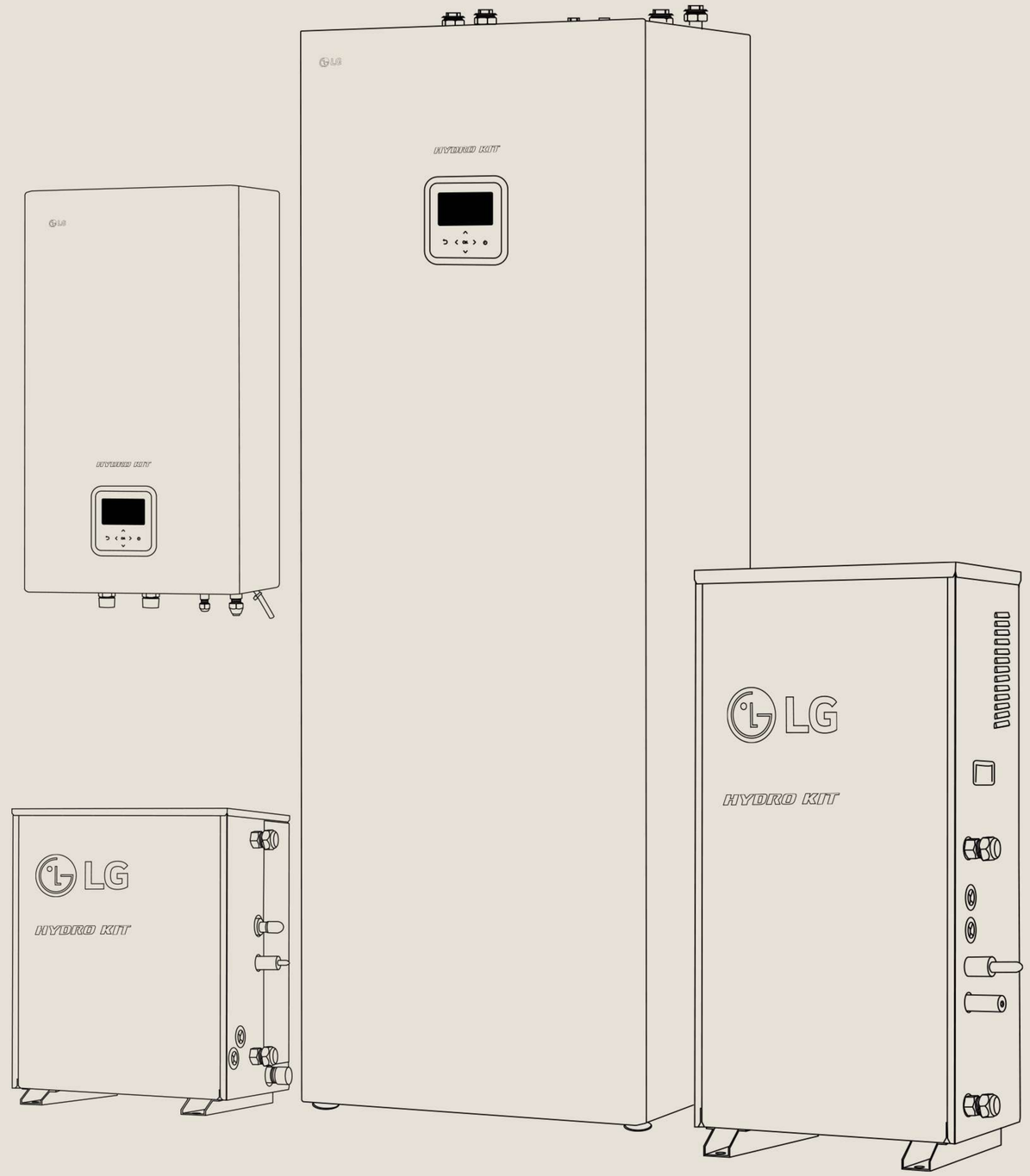
The Future of VRF Hot Water Solutions:

Hydro Kit

VRF systems, using advanced heat pump tech, are energy-efficient alternatives for heating, outshining conventional options. This white paper explores how the LG Hydro Kit expands VRF capabilities, offering efficient domestic hot water and heating, crucial for optimizing heating system designs in new-build or remodeling projects.



Hydro Kit White Paper Contents

01

Introduction

Electrification is a global trend that is changing the way we heat buildings. Amidst the evolving HVAC landscape towards enhanced efficiency, VRF systems have emerged as energy-efficient alternatives for heating, outshining conventional options like oil or gas boilers. Leveraging advanced heat pump technology and variable refrigerant flow control, VRF systems promise remarkable energy savings, cost reduction, and precise climate control. Notably, they've expanded their capabilities to include Domestic Hot Water (DHW) provision through a specialized product. Consequently, the implementation of these systems, particularly with the innovative Hydro Kit accessory, raises pertinent considerations in optimizing heating designs for new-build or remodeling projects. This whitepaper delves into the advantages of the Hydro Kit, offering a detailed comparison with air-cooled chillers, and shedding light on its prowess in energy efficiency, installation & maintenance, capability, and applicability, contributing to the ongoing green revolution within the HVAC industry for both residential and commercial spaces.

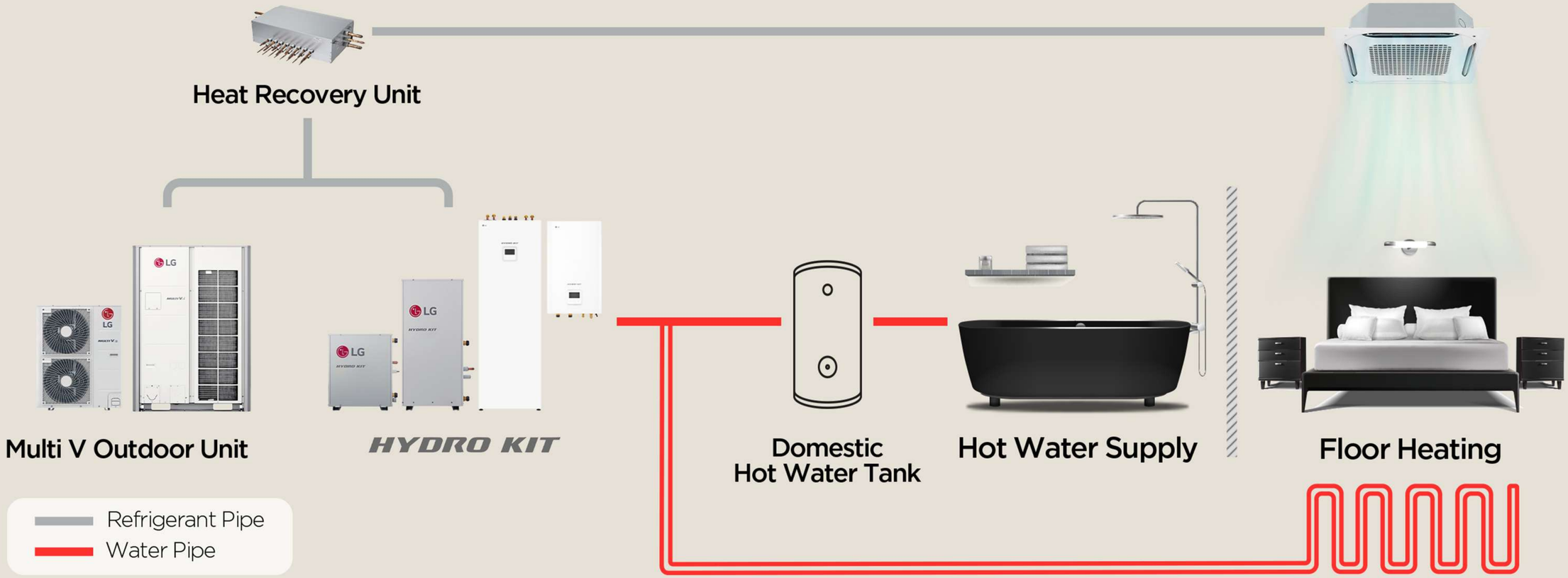
Hydro Kit

- Comparison with Air-Cooled Chiller
- Installation & Maintenance
- Capability & Applicability
- Energy Efficiency

02

What is the Hydro Kit?

The LG Hydro Kit is a specially designed product for LG VRF systems, allowing for hot water supply. With its intelligent heat exchange system, the Hydro Kit offers a versatile and energy-efficient heating solution that utilizes a refrigerant-to-water heat exchange to produce hot water. This system serves multiple purposes, including providing heating and DHW for a warmer indoor environment.



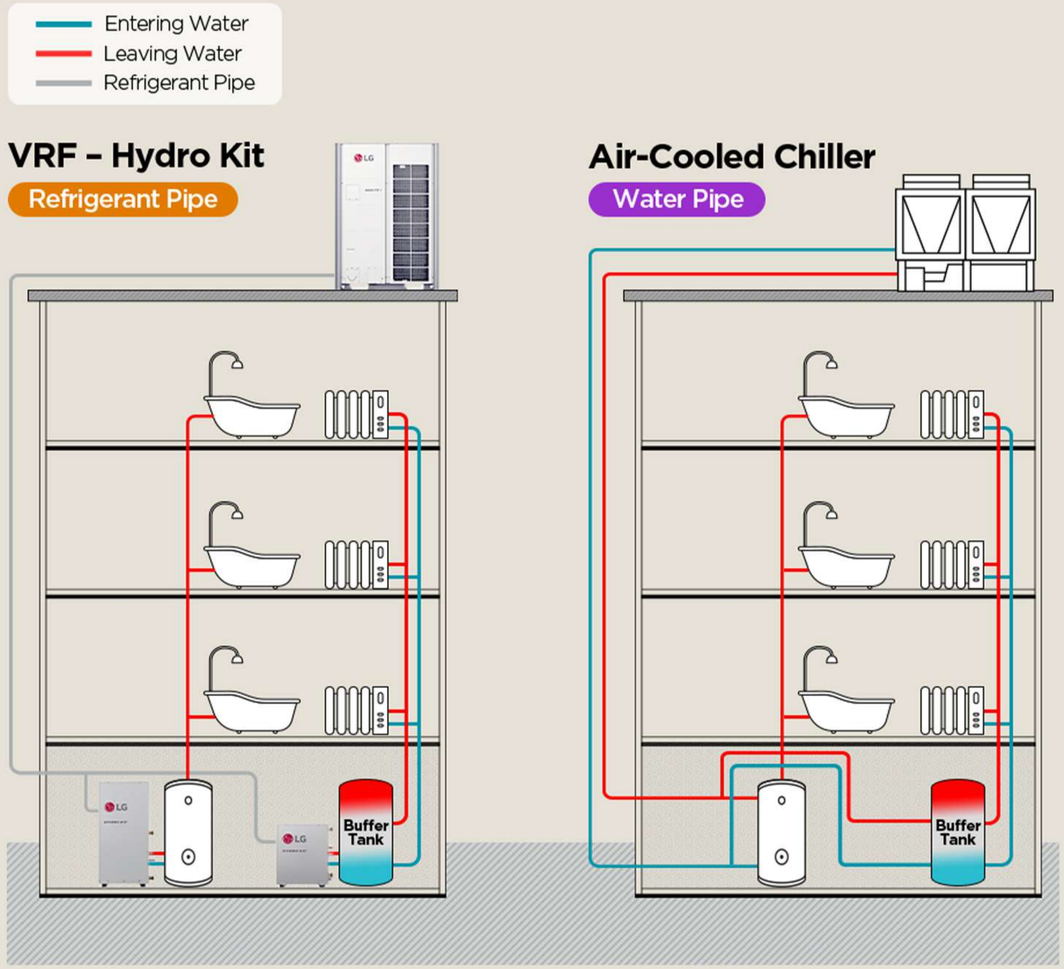
By combining the Hydro Kit with the 'Heat Recovery Unit', the VRF system becomes capable of recovering and redirecting waste heat from areas that need cooling to those that need heating in a building. While VRF alone can provide heating or cooling, when connected with the Heat Recovery Unit, it enables simultaneous heating, cooling, and DHW supply. As a result, the Hydro Kit maximizes energy efficiency by harnessing waste heat from indoor air-conditioning units.

The Hydro Kit's adaptability presents a heating and cooling solution suitable for various building types and sizes, including large houses, multi-family residential buildings, retail spaces, hotels, and offices. Its easy installation process and integration with existing infrastructure make it a practical choice. Moreover, its precise temperature control and zoned heating capabilities ensure a comfortable indoor environment while operating efficiently even in low ambient temperatures.

03

A Comprehensive View of the Hydro Kit and Air-cooled Chiller Systems

Both the Hydro Kit and air-cooled chiller systems are robust solutions that provide benefits to different types of buildings for heating. However, the Hydro Kit offers some distinct advantages. While air-cooled chillers are solutions that provide many benefits to a building, they do have certain limitations. Let's compare each solution.



	Freezing Risk	Pump	Initial Cost	Operating Cost	Maintenance	Pipe Diameter
Refrigerant Pipe	No	No Need	Low	Low	No Need	Small
Water Pipe	Yes	Need	High	High(Pump)	Need	Large

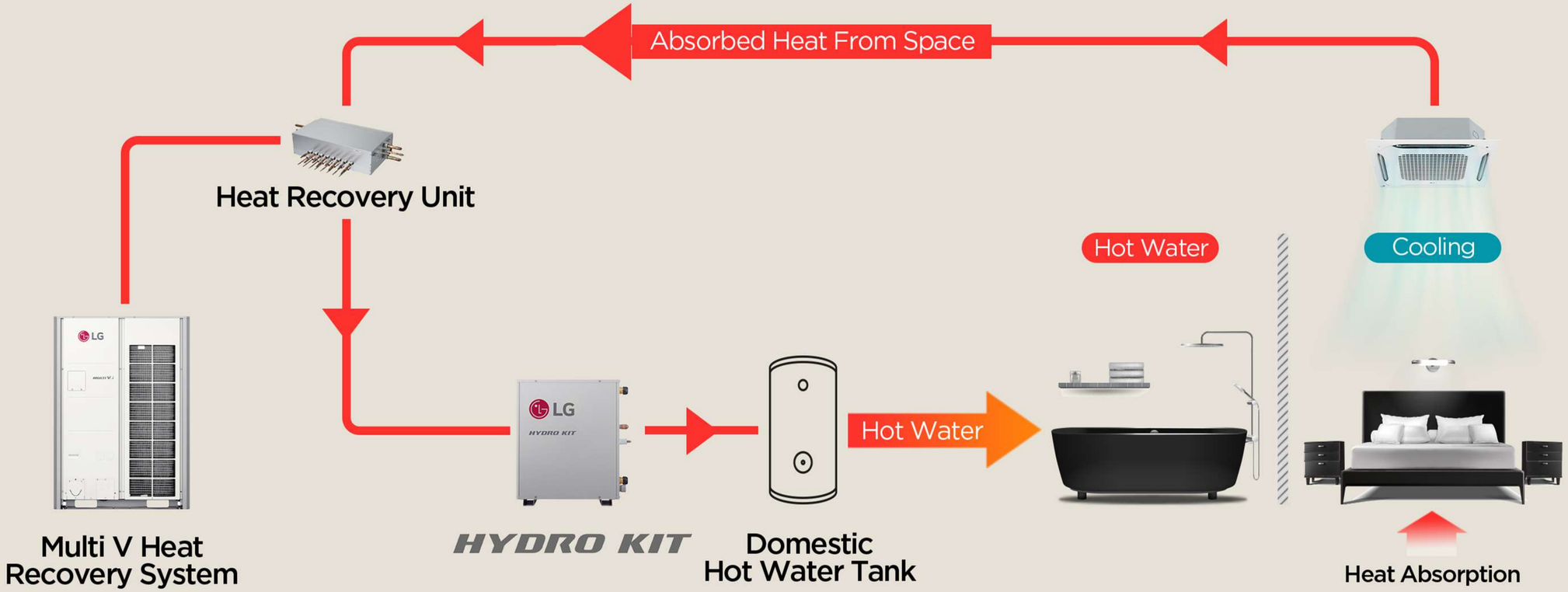
03

No risk of freezing at water side

The Hydro Kit offers significant advantages over air-cooled chiller systems in terms of cost and management by minimizing the water component. Unlike air-cooled chillers that employ water piping exposed to the outdoors, which increases the risk of freezing in cold temperatures, the outdoor unit of a VRF system and Hydro Kit are connected via refrigerant piping. This eliminates the risk of pipes freezing, ensuring optimal performance and reliability.

Installation Flexibility

The reduced water side of the Hydro Kit also makes installation easier and less expensive. The Hydro Kit provides more flexibility in system design and its simplified structure allows easy maintenance by eliminating the hassle of regular water replacement. Comparatively, the water piping used in air-cooled chiller systems is much larger than refrigerant piping and also requires insulation and additional components such as pumps, strainers, and so on.



03

Applicable for mid-sized builidngs

Air-cooled chillers are ideal for applications that demand high heating and cooling capacity per unit. On the other hand, Hydro Kit excels at providing efficient solutions for smaller and mid-sized areas. Both systems offer distinct capacities tailored to specific needs.

Optimize COP with heat recovery effect

While the VRF-Hydro Kit solution can be used as a standalone heating option, its performance is greatly enhanced when integrated with indoor units. This integration allows the system to recover heat, resulting in a significant improvement in efficiency, as measured by the Coefficient of Performance (COP). When used in conjunction with the Heat Recovery Unit, the Hydro Kit achieves an impressive COP of over 6, surpassing the COP of around 3 to 4 when used independently for heating. Not only does this make it more energy-efficient, but it also reduces operational costs. The Hydro Kit sets a new standard for energy-saving heating solutions, exemplifying its commitment to sustainability.

04

Capabilities of the Hydro Kit

There are two main types of the Hydro Kit:

1. Medium-Temperature Hydro Kit: This type heats water that reaches a temperature of 50°C when it leaves the system.

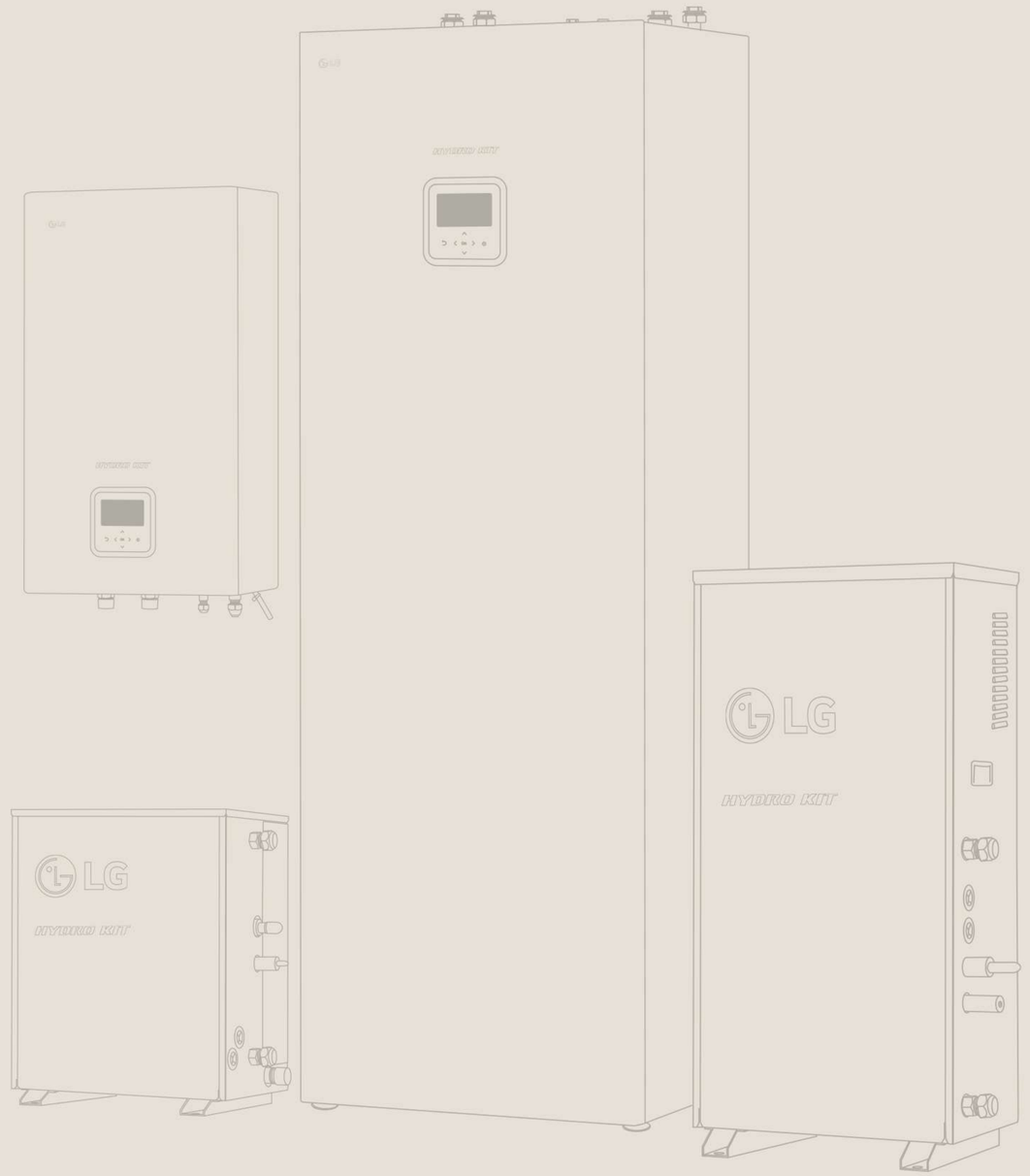
2. High-Temperature Hydro Kit with Cascade Cycle: This type heats water to a higher temperature of 80°C using a cascade cycle.

For the Medium Temperature Hydro Kit, there are three different versions available:

The performance of the Hydro Kit is closely linked to the outdoor unit's performance in the VRF system. For instance, when you connect the Hydro Kit to the LG VRF Multi V i unit, it can deliver its full heating capacity even in frigid outdoor temperatures as low as -10°C. Furthermore, it's designed to operate seamlessly even when the outdoor temperature plummets to a bone-chilling -25°C.*

* Results may vary depending on the environment.

04



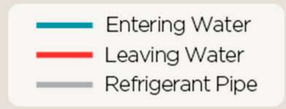
One of the key advantages of the VRF Hydro Kit is its ability to offer improved comfort and control for occupants. With precise temperature control and zoned heating capabilities, the system creates an ideal indoor environment tailored to individual preferences. Whether for residential or commercial applications, this system's flexibility ensures that it can effectively meet the demands of various setups from smaller spaces to larger establishments.

05

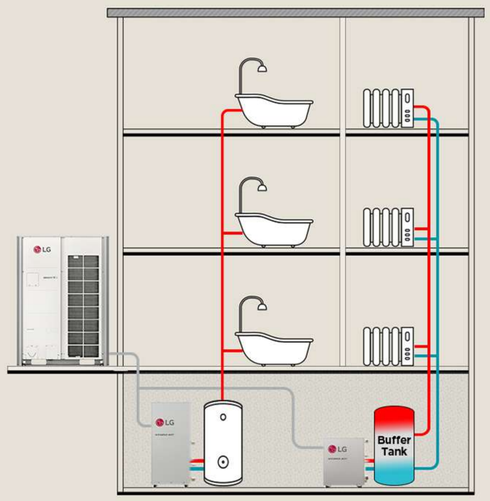
Applications Across Each Vertical

Multi-Family Residential

The Hydro Kit presents a versatile and adaptable solution for heating and domestic hot water (DHW) in multi-family residential buildings. There are two types of heating systems: centralized and individual. In a centralized system, the Multi V outdoor unit and the Hydro Kit work together to provide heating for the entire building. On the other hand, an individual system allows each tenant to have their own heating system by conveniently placing the Multi V outdoor unit on their balcony and combining it with the Hydro Kit. This unique feature ensures that every resident can enjoy personalized heating capabilities, resulting in optimal comfort. Furthermore, the Wall Mounted Hydro Kit is specifically designed for residential use, effectively saving indoor space. By integrating the Hydro Kit into the HVAC strategy of a multi-family residential building, property managers and homeowners can benefit from the efficiency and effectiveness of this advanced heating solution.

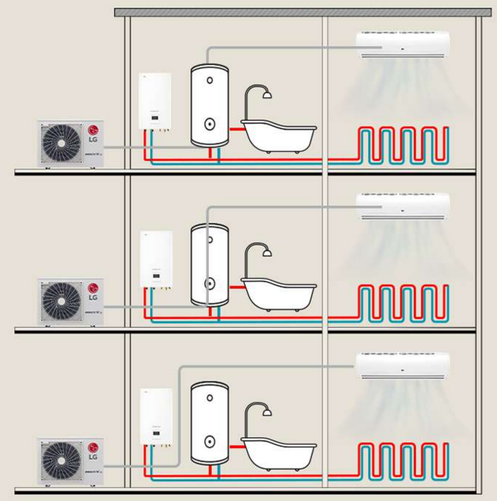


Centralized System



VRF + Floor Standing Hydro Kit(MT/HT)
+ Buffer Tank + DHW Tank

Individual System



VRF + Wall-Mounted Hydro Kit
+ DHW Tank + AC Indoor Unit

05

Designing Heating Systems for New-build and Renovation Projects

When considering heating systems for new constructions or renovating existing spaces, it is important to keep several key factors in mind. These include the required temperatures for heating and hot water, the type of radiators, and the chosen system.

For domestic hot water, in a centralized system, the hot water tank needs to keep the water at a minimum temperature of 60°C for both new construction and renovation. On the other hand, individual systems typically require a minimum temperature of 50°C.

When it comes to heating, different radiator setups require different temperatures. In new construction projects, radiators generally perform optimally at lower temperatures between 40°C to 50°C . However, when renovating, older radiators may require higher temperatures, typically around 65°C to 70°C.

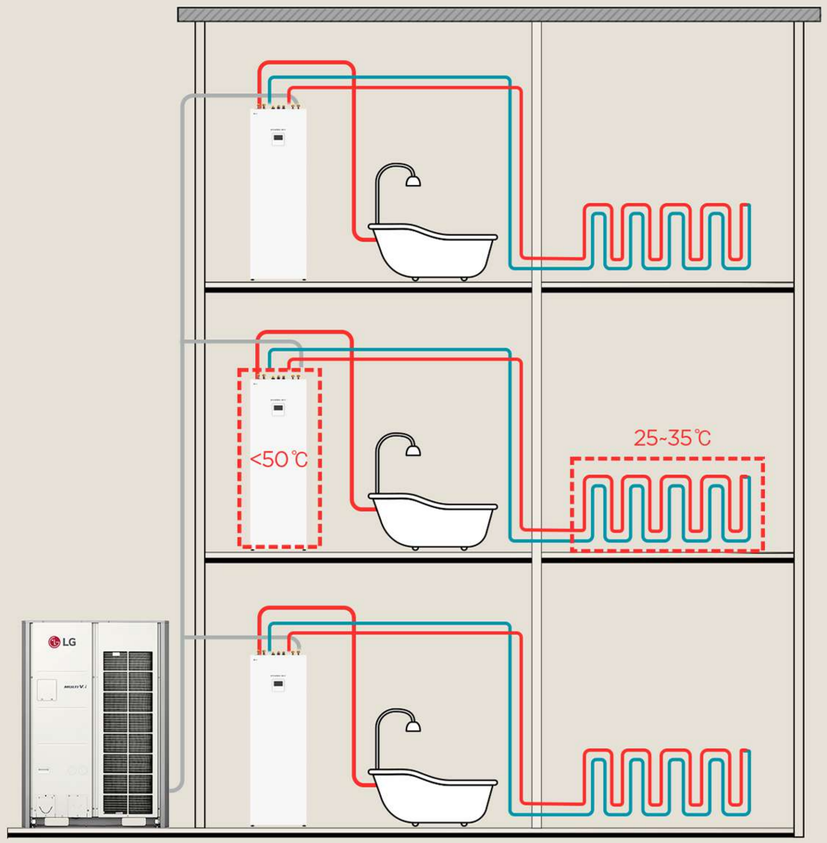
For underfloor heating, temperatures of 25°C to 30°C are suitable for both new constructions and renovations. The design of the Hydro Kit is dependent on these specified temperature requirements.

05

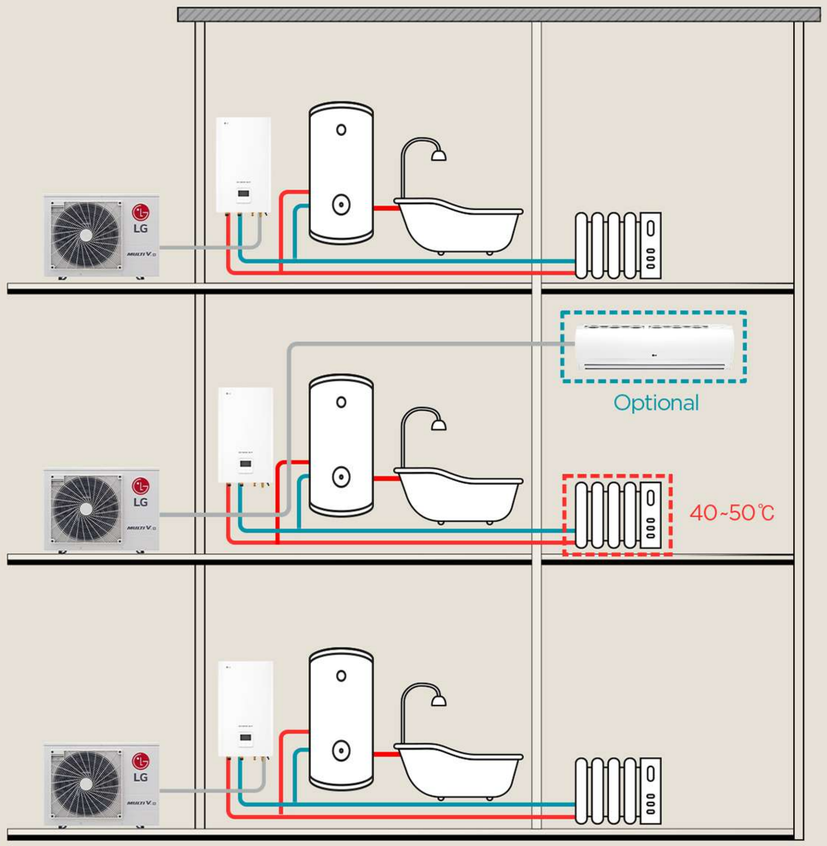
Application for New Building

Entering Water
Leaving Water
Refrigerant Pipe

Central Heating



Individual Heating

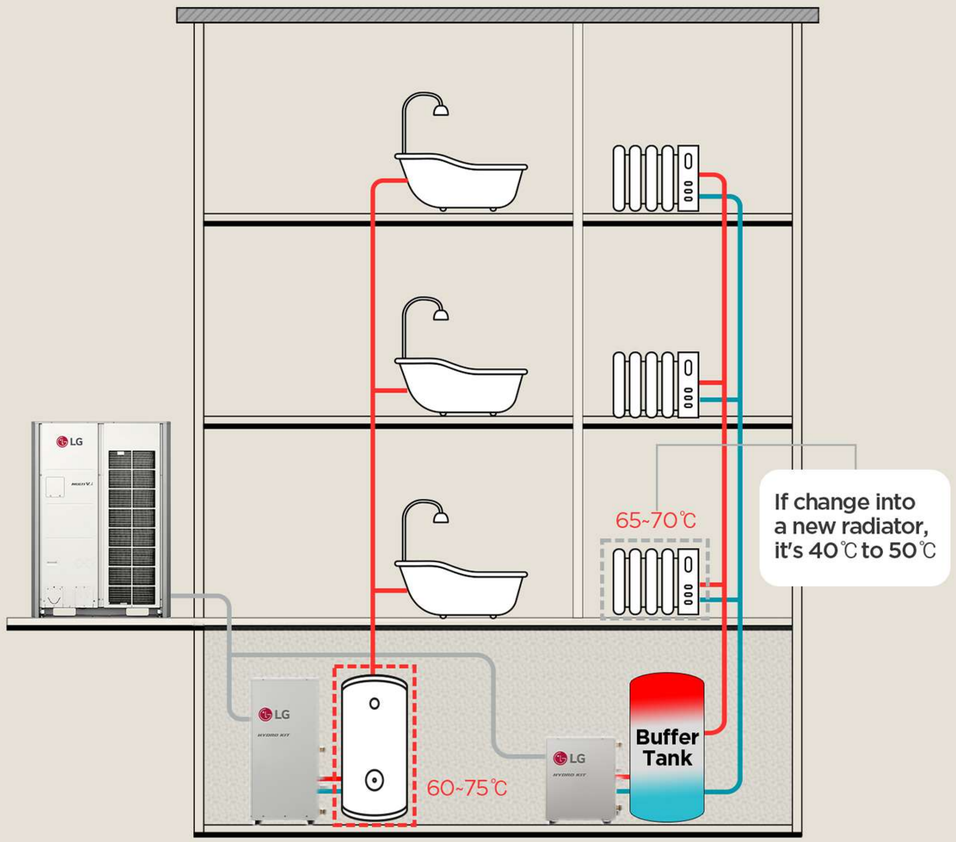


05

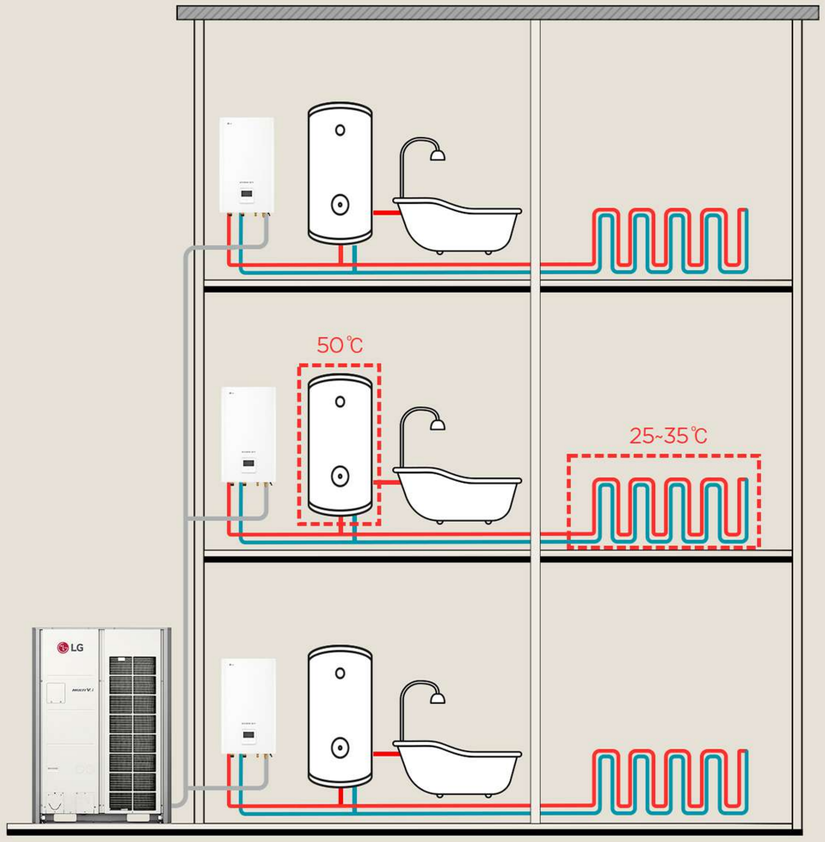
Application for Renovation

Entering Water
Leaving Water
Refrigerant Pipe

Central Replacement



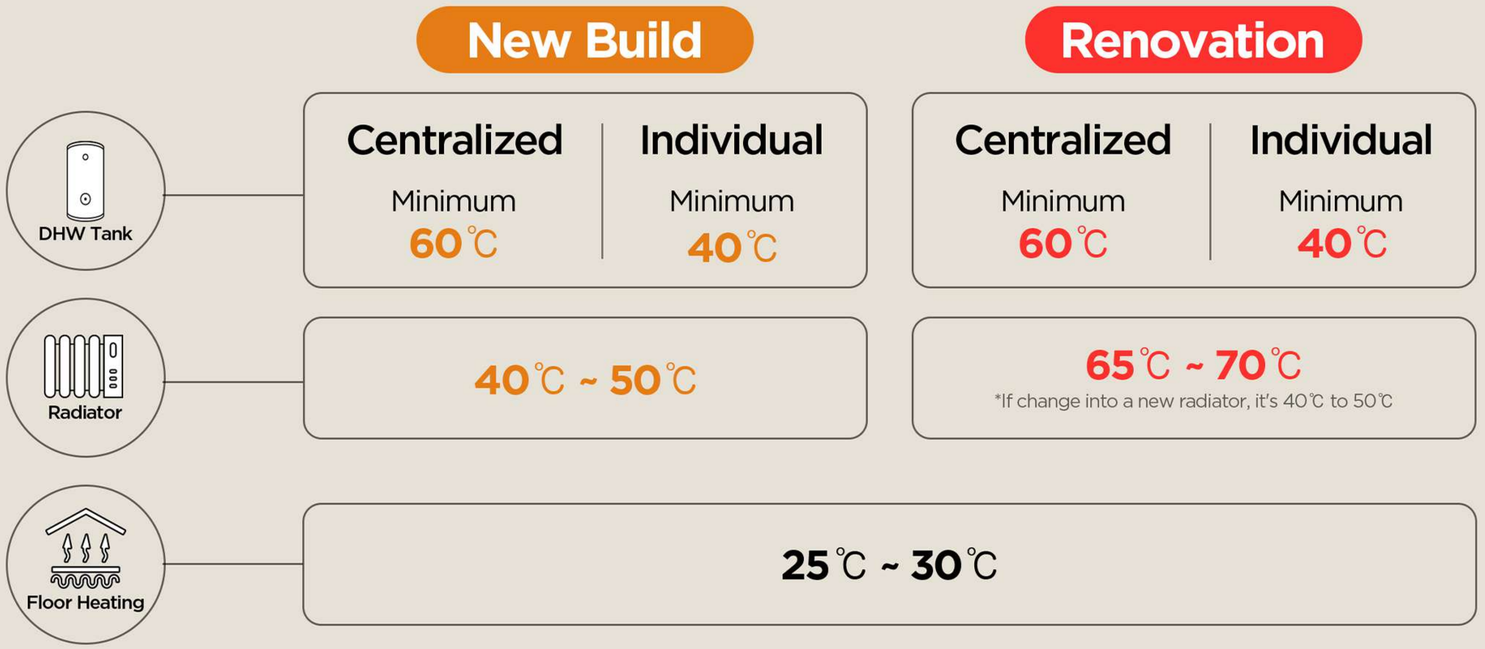
Individual Replacement



05

Renovation projects often require higher radiator temperatures due to older heating systems operating at elevated temperatures. While it's possible to connect the Hydro Kit to existing radiators, it might be cost-effective to switch to new radiators that work better with the heat pump's characteristics. New radiators designed for lower temperatures can help save on operation costs. This, in turn, might allow for the use of a mid-temperature Hydro Kit instead of a high-temperature one. In some cases, government subsidies are available for installing the Hydro Kit during residential remodeling. On the flip side, for new construction projects, the radiators can be designed to work with lower temperatures, thanks to the capabilities of heat pumps.

In summary, when designing a heating system with the Hydro Kit, it is advisable for renovation projects to explore the potential cost savings by considering radiator replacements. Conversely, for new constructions, it is prudent to select the appropriate product based on the reduced temperature needs of modern radiators and insulation requirements. By doing so, one can optimize both efficiency and effectiveness in heating solutions.



05

Hotel

Hotels are the cases where simultaneous cooling and heating are required. Each guest room needs air conditioning and hot water. Additionally, common areas such as pools and saunas also need hot water. The Hydro Kit, integrated with a heat recovery unit and indoor unit, offers a remarkable solution by recovering waste energy from cooling and providing heating with exceptional energy efficiency. This feature contributes significantly to energy cost savings, which makes the Hydro Kit's capabilities a valuable asset for hotels.

05

Restaurant

In a restaurant, the kitchen area requires a constant supply of hot water for cooking and dishwashing. The Hydro Kit offers versatile solutions for cooling, heating, and providing hot water. Its remarkable efficiency lies in its ability to recycle wasted heat from indoor units, resulting in substantial energy savings. This makes it an ideal choice for all types of restaurants that rely on a reliable and efficient hot water supply.

06

Conclusion

The Hydro Kit and air-cooled chiller systems offer unique advantages for different types of buildings. The Hydro Kit excels in energy efficiency, ease of installation, and maintenance thanks to its streamlined water side. By incorporating heat recovery, the Hydro Kit enhances energy efficiency while providing precise control and adaptability for a wide range of applications. This makes it an excellent choice for both residential and commercial buildings.

07

Product	Ref.	Power	Water Temp (Cooling/Heating)	Capacity (kW)					
				5.6	7.1	9.0	13.8	25.2	31.5
 Wall Mounted Hydro Kit				●	●	●			
 **IWT Hydro Kit** (Integrated Water Tank)	R32 & R410A	1ø230V	7℃ / 50℃	●	●	●			
 **Floor Standing Hydro Kit** (Medium Temperature)							●		●
 **Floor Standing Hydro Kit** (High Temperature)	R410A + R134A or R32 + R134A	1ø230V	- / 80℃				●	●	
		3ø400V					●	●	

www.lg.com/global/business/air-solution

facebook.com/lghvacglobal

linkedin.com/company/lghvacglobal