

Ref NO. : RP-JR13-HP01

Waste Heat Recovery Project

on existing “Conventional Chiller System”

benefit: Had Been “PAYBACK” within 12 Months

Case Study



Job Reference by RPT

Client: HKUST

Region : Hong Kong

Ref NO. : RP-JR13-HP01

Project Title: Waste Heat Recovery on existing
"Conventional Chiller System"

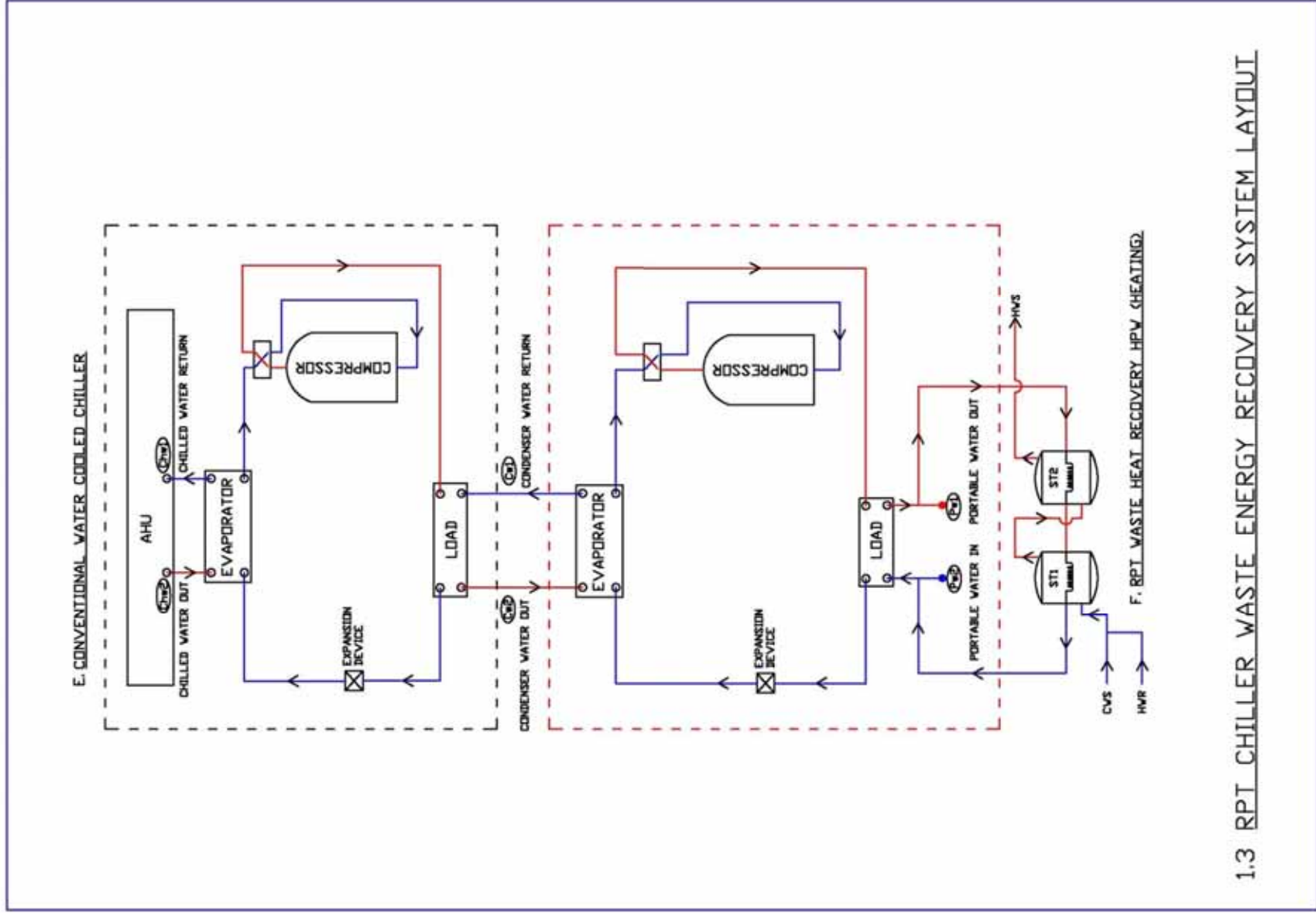
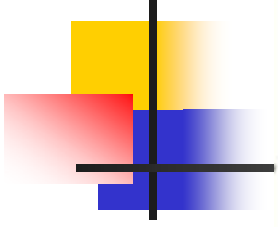
Completed: January 2013



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RPT Designed Waste Heat Recovery SYSTEM



1.3 RPT CHILLER WASTE ENERGY RECOVERY SYSTEM LAYOUT

SYSTEM DESCRIPTION

RPT Designed Heat Recovery System

- 1. Absorb "Waste" heat from HVAC Chiller condensing circuit;
- 2. Return "Cooled" condensing water back to the Circuit;
- 3. To transfer the "Absorbed" waste heat energy from condensing water to produce hot water to the following:
 - I] Main Building Facilities, Kitchen & Laundry & Athletic, etc.;
 - II] Pool Hot Water Showering System;
 - III] Indoor Swimming Pool (Warm Water) System;
 - IV] Athletic Hot Water Showering System.



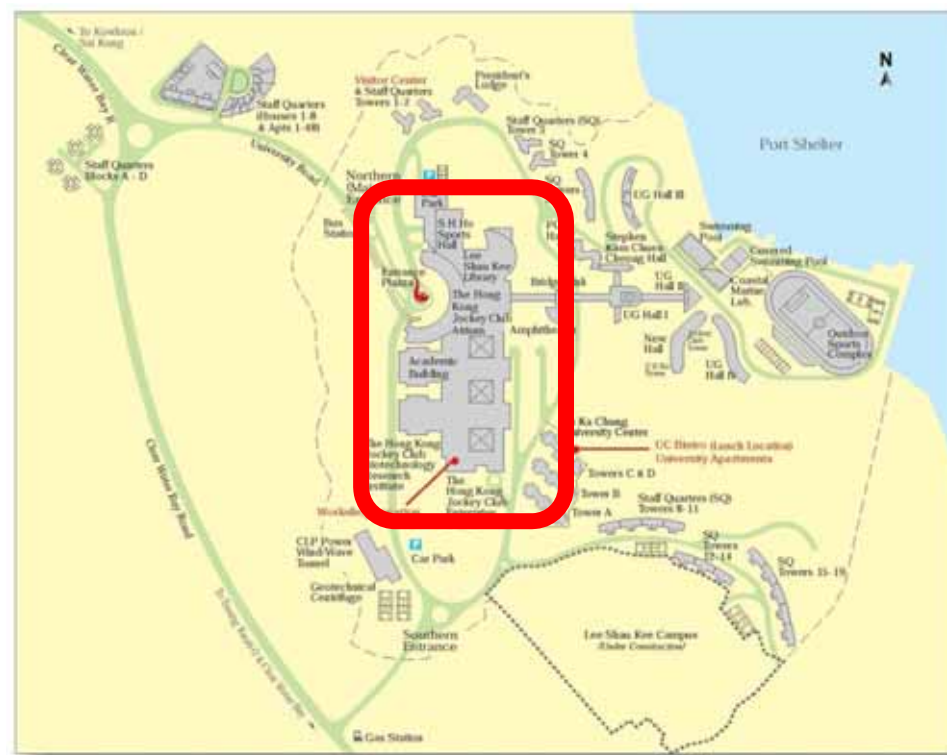
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Introduction # 1 (LG3) 主樓

The Newly installed RPT Smart Energy Hot Water System consists of the Colmac **Water Source “Heat Pump Water Heaters”**, which absorbs waste heat from the Source Water (condensing) System.

This heat that is absorbed by the refrigeration circuit of the “Heat Pump Water Heaters” using vapor compression technology to transfer the absorbed heat to the portable water that is circulated through the heat exchanger and transferred to the existing Hot Water system.



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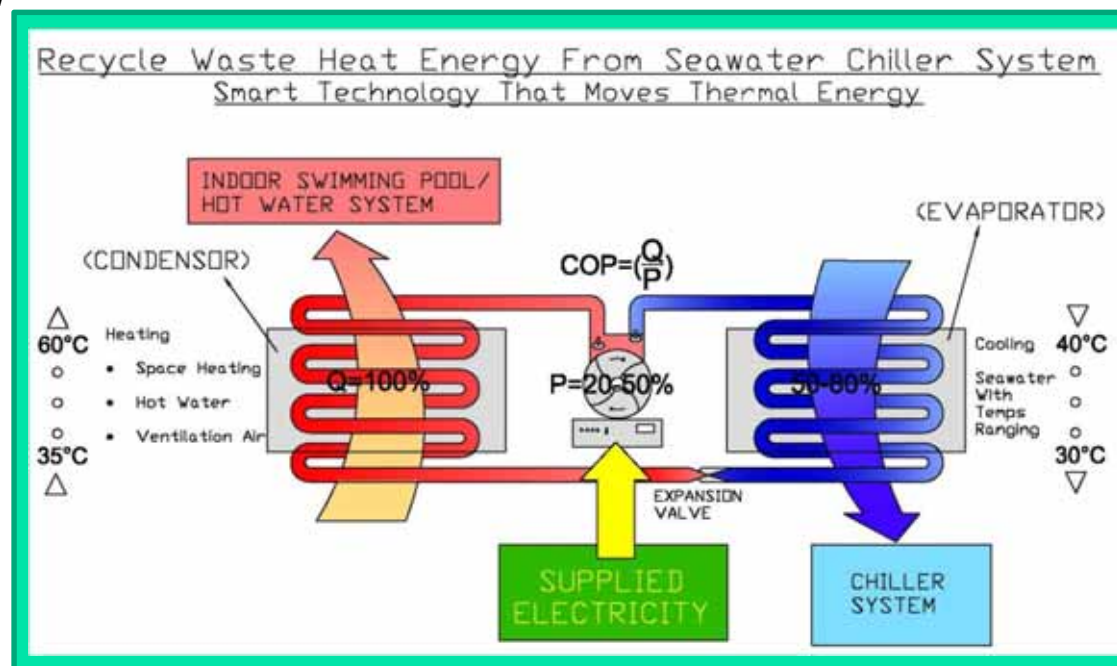
Before (LG3)主樓

This was the original site view before the installation of **Waste Heat Recovery System**.



RPT proposed and provided the below services:

- Redesign the system related piping circuit;
- Re-design the system related electrical and control circuit;
- Design & Engineering of thermal and hydronics, re-arranging flow rate and water pressure in the related piping system.



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Completed (LG3)主樓

The same plant room after the installation was completed.

RPT provided the following technical services and support:

d]Supervise, Inspection, Test & Commissioning the complete system;

e]Operational, and Education Seminars;

f]Maintenance.



RPT Calculations with Performance Result: Smart Energy System for Waste Heat Recycle From Chiller to Hot Watering 2013

ITEM	HPW Model	POWER	Unit	QTY	Evaporator FlowRate	Unit	Evaporator Delta T	Unit	Evaporator Absorb	Unit	Condenser FlowRate	Unit	Condenser Delta T	Unit	Condenser Output	Unit	FULL Load	Unit	COP
1	HPW15 [LG3 Site / HKUST]	70	Kw	3	2.5	L/s	5	°C	565	Kw	1.5	L/s	8	°C	543	Kw	20 x 3	Kw	9.04



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Performance Conclusion (LG3)主樓

This system is absolutely to bypass those gas boilers, just rely on three Heat Pump Water Heaters to supply hot water.

Gas Boiler

BENEFIT:

- 1] **Waste** from the buildings Air-Conditioning System is transferred to the Hot Water System there by reducing energy required for hot water production.
- 2] The Gas Hot Water System is now redundant no more energy cost or Bills the Gas Hot Water.
- 3] 100% **"SMART"** & **"GREEN"** Energy Solution !!

Gas Meter:

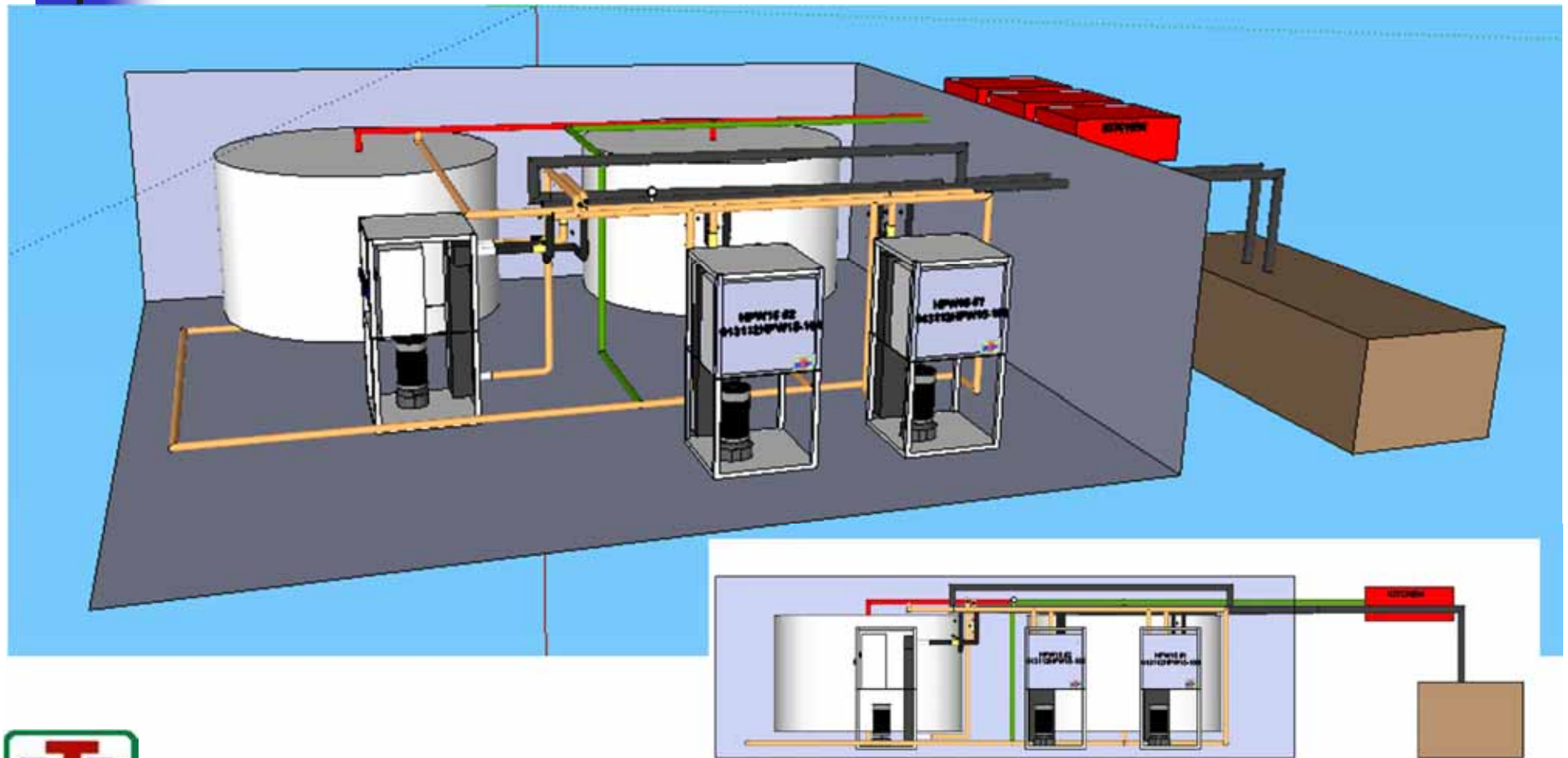
After the new "HEAT PUMP WATER HEATER SYSTEM" has been in operation, this GAS METER has stopped operating completely!!



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3D DESCRIPTION (LG3)主樓



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Introduction # II (OSP) 室外游泳池

The purpose of this Application is to provide Hot Water mainly for the Shower Rooms in the Swimming Pool Plant Room. So the Colmac "**Heat Pump Water Heater**" installed to absorb waste heat from the Source Water System.

That heat is absorbed by the refrigeration circuit of the "**Heat Pump Water Heater**" using vapor compression technology to transfer the absorb heat through the heat exchanger and transferred to the "portable hot water" showering system.



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Before (Outdoor Swimming Pool) 室外游泳池

This was the original site view before the installation.

RPT proposed and provided the below services:

- a] Redesign the system related piping circuit;
- b] Redesign the system related electrical and control circuit;
- c] Design and Engineer thermal dynamics and hydronics, re-arranging flow rate and water pressure in the piping system.



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Completed (Outdoor Swimming Pool) 室外游泳池

This site view after the completion of installation.

RPT provided the following technical services and support:

d]Supervise, Inspection, Test & Commissioning the Complete System;

e]Operational, and Education Seminars;

f]Maintenance.



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Performance Conclusion (OSP) 室外游泳池

This system is absolutely to bypass those gas boilers, just rely on one water source HPWH to supply hot water.

BENEFIT:

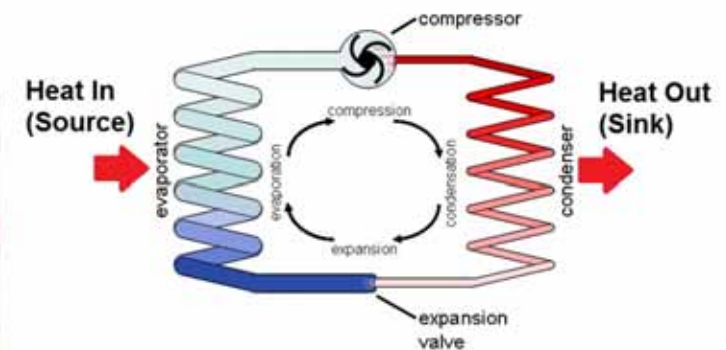
- 1] **Waste** from the buildings Air-Conditioning System is transferred to the Hot Water System there by reducing energy required for hot water production.
- 2] The Gas Hot Water System is now redundant no more energy cost or Bills the Gas Hot Water.
- 3] 100% **"SMART"** & **"GREEN"** Energy Solution !!



Gas Boilers

Gas Meter:

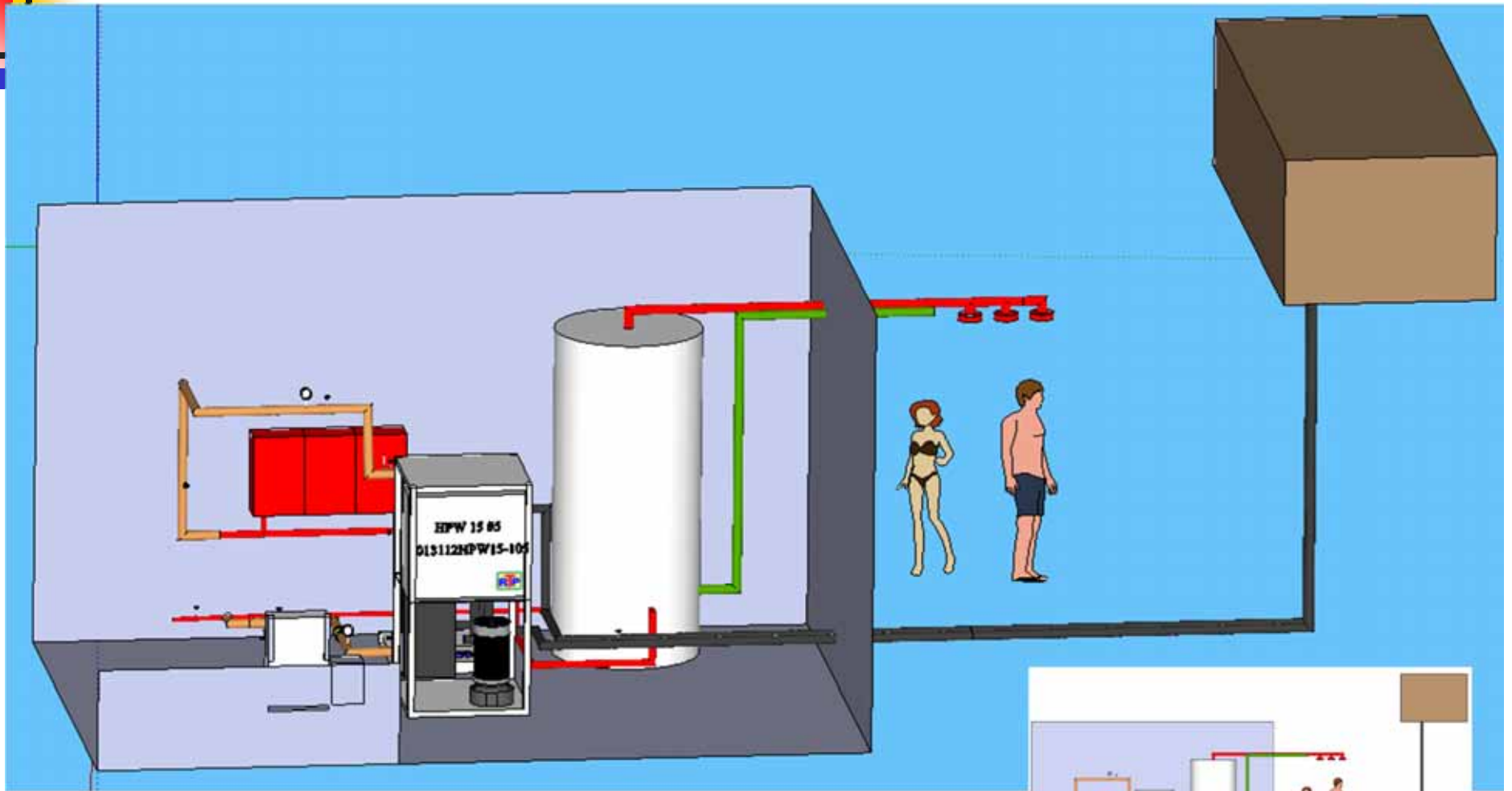
After the "HEAT PUMP WATER HEATER SYSTEM" has been in operation, this GAS METER has stopped operating completely!!



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3D DESCRIPTION (OSP) 室外游泳池



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Introduction # III (ISP)室內游泳池

The purpose of this Application is mainly to provide Warm Water System in a Swimming Pool Plant Room. So the Colmac water source "Heat Pump Water Heater" installed to absorb waste heat from the Source Water System.

The heat that is absorbed by the refrigeration circuit of the "Heat Pump Water Heater" using a vapor compression technology transfers the absorb heat through the primary heat exchanger and then transferred indirectly via the secondary titanium heat exchanger to the "pool water" system.



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Before (Indoor Swimming Pool) 室內游泳池

This was the original site view before the installation.

RPT proposed and provided the below services:

- a] Redesign the system related piping circuit;
- b] Redesign the system related to electrical and control circuit;
- c] Design and Engineer thermal dynamics and hydronics, re-arranging flow rate and water pressure in the piping system.



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Completed (Indoor Swimming Pool) 室內游泳池

This was the site view after the installation was completed.

RPT provided the following technical services and support:

d]Supervise, Inspection, Test & Commissioning the Complete System;

e]Operational, and Education Seminars;

f]Maintenance.



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Performance Conclusion (ISP)

室內游泳池

The newly installed "SMART SYSTEM" totally replaced the original aging inefficient "Heat Pump Water Heating System".

BENEFIT:

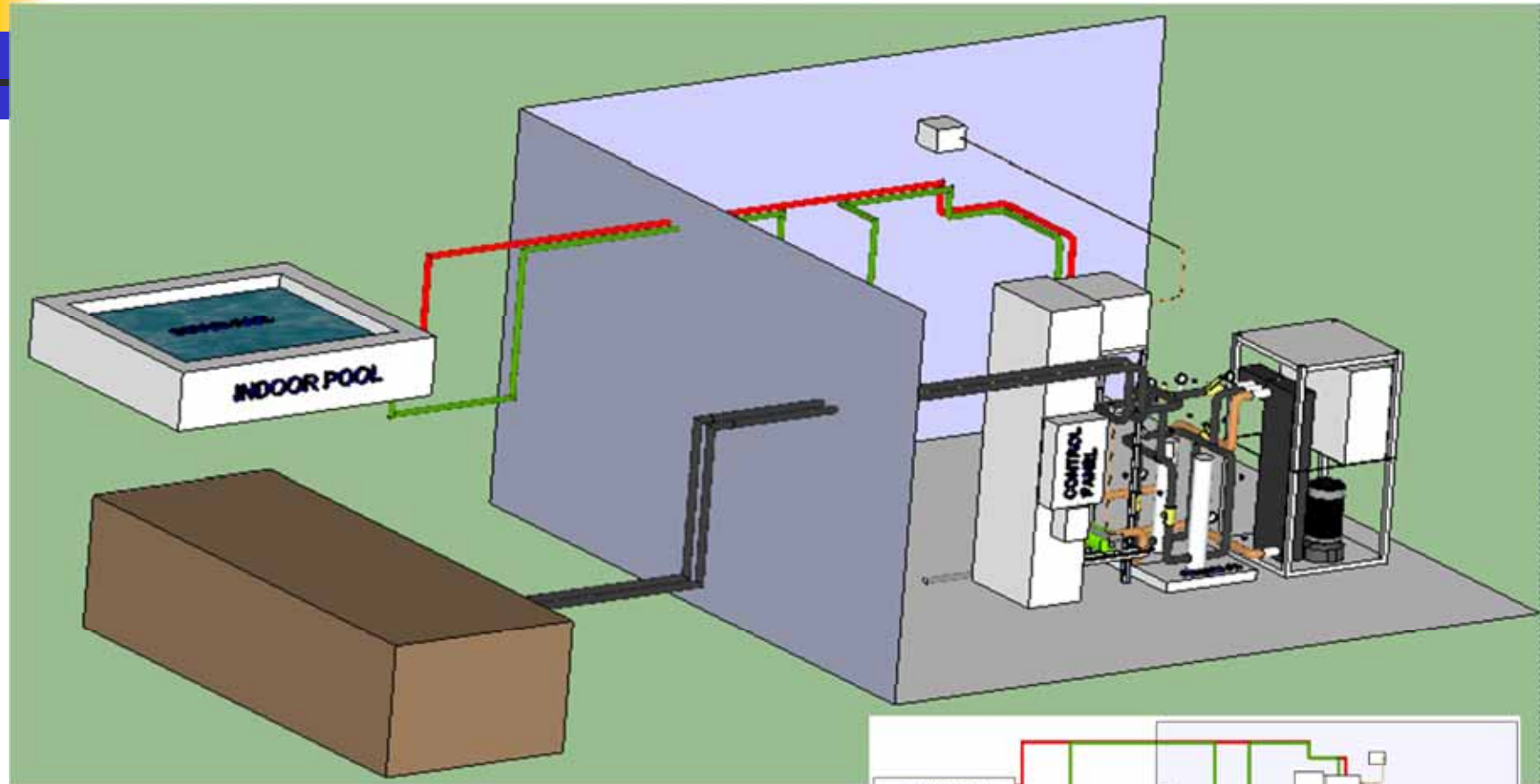
- 1] **Waste** from the buildings Air-Conditioning System is transferred to the Hot Water System there by reducing energy required for hot water production.
- 2] The system is operating efficiently better than the old Aging system.
- 3] 100% **"SMART"** & **"GREEN"** Energy Solution !!



Obsoleted Air Source Heat Pump



3D DESCRIPTION (ISP) 室內游泳池



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Introduction # IV (OAF) 運動場

The purpose of this Application is mainly a Hot Water Showering System in Swimming Pool Plant Room. So the Colmac water source "Heat Pump Water Heater" installed to absorb waste heat from the Source Water System.

This heat that is absorbed by the refrigeration circuit of the "Heat Pump Water Heater" uses vapor compression technology to transfer the absorb heat through the heat exchanger and transferred to the "potable hot water" showering system.



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Before (Outdoor Athletic Field)運動場

This was the original site view before the installation taken place.

RPT proposed and provided the below services:

- a] Redesign the system related piping circuit;
- b] Redesign the system related electrical and control circuit;
- c] Design and Engineer thermal dynamics and hydronics, re-arranging flow rate and water pressure in the piping system.



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Completed (Outdoor Athletic Field)運動場

This was the site view after the installation was completed.

RPT provided the following technical services and support:

d]Supervise, Inspection, Test & Commissioning the Complete System;

e]Operational, and Education Seminars;

f]Maintenance.



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Performance Conclusion (OAF)運動場

This system is absolutely to bypass those gas boilers, just rely on one "Heat Pump Water Heater" to supply hot water.

BENEFIT:

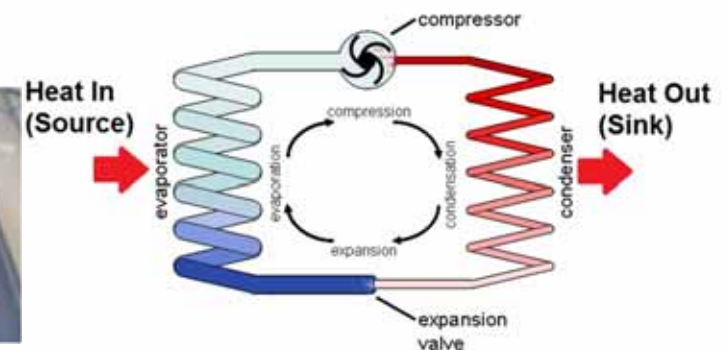
- 1] **Waste** from the buildings Air-Conditioning System is transferred to the Hot Water System there by reducing energy required for hot water production.
- 2] The Gas Hot Water System is now redundant no more energy cost or Bills the Gas Hot Water.
- 3] 100% "**SMART**" & "**GREEN**" Energy Solution !!

Gas Meter:

After the "SMART HEAT PUMP WATER HEATER SYSTEM" has been in operation, this GAS METER has stopped operating completely!!



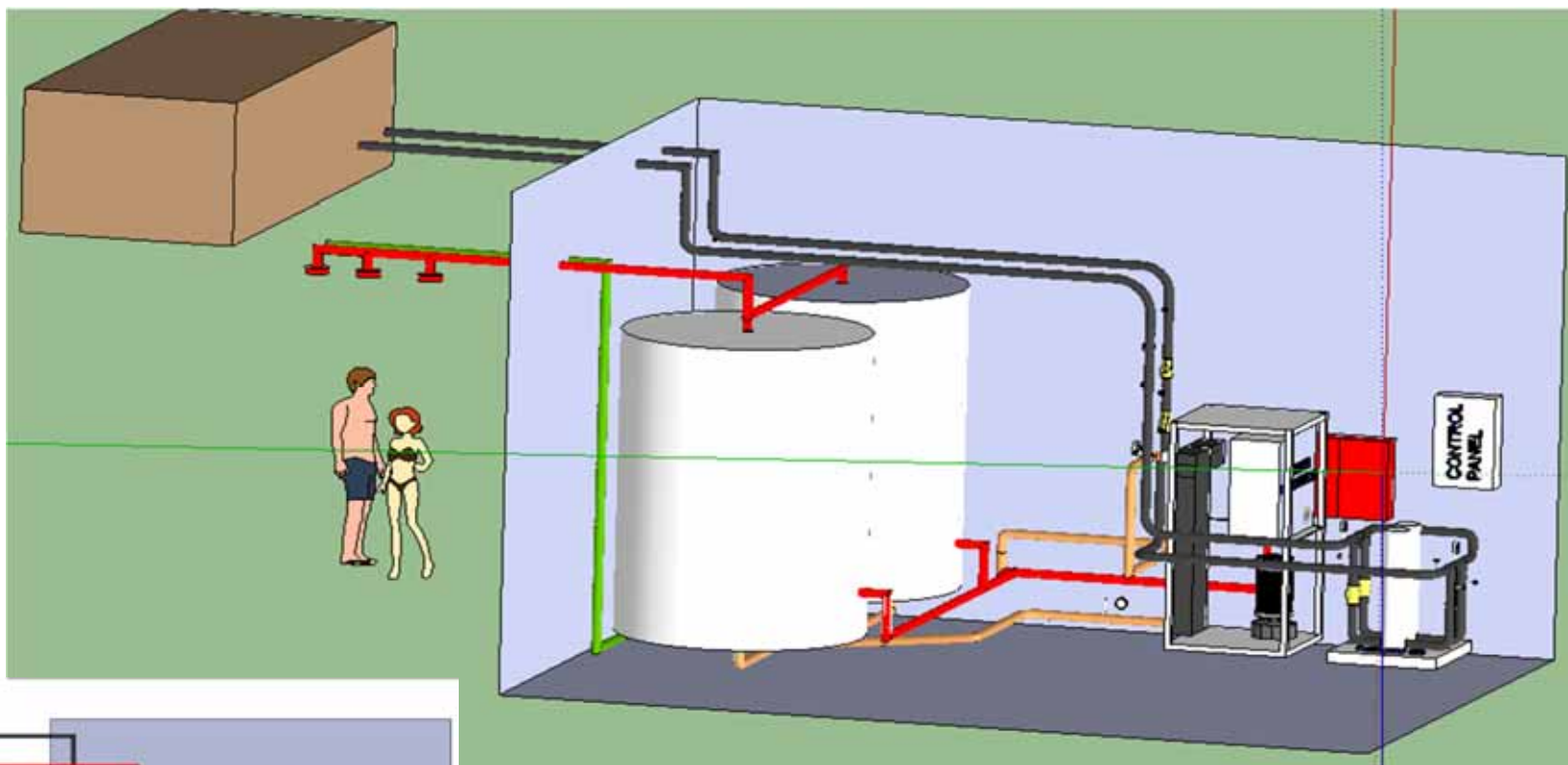
Gas Boilers



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3D DESCRIPTION (OAF)運動場



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End of Case Study

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