

## IPS™ Capital Cost Savings

IPS™ uses the hydronic system for domestic use already in the budget to reduce installed system costs. Capital cost savings are achieved through an accumulation of multiple attributes.

**Goal: For the total installed cost of the mechanical system to be less than \$15/sq. ft.**

### Piping Reduction

The mechanical system is *at all times* totally isolated from the domestic water system. The IPS™ Terminal becomes a “fixture” and the temperature of the cold water is managed while the hot water temperature remains unchanged. Standard 4-pipe fan coil systems require domestic cold water, domestic hot water supply, domestic hot water return, heating water supply, heating water return, chilled water supply and chilled water return for a total of seven pipes. 2-pipe fan coil systems require five pipes; domestic cold water, domestic hot water supply and return – space heating water supply and return. In the cooling season, the heating pipes “changeover” to chilled water. Radiant baseboard systems have five pipes. Water source heat pumps have five pipes. Variable refrigerant adds refrigerant piping and controls plus the cost of electrical. The Integrated Piping System (IPS™) adds a single pipe for a total of four pipes; a domestic hot water supply and return, along with a domestic cold water supply and return. The supply is sized for the domestic requirement and the return is sized for HVAC.

### Boiler Reduction

By utilizing the domestic hot water boilers and distribution system for dual-purpose use, the need for separate space heating boilers is eliminated.

### Pump Reduction

Further capital cost savings are realized with IPS™ as the domestic water system eliminates the need for a separate space-heating loop. The pumps typically needed in standard hydronic heating systems to circulate space-heating water are eliminated.

### Associated Equipment Reduction

Sometimes referred to as “interface costs” are the costs associated with installing the second set of pipes. Installation requires building space along with fittings and valves, chases, access, insulation, hangers and treatment of wall or floor penetrations, inspection and test; and all in addition to balancing and pressure management. In addition, stagnant water and dead legs are eliminated as now both the hot and cold water are continuously circulating.

### Labor Costs

Labor costs are reduced because the materials going into the building are reduced. Overall, labor is reduced as equipment and piping are eliminated.

## IPS™ Operational Cost Savings

The central plant advantage has always been efficiency. Anytime terminal systems are applied the efficiency drops because the terminal units' cycle at purchased horsepower, more horsepower than the building Block load is purchased, and at a higher dollar per ton cost for equipment.

The advantage of hydronic systems is that BTUs are transported at 10% of the cost of BTUs in duct, but the disadvantage is the cost to install the pipe. The history of hydronic systems is always about reducing the pipe and maintaining comfort. Two-pipe systems are affordable but sacrifice comfort. Four-pipe systems are affordable if the budget already has a central chiller plant. WSHP systems heat and cool with DX circuits and reduce the cost of the pipe. Packaged Terminal Air Conditioners eliminate the pipe, but increase electrical cost, waste energy and sacrifice comfort. Variable Refrigerant units try to improve on a bad situation, but add refrigerant piping and controls to the cost. 10 years ago a few innovative designers figured out how to use domestic cold water for cooling. Domestic Hot water heating has been done since the 1960's. The domestic cooling water entering a building is dependent on many variables, but managing the cold water temperature between 45-50°F allows a fan coil terminal to become an "HVAC Fixture".

**In buildings where hot and cold water distribution is already a part of the cost, adding one-pipe and a lower cost per ton central plant is the answer.** The increased efficiency plus the heat recovery design yields increased comfort at low installed and operating cost. Primary/secondary chiller plants are common and these building types already have large domestic boilers. The domestic water heating load exceeds the space heating load and the cooling load which the IPS system recovers by design. The domestic water supply to the building is Free-Cooling, Geo-exchange heating, or both. All for the cost of adding one pipe to the elements already in the budget. Every project has to be designed for the specifics, of course, but the basic system is unchanged for the last 10 years.

### **Why haven't I heard of Integrated Piping System before?**

There are 130 projects confined to a band of projects from Salt Lake City, Utah to Edmonton, Alberta, Canada, which is where it started. It's coming... HVAC is a conservative and competitive marketplace; those designers marketing the system have held it close to the vest because it is very simple, low risk, fast and reliable. A review of the projects shows the same design team installing repeat projects in relatively small market areas.

### Average Cost Range - \$ / Square Foot

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System	Installation Cost	Operating Cost
4-pipe	\$ 25-27	\$ .70-.90
2-pipe	\$ 20-23	\$ .90-1.10
WSHP - VRV	\$18-24	\$ .90-1.20
PTAC	\$13-14	\$1.60-1.80
<b>IPS</b>	<b>\$14-15</b>	<b>\$.80-1.00</b>

\* Based on electricity costs of \$ .10 /kWh and gas costs of \$1.50 /Therm.

### Simple Payback - based on average difference (years)

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System	Installation	Operating	Payback
4-pipe	+13	-0.9	14 years
2-pipe	+9	-0.7	12 years
WSHP - VRV	+7.5	-0.65	11 years
PTAC	+13.5	1.70	Basis*
<b>IPS</b>	<b>+1</b>	<b>-0.8</b>	<b>1.25 years</b>

\* Not adjusted for PTAC equipment life of approx. 7 years vs. fan coil equipment life of approx. 20 years.

To learn more, visit [williamsapplied.com](http://williamsapplied.com) for installations and additional technical information or contact your local Williams Applied Products Representative.