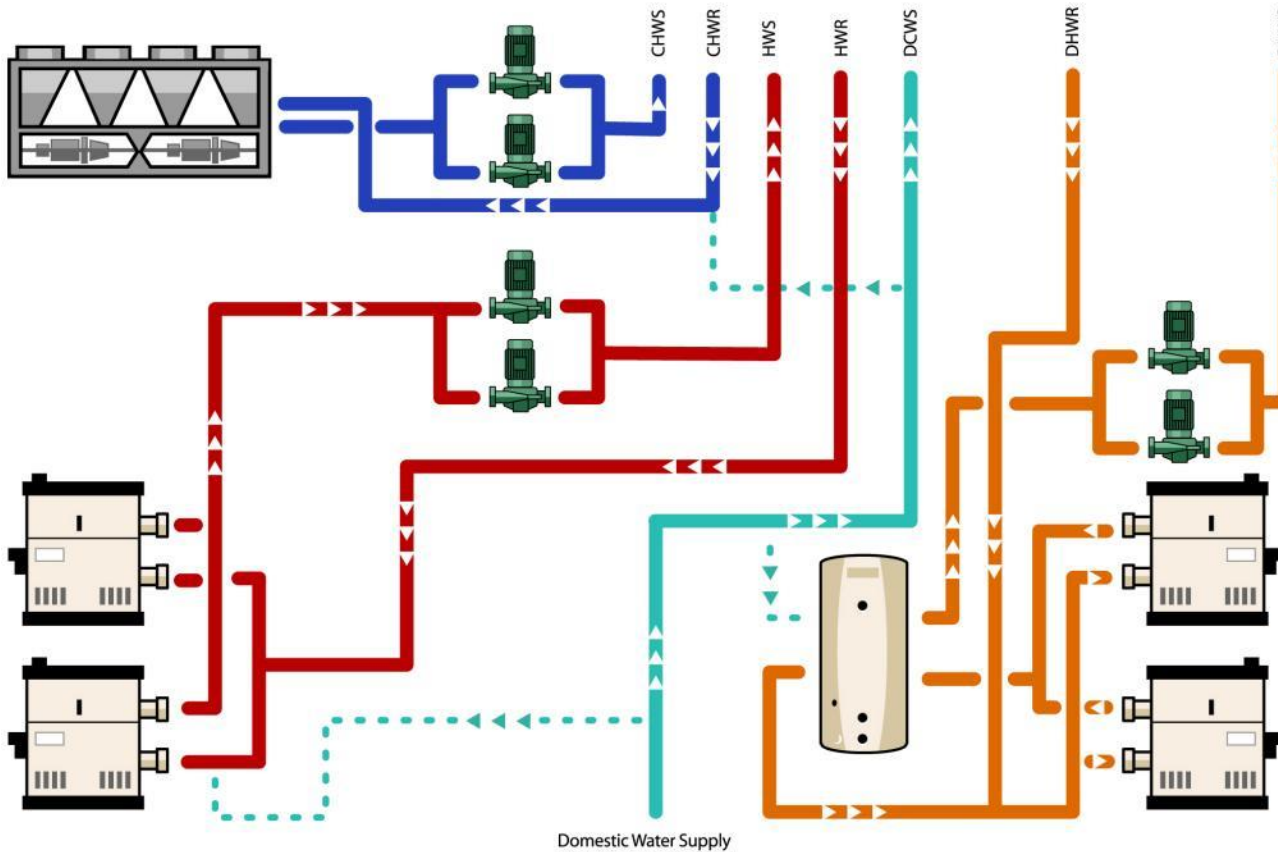


Dormitories



Apartments

# IPS - System Comparison 4-Pipe Hydronic



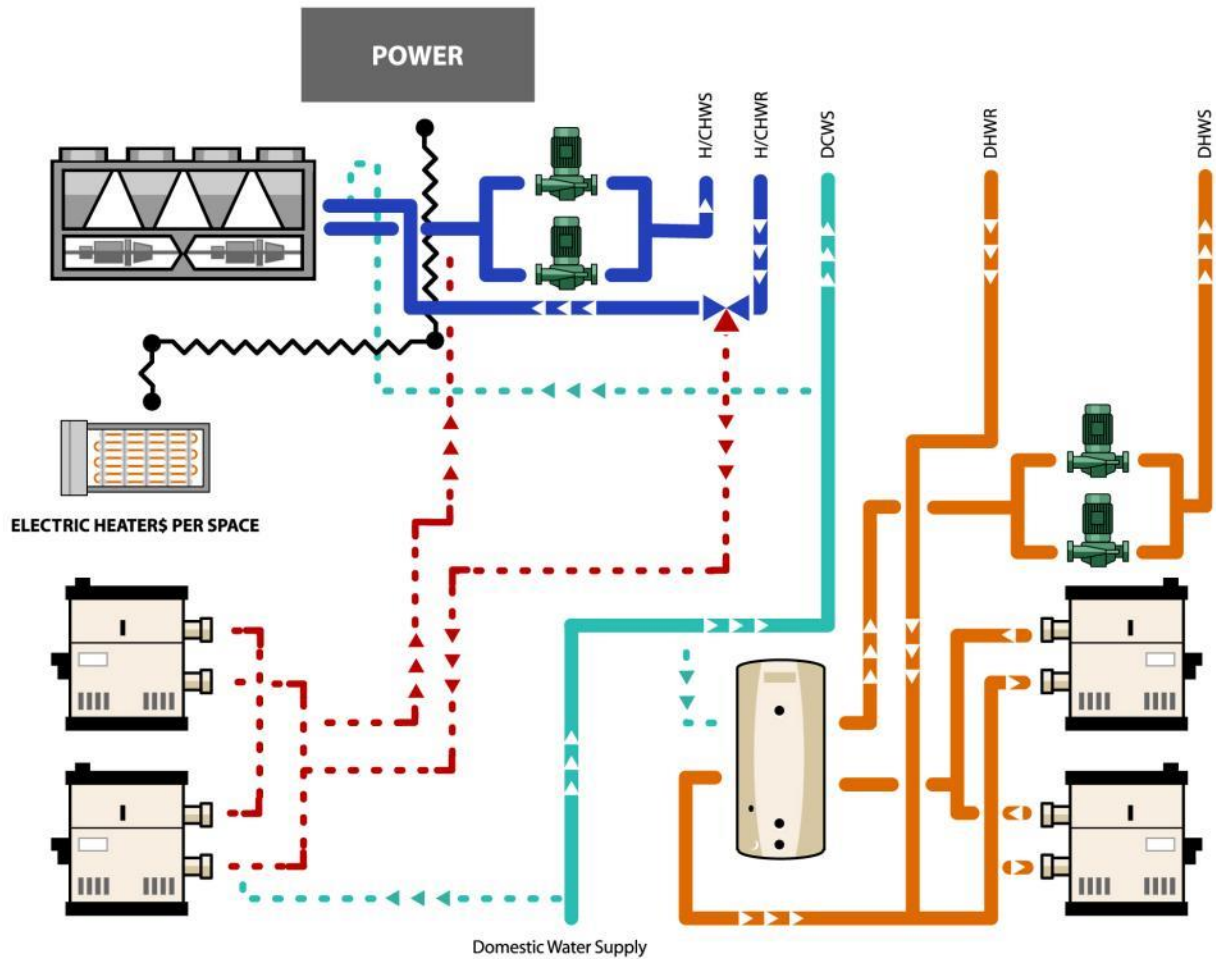
## Advantages:

- Superior Comfort
- Superior Efficiency

## Disadvantages:

- Higher Installed Costs

# IPS - System Comparison 2-Pipe Hydronic



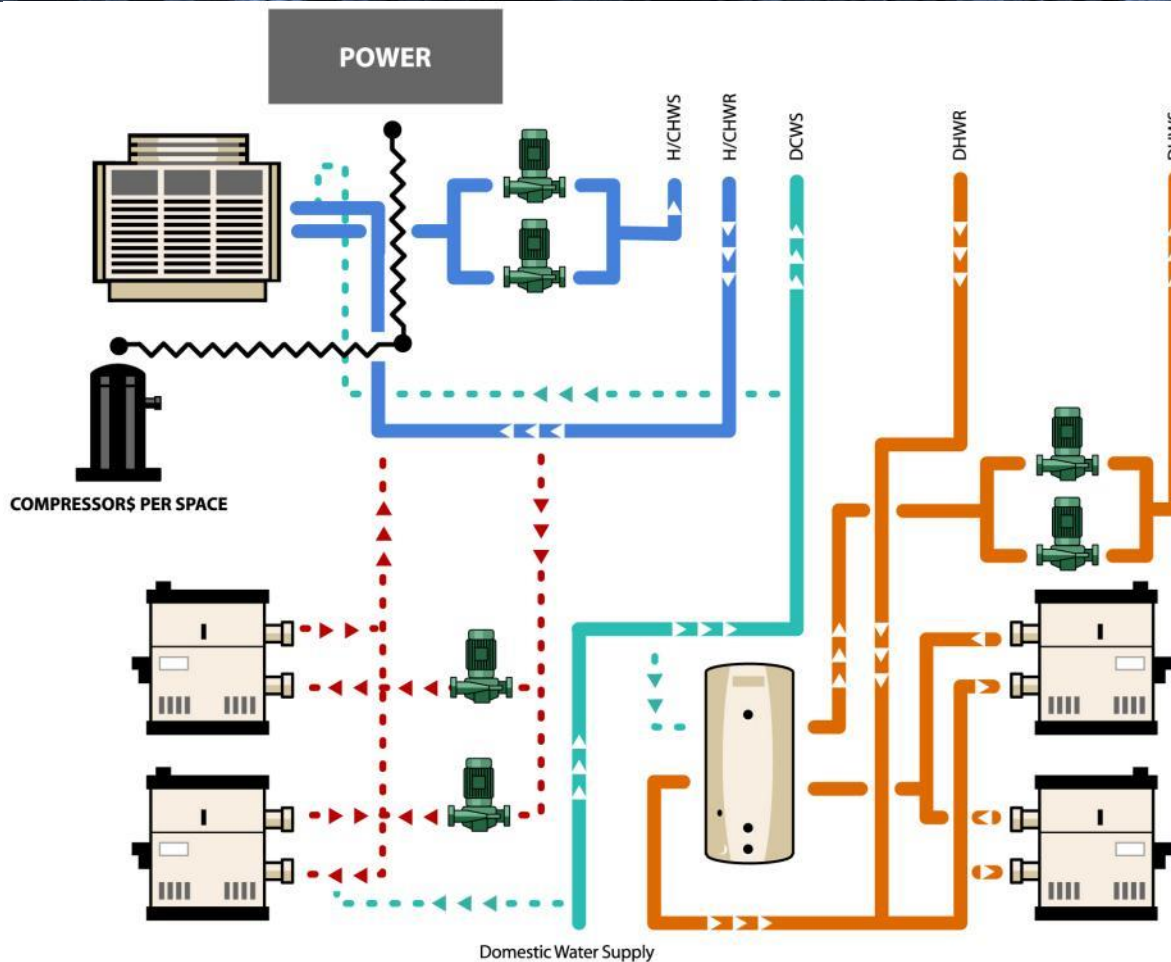
## Advantages:

- Reduced Installed Costs.
- Central Chiller Efficiency

## Disadvantages:

- Electric Heat
- Managing the Changeover
- Potential Loss of Comfort Control

# IPS - System Comparison Water Source Heat Pump



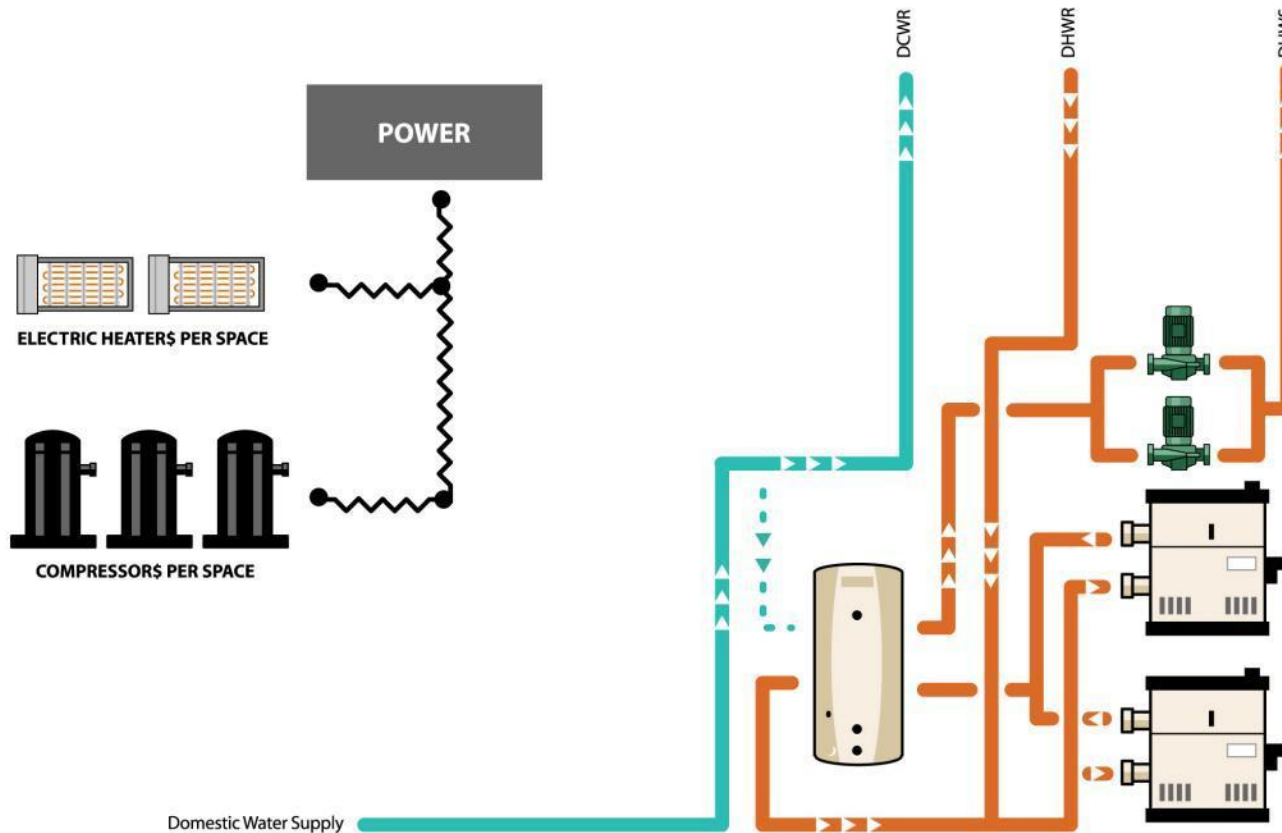
## Advantages:

- Provides Heating and Cooling
- Reduced Installed Costs
- No Chiller

## Disadvantages:

- Compressor in Every Space
- Compressor Heating is Electric Heat
- Potentially No Heat to Transfer

# IPS - System Comparison Packaged Terminal AC



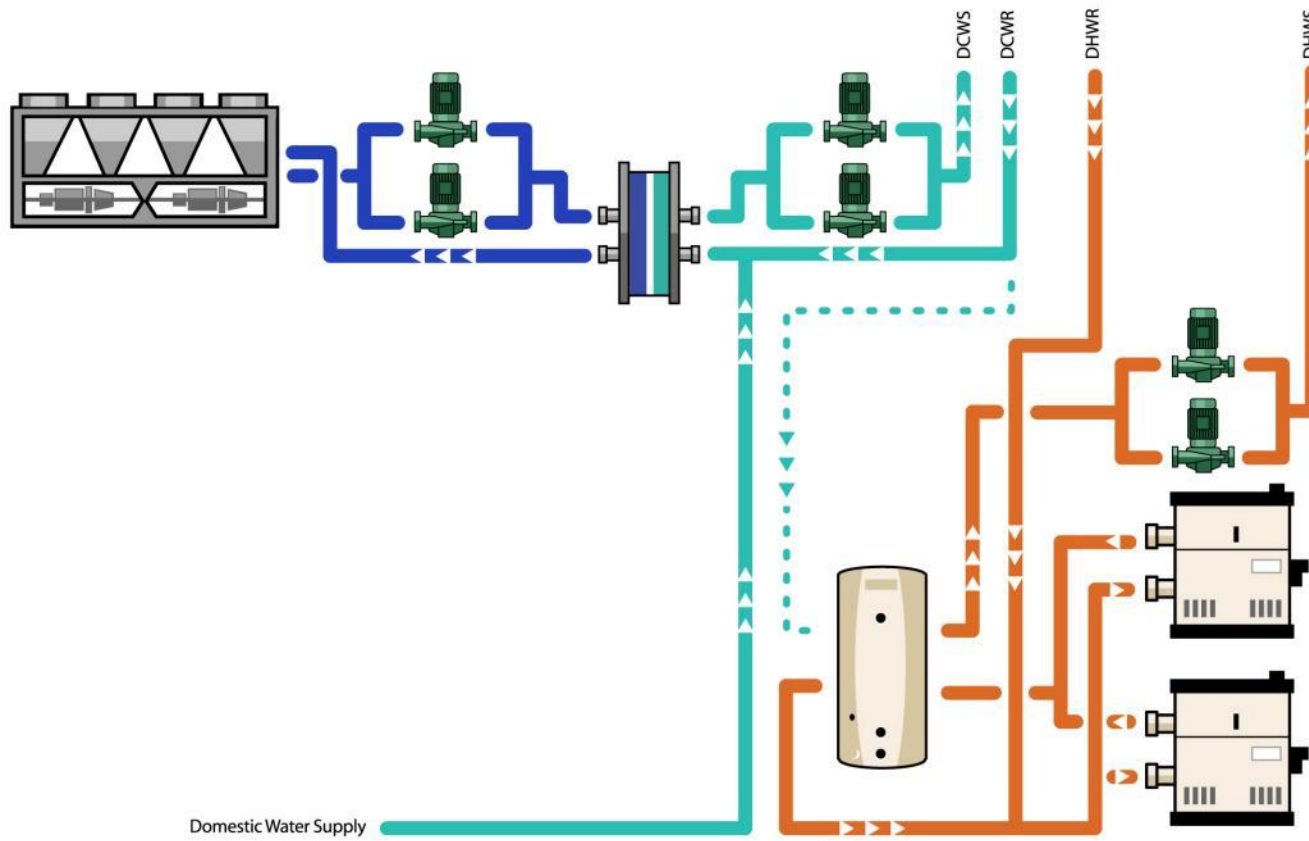
## Advantages:

- Provides Heating and Cooling
- Lowest Installed Costs

## Disadvantages:

- Highest Cost to Operate
- Noisiest Equipment Choice
- Least Comfortable
- Most Invasive to Building Envelope (16"X42" Punch-outs in Every Room)

# IPS - System Comparison Integrated Piping System



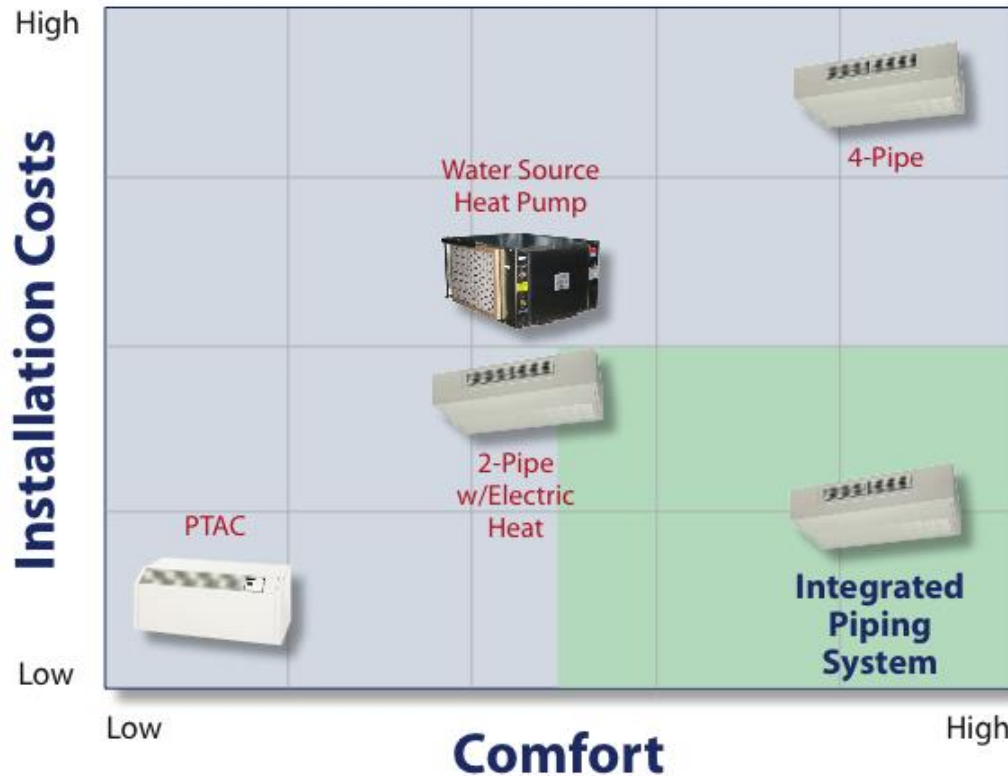
## Advantages:

- Quiet, Comfortable Heating and Cooling
- Significantly Reduced Installed Costs
- Heat Recovery and Economizers

## Disadvantages:

- Requires Domestic Water Piping Throughout Building

# IPS - System Comparison Installed Costs vs. Comfort

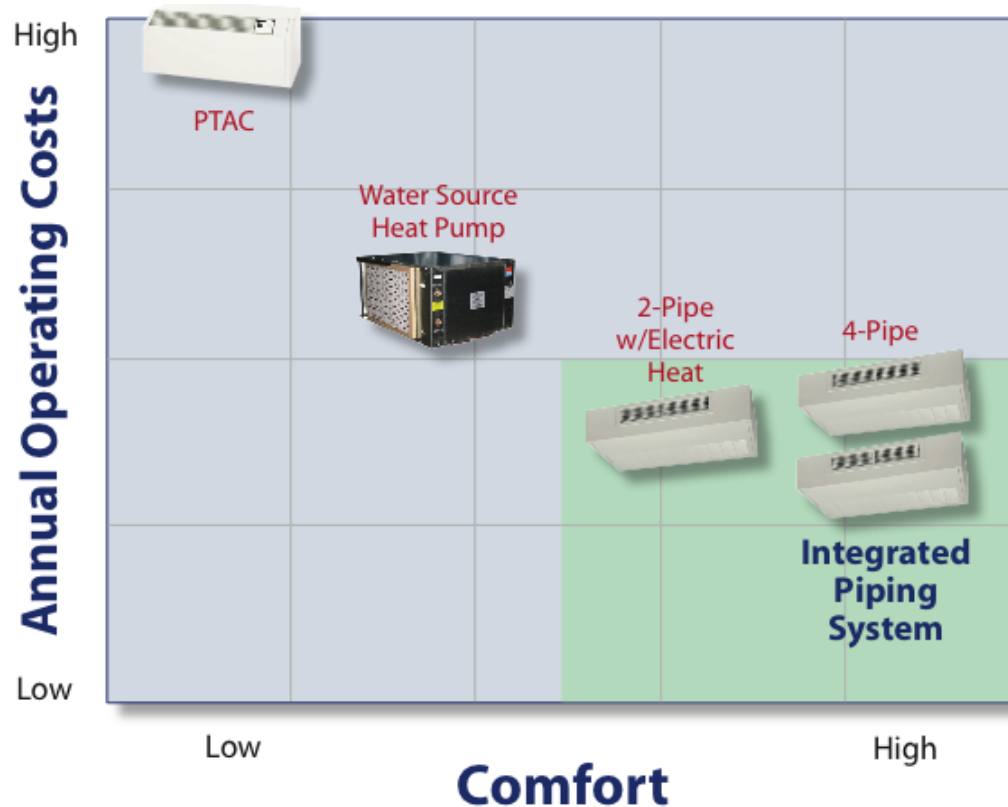


■ Represents ideal range as it applies to suggested building types.

## **Advantage...IPS!**

The IPS offers both a high level of relative comfort along with *very competitive* installation costs.

# IPS - System Comparison Operating Costs vs. Comfort

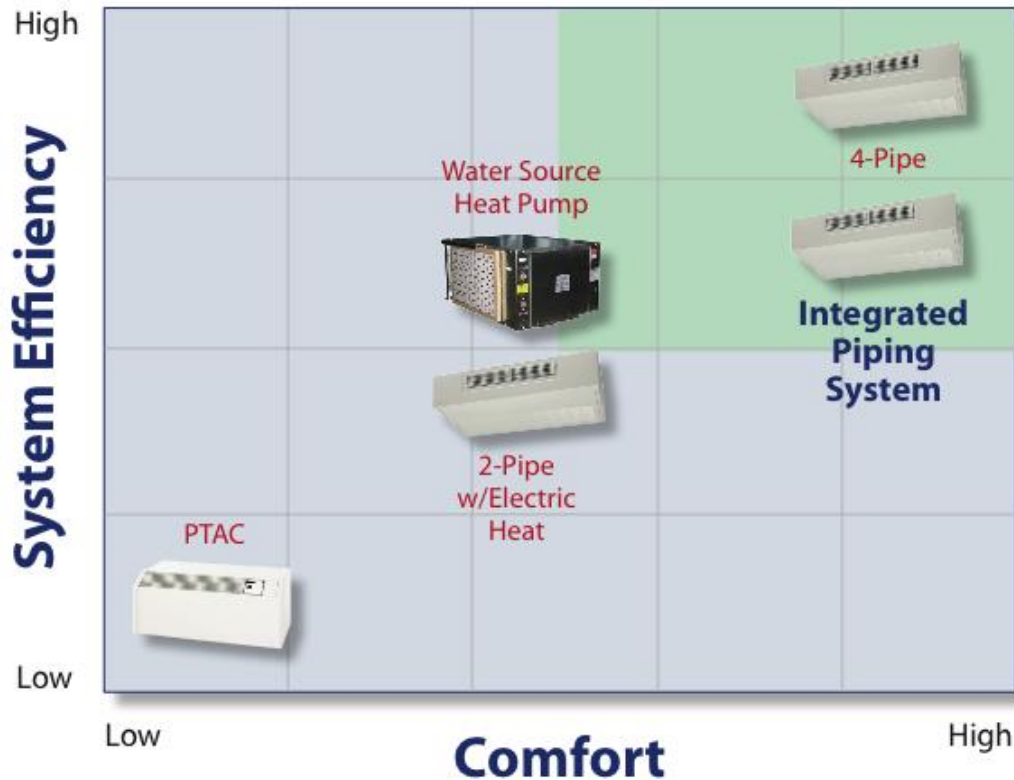


## **Advantage...IPS!**

Annual operating costs are very favorable, especially when compared to PTACs!

Represents ideal range as it applies to suggested building types.

# IPS - System Comparison System Efficiency vs. Comfort



## Advantage...IPS!

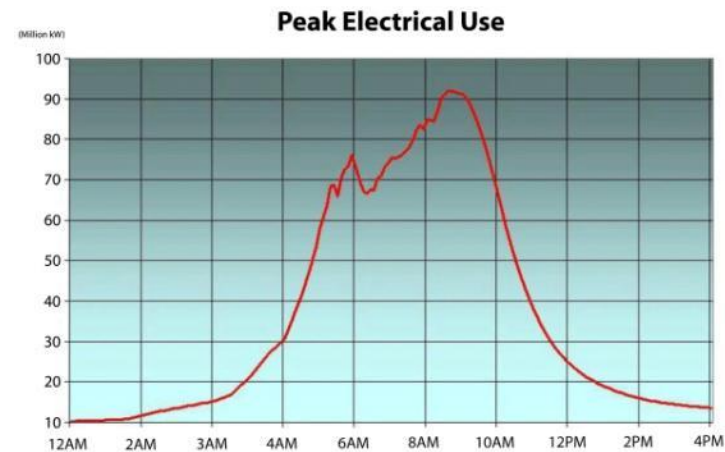
System operating efficiency is excellent with the IPS.

■ Represents ideal range as it applies to suggested building types.

# History of IPS

Anticipated power shortages led to utility companies supporting high efficiency HVAC systems to help flatten peak electrical use.

Such efforts revealed that hydronic heating and cooling are systems of choice.





# History of IPS

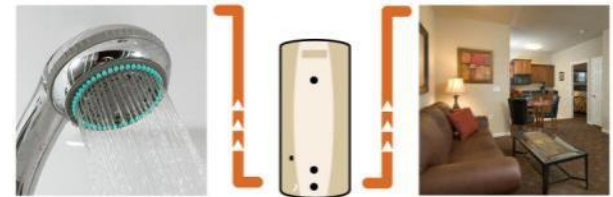
Progression of system to date 130 Projects between  
US and Canada.

Success timeline 12 year period



# Integrated Piping System How It Works - Heating

- Domestic water piping is used for dual functions; domestic hot water for personal use and space heating.
- Terminal units are placed in each zone, giving occupants 100% control of their environments.



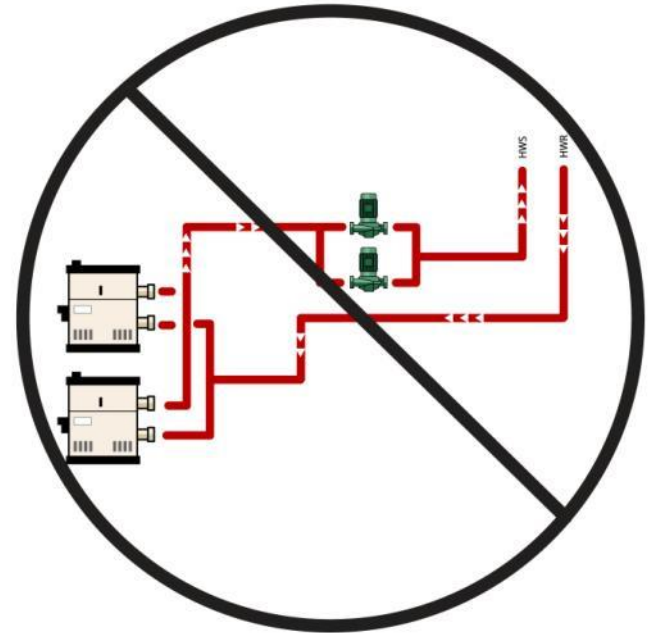
# Integrated Piping System How It Works - Heating

- When the thermostat calls for heating, a valve opens allowing 140°F domestic hot water to flow through coil and heat the space.
- Domestic hot water then returns to boiler at 120°F for reheat.



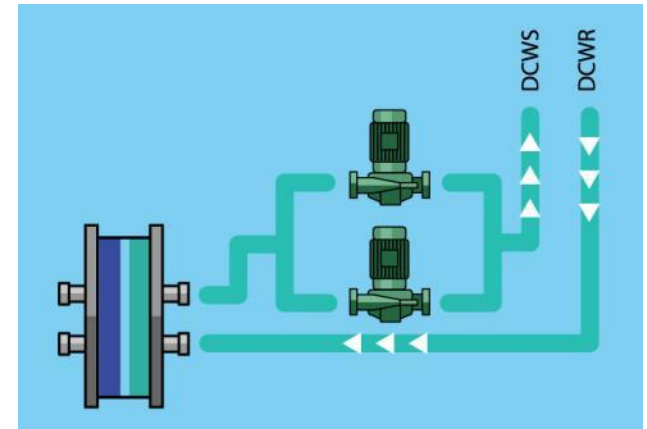
# Integrated Piping System How It Works - Heating

- Use of domestic supply and return hot water lines for space heating eliminates the need for *dedicated* space heating piping and equipment, such as boilers, pumps and storage tanks.

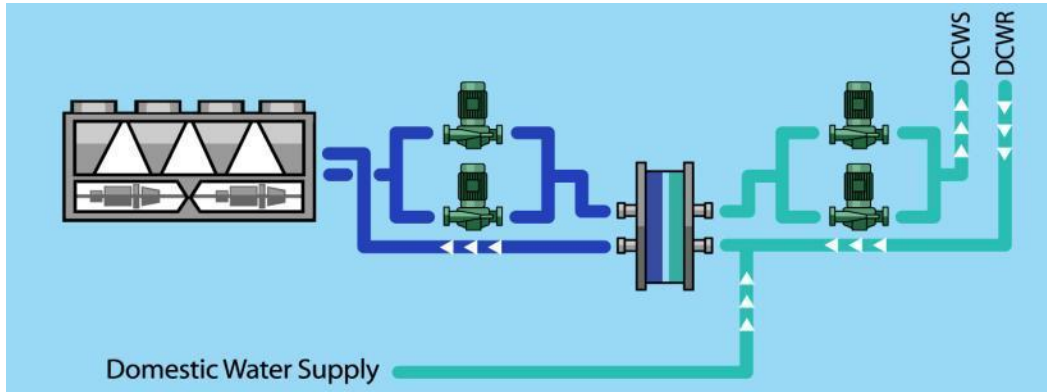


# Integrated Piping System How It Works - Cooling

- The slightly modified cold water piping system provides water for both domestic use and cooling comfort.



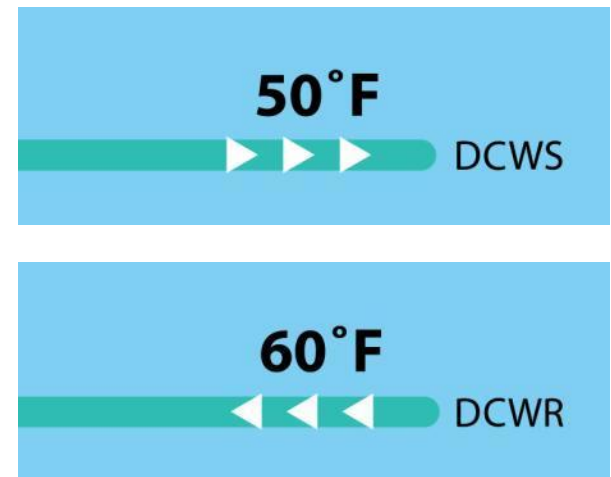
# Integrated Piping System How It Works - Cooling



- A return line is added to the domestic cold, creating a continuous circulating loop; same as the hot water.
- A chiller, isolated by a double-wall plate heat exchanger, is added for comfort conditioning requirements and confined to mechanical room.

# Integrated Piping System How It Works - Cooling

- Domestic cold water is supplied at 50°F, then returns at approximately 60°F.
- If water supplied to the building is less than the return water temperature, economizer cooling is achieved.

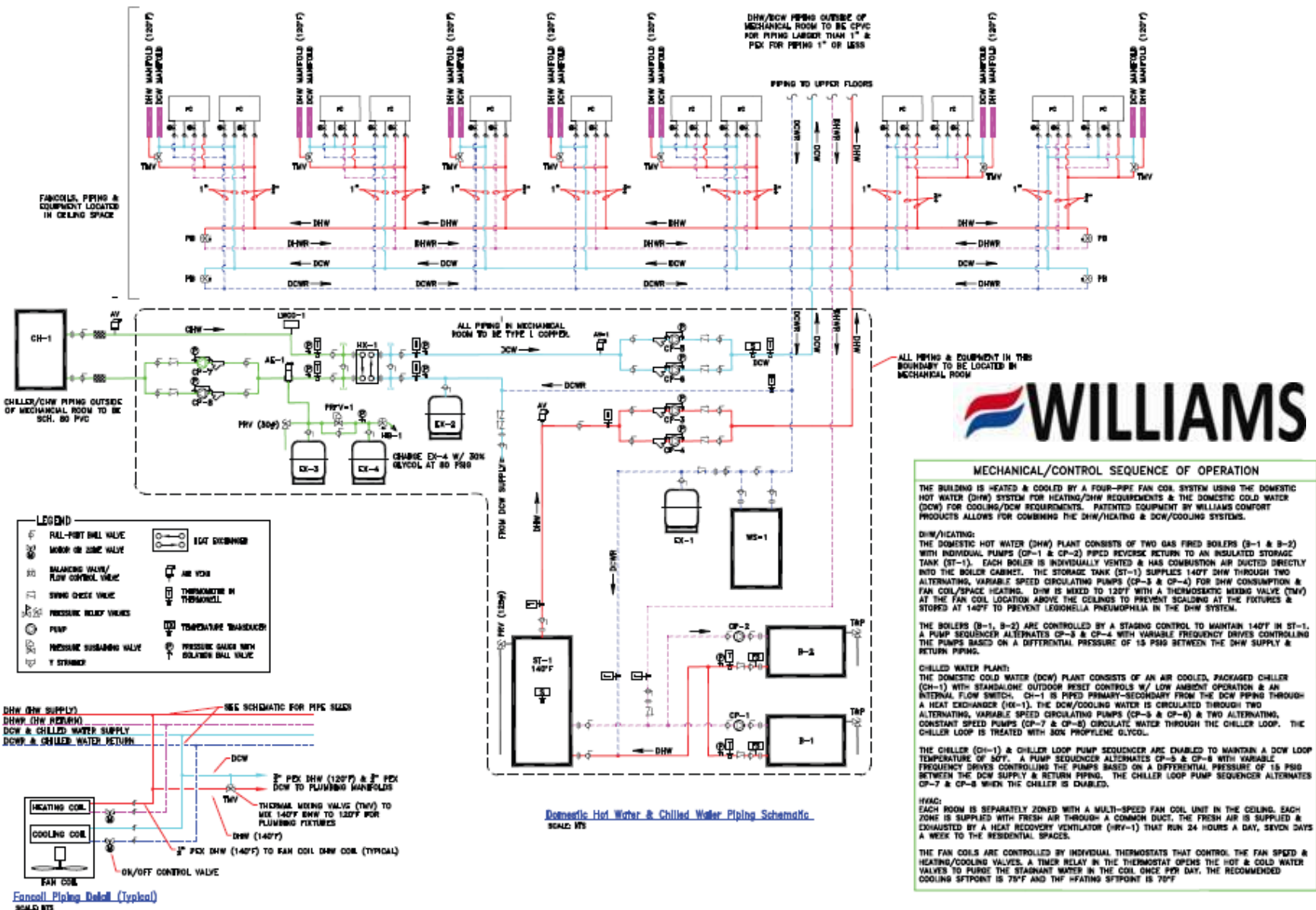


# Integrated Piping System How It Works - Cooling

- 3 existing pipes plus 1 new = ***True 4-pipe heating and cooling comfort!***

And all at a fraction of the installed and operating costs of traditional hydronic systems!





**MECHANICAL/CONTROL SEQUENCE OF OPERATION**

THE BUILDING IS HEATED & COOLED BY A FOUR-PIPE FAN COIL SYSTEM USING THE DOMESTIC HOT WATER (DHW) SYSTEM FOR HEATING/DHW REQUIREMENTS & THE DOMESTIC COLD WATER (DCW) FOR COOLING/DCW REQUIREMENTS. PATENTED EQUIPMENT BY WILLIAMS COMFORT PRODUCTS ALLOWS FOR COMBINING THE DHW/HEATING & DCW/COOLING SYSTEMS.

**DHW/HEATING:**  
 THE DOMESTIC HOT WATER (DHW) PLANT CONSISTS OF TWO GAS FIRED BOILERS (B-1 & B-2) WITH INDIVIDUAL PUMPS (CP-1 & CP-2) PIPED REVERSE RETURN TO AN INSULATED STORAGE TANK (ST-1). EACH BOILER IS INDIVIDUALLY VENTED & HAS COMBUSTION AIR DUCTED DIRECTLY INTO THE BOILER CABINET. THE STORAGE TANK (ST-1) SUPPLIES 140°F DHW THROUGH TWO ALTERNATING, VARIABLE SPEED CIRCULATING PUMPS (CP-3 & CP-4) FOR DHW CONSUMPTION & FAN COIL/SPACE HEATING. DHW IS MIXED TO 120°F WITH A THERMOSTATIC MIXING VALVE (TMV) AT THE FAN COIL LOCATION ABOVE THE CEILING TO PREVENT SCALDING AT THE FIXTURES & STORED AT 140°F TO PREVENT LEGIONELLA PNEUMOPHILIA IN THE DHW SYSTEM.

THE BOILERS (B-1, B-2) ARE CONTROLLED BY A STAGING CONTROL TO MAINTAIN 140°F IN ST-1. A PUMP SEQUENCER ALTERNATES CP-3 & CP-4 WITH VARIABLE FREQUENCY DRIVES CONTROLLING THE PUMPS BASED ON A DIFFERENTIAL PRESSURE OF 15 PSIG BETWEEN THE DHW SUPPLY & RETURN PIPING.

**CHILLED WATER PLANT:**  
 THE DOMESTIC COLD WATER (DCW) PLANT CONSISTS OF AN AIR COOLED, PACKAGED CHILLER (CH-1) WITH STANDBY/OUTDOOR RESET CONTROLS W/ LOW AMBIENT OPERATION & AN INTERNAL FLOW SWITCH. CH-1 IS PIPED PRIMARY-SECONDARY FROM THE DCW PIPING THROUGH A HEAT EXCHANGER (HX-1). THE DCW/COOLING WATER IS CIRCULATED THROUGH TWO ALTERNATING, VARIABLE SPEED CIRCULATING PUMPS (CP-5 & CP-6) & TWO ALTERNATING, CONSTANT SPEED PUMPS (CP-7 & CP-8) CIRCULATE WATER THROUGH THE CHILLER LOOP. THE CHILLER LOOP IS TREATED WITH 30% PROPYLENE GLYCOL.

THE CHILLER (CH-1) & CHILLER LOOP PUMP SEQUENCER ARE ENABLED TO MAINTAIN A DCW LOOP TEMPERATURE OF 40°F. A PUMP SEQUENCER ALTERNATES CP-5 & CP-6 WITH VARIABLE FREQUENCY DRIVES CONTROLLING THE PUMPS BASED ON A DIFFERENTIAL PRESSURE OF 15 PSIG BETWEEN THE DCW SUPPLY & RETURN PIPING. THE CHILLER LOOP PUMP SEQUENCER ALTERNATES CP-7 & CP-8 WHEN THE CHILLER IS DISABLED.

**FAN COIL:**  
 EACH ROOM IS SEPARATELY ZONED WITH A MULTI-SPEED FAN COIL UNIT IN THE CEILING. EACH ZONE IS SUPPLIED WITH FRESH AIR THROUGH A COMMON DUCT. THE FRESH AIR IS SUPPLIED & EXHAUSTED BY A HEAT RECOVERY VENTILATOR (HRV-1) THAT RUN 24 HOURS A DAY, SEVEN DAYS A WEEK TO THE RESIDENTIAL SPACES.

THE FAN COILS ARE CONTROLLED BY INDIVIDUAL THERMOSTATS THAT CONTROL THE FAN SPEED & HEATING/COOLING VALVES. A TIMER RELAY IN THE THERMOSTAT OPENS THE HOT & COLD WATER VALVES TO PURGE THE STAGNANT WATER IN THE COIL ONCE PER DAY. THE RECOMMENDED COOLING SETPOINT IS 70°F AND THE HEATING SETPOINT IS 70°F.