PASSIVE SYSTEMS

Glazing Tinting Films

System Description

Glazing tinting films work by reducing the solar heat gain coefficient by applying a thin, tinted film on an existing glazing system. The film reduces the solar radiation transmitted through the window thereby reducing the heat gain experienced by a unit. A wide range of products are available that can be applied both on the exterior and interiors of windows.

Advantages	Disadvantages
Reduces solar heat gain, therefore reducing the peak cooling load of a unit. Materials are relatively inexpensive and can be bought at hardware stores. Can be added on a unit-by-unit basis.	Does not reduce heat gain due to conduction (not effective against the effect of heat waves). Does not offset thermal mass heat gains during heat waves. Does not reduce energy consumption for heating.

Implementation Challenges

The film can be applied by unit owners themselves if they have safe access to the exterior windows. Glazing systems are ultimately considered common property within strata buildings and therefore any application of the product would require prior approval of a council. Furthermore, as the tint can impact the aesthetic of a building, the same product would need to be applied to achieve aesthetic uniformity. This requires coordination and consensus among unit owners for effective implementation. Many contractors within the Metro Vancouver area do specialize in installation of tinting systems that can review building specific applications.

External Shading Systems

External shading systems are another approach to reducing the peak cooling load of a building. These systems generally involve louvered panels or horizontal sunscreens that create a shade from the sun over glazing systems. Unlike tinted windows which reduce the solar heat gain coefficient, shading systems prevent solar radiation from reaching the window. This has a greater impact in reducing the overall heat gain experienced since the system can prevent direct sunlight

from reaching any fenestrations. External shading has the greatest impact when installed on southern facing windows for overall reduction in building cooling load. The implication is that not everyone in the building may have an external shade installed if an economic approach is taken which has the potential to hinder obtaining majority consensus from unit owners.

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Implementation Challenges

Retrofitting an external shading system on a building is a significant undertaking and will require design consultants. Depending on the complexity of the building and the system being considered, this may require an architect, envelope engineer, and structural engineer. The design process will entail a site review, preparation of recommendations and design options, and eventually the preparation of construction documents. Once construction documents are prepared, these can be put to a public tender to hire a contractor for installation. In terms of cost of the system, it is difficult to estimate as there are a number of factors that influence this. These factors include the size of the building, the type of existing structure, size of the fenestrations, materials chosen, etc.

A special levy will likely be needed to be voted on to finance design consultant fees and the construction of the external shading system. Strata reserve funds typically do not account for retrofits of this nature. As this is a whole building solution, implementation will require a three quarter majority to vote in favor to proceed. Securing this majority will be challenge for any Strata Council as there are no guarantees the system will be able to offset the impacts of a heat wave.

ACTIVE SYSTEMS

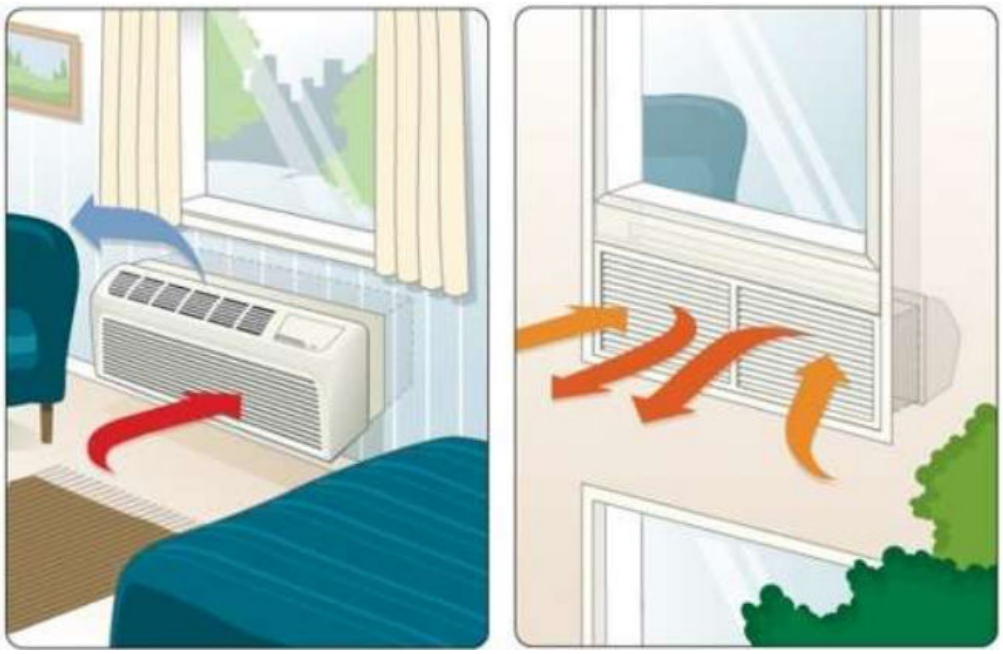
Packaged Terminal Air Conditioner

System Description

The Packaged Terminal Air Conditioner (PAC) is a type of ductless air-cooled heat pump where both the condenser and evaporator are contained in a single unit. The unit is wall mounted on an exterior wall with the condenser portion of the unit sitting outside and the evaporator sitting inside. It has an integral supply air grille where the direction of airtlow can be adjusted. A single unit is generally needed for a single room with an exterior wall.

PTACs are “thru-wall” systems where the full cross section of the unit must penetrate the wall. Units are typically supplied with a frame that can be installed on an exterior wall to ensure the opening is the right size and the unit can sit flush within. Remote thermostats can be tied into them for control or units can come with built-in controls.

Advantages	Disadvantages
Relativley economical cost. The unit is stand-alone. No external components are necessary. Can provide both heating and cooling.	Requires a large opening in the envelope for installation. Large openings increase risks of water ingress. Compressors are internal to the unit and can be quite noisy for occupants. May require structural engineer to detail exterior wall opening.



Implementation Challenges

In the retrofit context, the biggest barrier to PTAC installation is the size of opening on the exterior wall that is needed to install a unit. Structural reinforcement will likely be required given the size of the opening that is needed. Any work involved would require a structural engineer to review the feasibility and determine what type of reinforcement would be required to ensure integrity of the opening. This work would certainly require Strata Council Approval, building permits, and multiple disciplines of contractors to install.

In addition to a structural engineer, a unit owner may require the services of an envelope engineer. With PIAC units, water ingress is a high risk even in new construction projects. An envelope engineer would be able to review the specific exterior wall assembly and provide a design to minimize the risk of water damage as result of the large opening created. If a Strata chooses to pursue this option, the size and quantity of openings required through the existing building would be of concern and thorough review of existing conditions would be necessary by a consulting team. While the PTAC unit itself may not be expensive, the risks involved and the costs to mitigate these risks can be significant.

Integrated Heat Pump

System Description

Integrated heat pumps are similar to PTAC units in that they are “thru-wall” systems as well. The primary difference is that the condenser is located indoors but heat exchange to the outdoors is still possible with two 162mm (6 in.) diameter to 200mm (8 in.) diameter piped through the exterior wall directly to the outdoors. Manufacturers such as Innova offer compact units with low pro-

files with integral supply grilles. A single unit will need to serve a single room with an exterior wall. Units can be controlled with remote thermostats or can come with built-in thermostats.

Advantages	Disadvantages
Relativley mid-range in cost. The unit is stand-alone. No external components are necessary. Can provide both heating and cooling. Required opening is relativley small. Compressors are internal to the unit but quieter than PTACs.	Requires an opening large enough an envelope consultant should be involved. Large openings increase risks of water ingress. May require structural engineer to detail exterior wall opening. Not common.

Implementation Challenges

While the required opening size is smaller than what is necessary for a PTAC unit, integrated heat pump openings are not negligible. They are still around 150mm (6 in.) to 200mm (8 in.) in diameter which is roughly equivalent to what is necessary for a washroom exhaust duct termination at the exterior wall. Openings of this size may not require a structural engineer to review though the question should still be asked as wall construction can vary from building to building. The opening is still large enough where an envelope engineer should review how holes would be cored through existing walls. If this is not executed properly, water ingress is a risk. The risk is then compounded if multiple penetrations are created throughout a building so a technical sound and consistent strategy needs to be determined by an envelope consultant.