FAMILY REUNION

Connect North & South Korean separated families

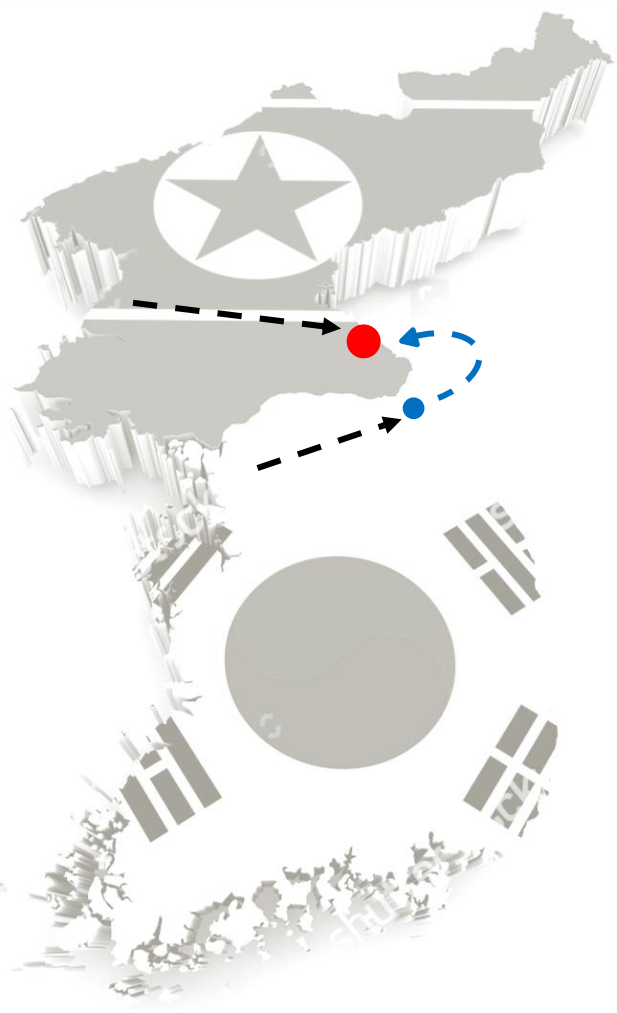
[14,000 people and over 80 years old]

In 1953, 10 million Korean families were separated by a wall between North and South Korea. Today, over 140,000 are still separated.

Nobody is allowed to cross this wall, and South Koreans may not enter North Korea.

Pic Source : http://korea.stripes.com/news/families-still-separated-60-years-after-korean-war

EXISTING SITUATION



Time? 14,000 ÷ 600 people/year = 18 years

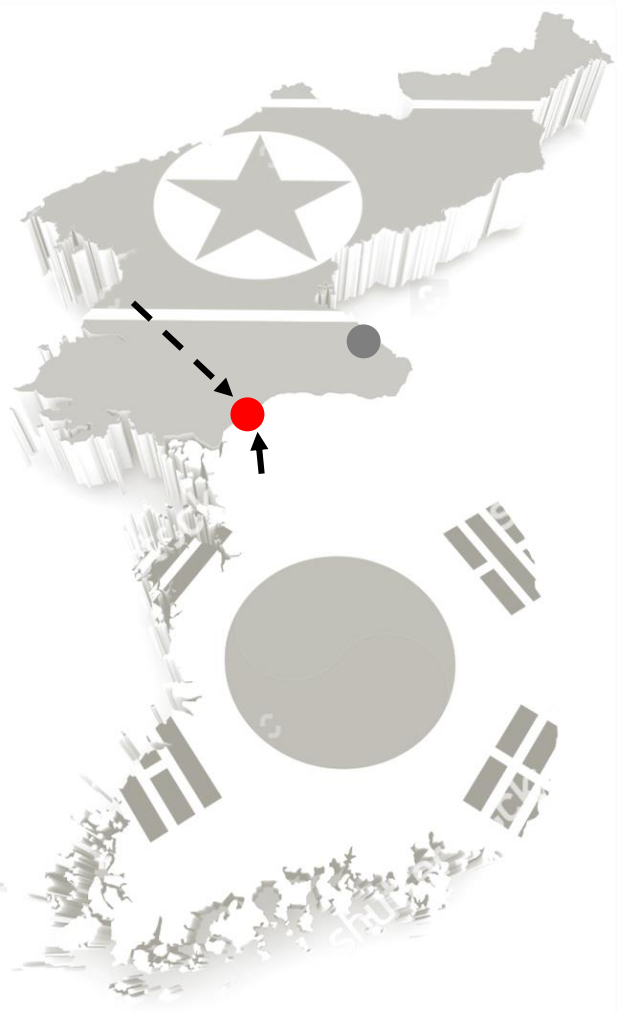
Cost? (🍽 + 🛏) x 6days = $ 1.2 million

Since 2000 Only a number of people are chosen according to the limited hotel capacity for reunion and involves very high cost for transportation and hotel for 6 days.

Waiting time for one meeting could be 18 years in the worst case. It is hard for elders, they may no longer be able to wait.

Pic Source : http://www.bbc.com/news/world-asia-pacific-14611873

PROPOSED SOLUTION_ DAY VISIT



Time? 14,000 ÷ 300 people/day = 110 days

Cost? (🍽 + 🛏) x 1days = $ 0.1 million

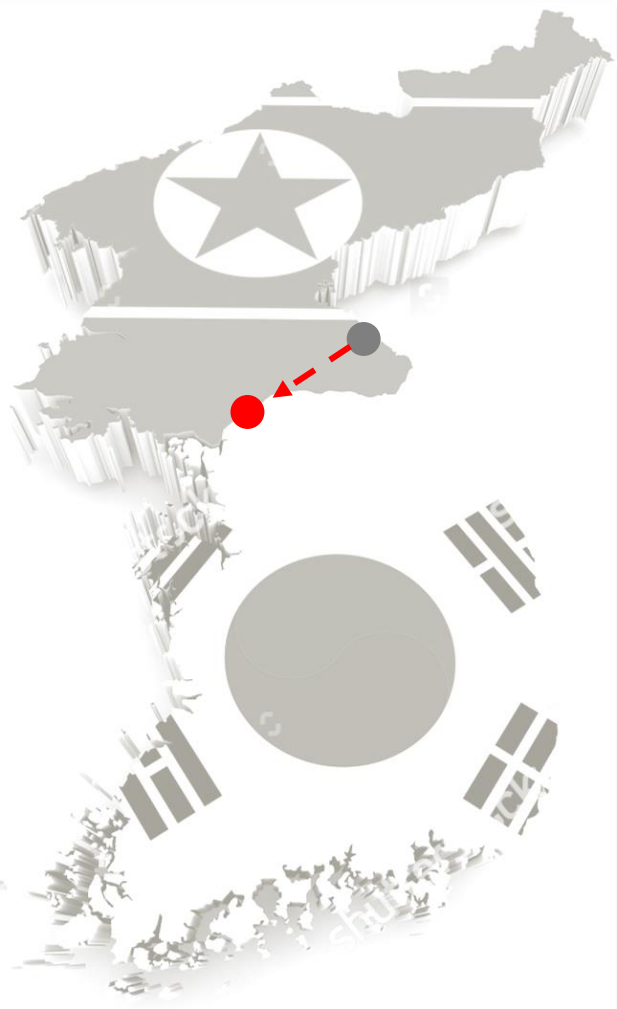
The goal of my proposed project is to connect North and South Korea by developing a new community that serves as a meeting point for the families to reunite.

Shipping containers will be used to construct affordable houses in a short period of time.

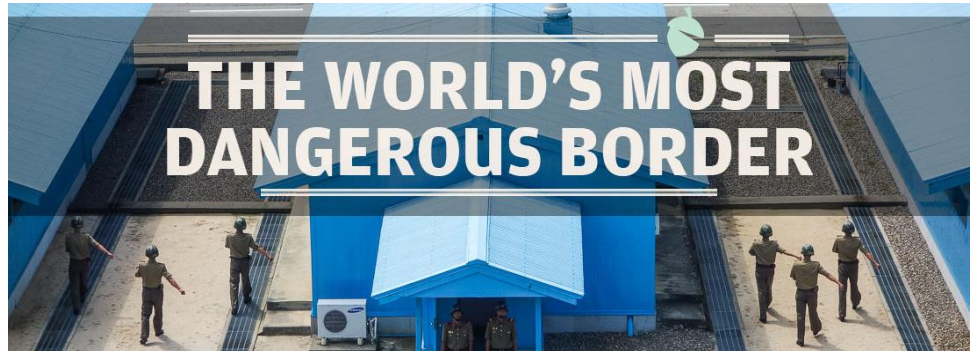
Pic Source : http://www.korea.net/NewsFocus/Travel/view?articleId=119589

Pic Source : https://twitter.com/ISOspaces

PROPOSING NEW LOCATION



Danger? ☹



North Korea → Border (DMZ)

Safe! ☺

Then a new meeting point in the border (DMZ) between North and South Korea is proposed to reduce meeting cost along with traveling or waiting time.

The key is that this location allows for a day's visit with existing public transportation.

Pic Source : http://www.earthnutshell.com/the-worlds-most-dangerous-border-a-tour-of-north-koreas-dmz/

Pic Source : http://wowkorea-supporters.blogspot.de/2014/06/wow-korea-supporterstravel-koreadmz.html

PROPOSED CONCEPT

Fast

Meeting shelter

Day visit (8hours)

Low cost

Local Material

Passive

Comfort

300 people / day

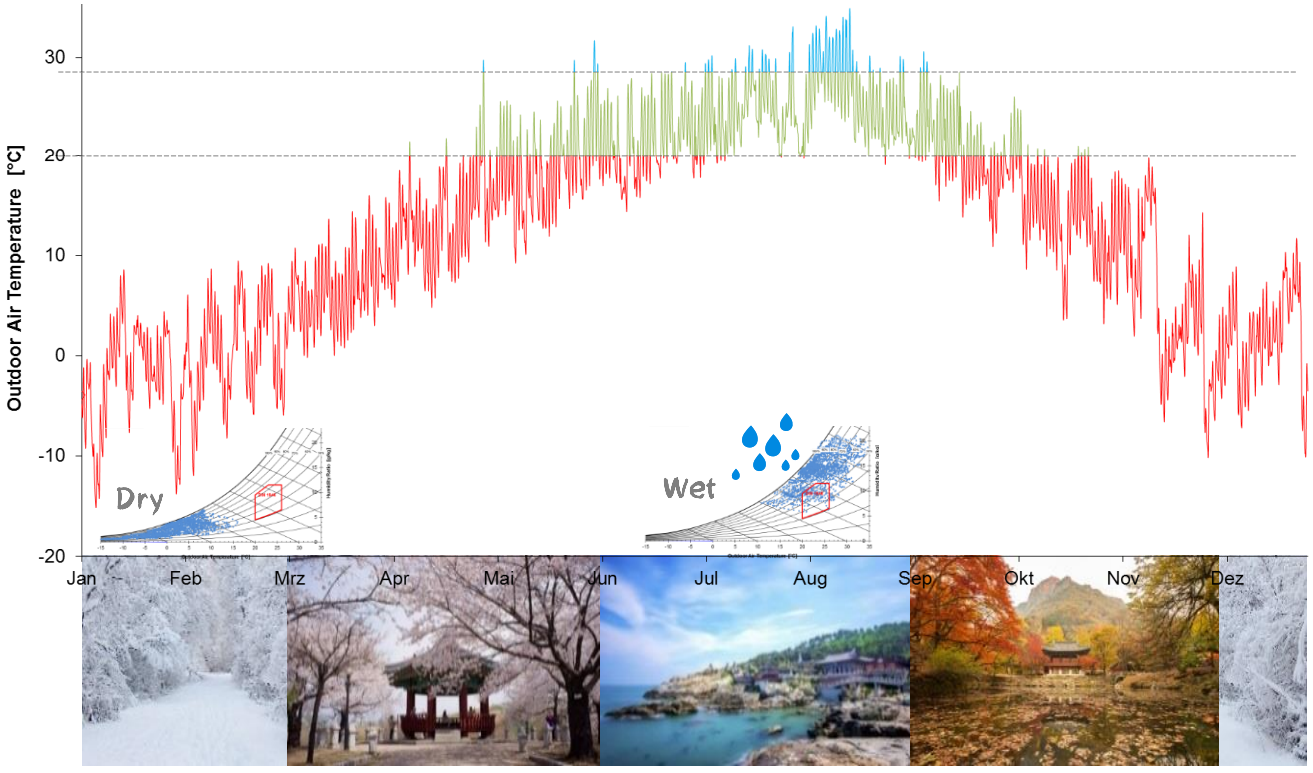
Elder (over 80 years old)

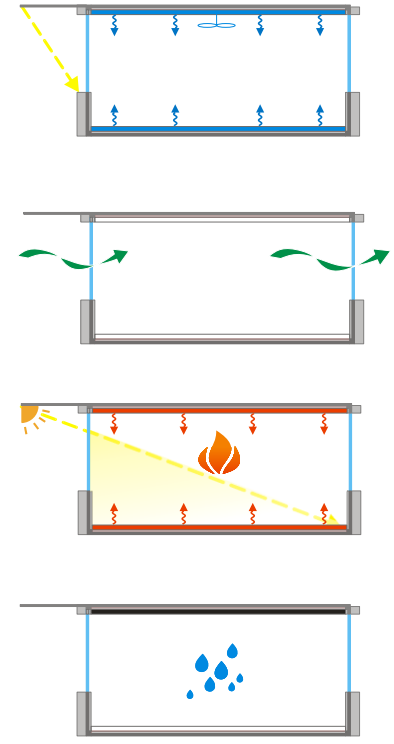
Time, cost are reduced by building with pre-fabricated shipping containers and local material like Hanji (paper) on window and Hwangto (earth) on walls with a passive hydrothermal strategy.

Comfort is achieved through floor heating and natural ventilation with operable windows and self-shading.

Pic Source : https://lunchboxarchitect.com/featured/port-a-bach-shipping-container-home/

WEATHER





The different seasonal weather, acts as the biggest challenge to design. Figure 4 below shows that based on outdoor air temperature, winter in Korea is very cold (-15°C) and dry by Siberian wind.

However, summer is very hot (+35°C) and wet by monsoon.

Pic Source : http://says.com/my/lifestyle/spring-in-korea

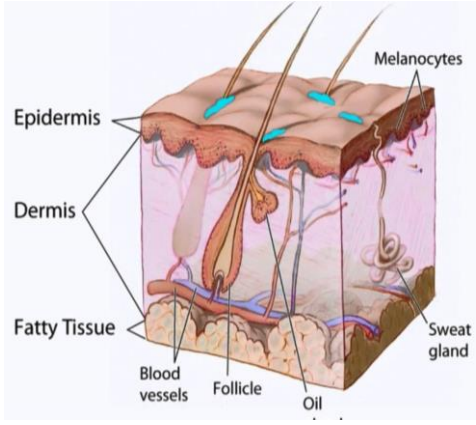
Pic Source : https://www.bookmundi.com/south-korea/travel-guide/best-time-to-visit-south-korea-513

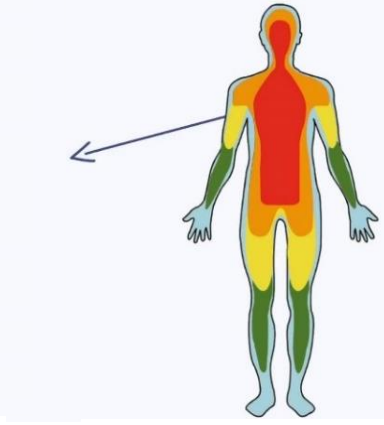
LOCAL MATERIAL

Self control

Temperature

Humidity





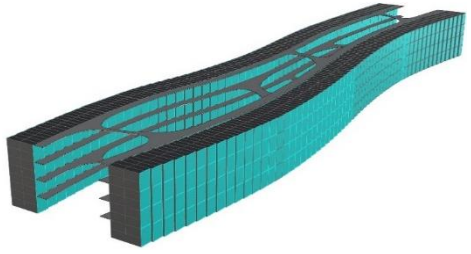
In order to improve hydrothermal comfort quickly, the proposed solution is to maximize the humidity control and minimize heat loss.

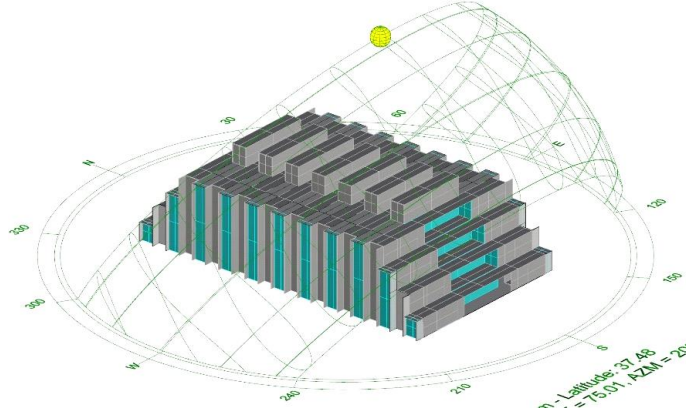
A layer of insulation with available material in Korea like Hanji and Hwangto.

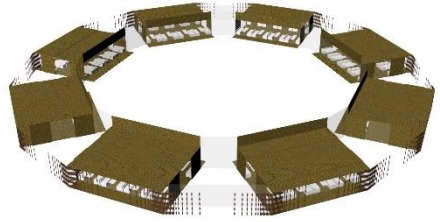
Pic Source : http://www.korea.net/NewsFocus/Culture/view?articleId=101553

Pic Source : https://www.youtube.com/watch?v=6k5foMxNOsY

DESIGN ITERATIONS







The design process went through multiple iterations. At each stage, the design was evaluated based on accessibility, local climate, and construction cost and time.

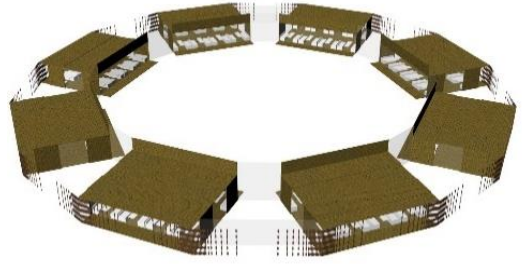
The final design is easier to construct than the second design shown in the middle. It uses less volume and therefore requires less heating and cooling.

PROPOSED DESIGN

Seasonal configulation

Create buffer zone

Circular arrangement

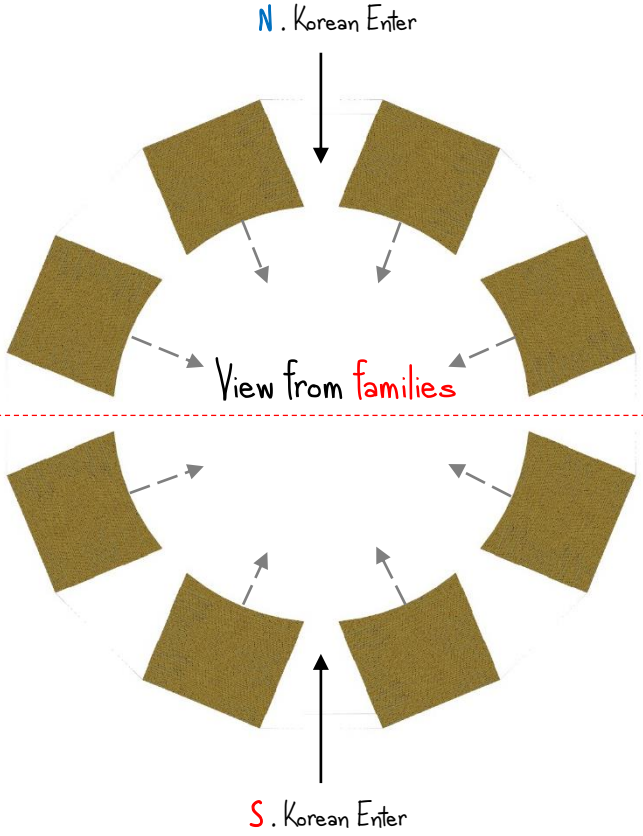


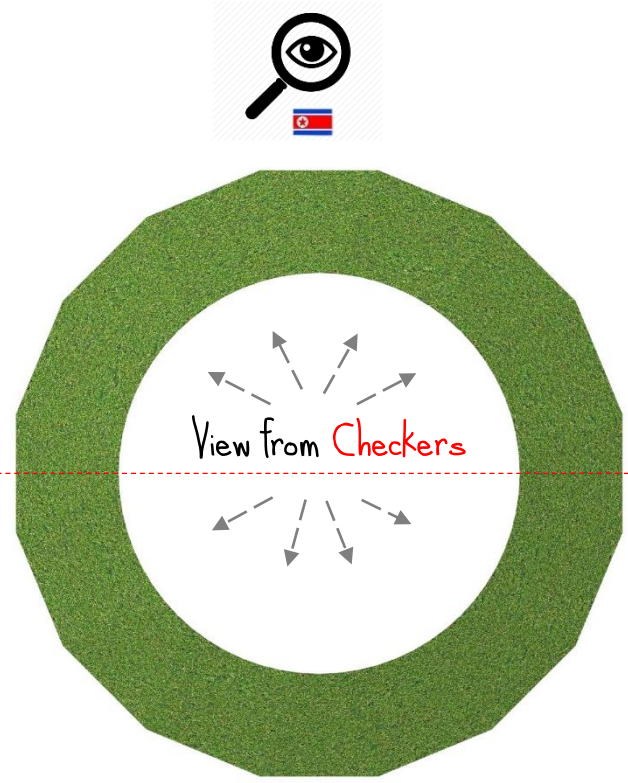
The shipping container unit can be adjusted using operable window doors for daylight control and natural ventilation.

Two units can be assembled together as one module to increase indoor space for seating and walking.

Eight modules can be arrayed in a circular arrangement.

CIRCULAR ARRANGEMENT



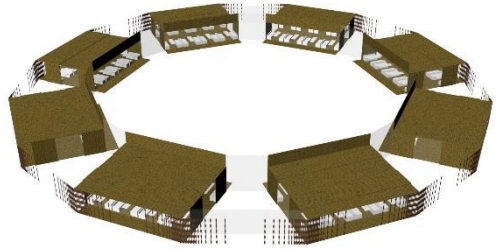


The open view arrangement provides a good view of the courtyard in the event of a big celebration and allows the checkers from North Korea easy access.

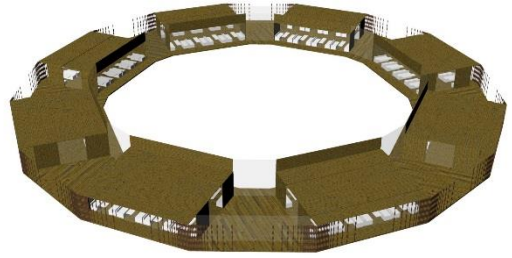
This is because the North Korean authorities are strict in order to prevent the leaking of top military and the spread of a different idealism.

DESIGN ELEMENTS

Meeting zone



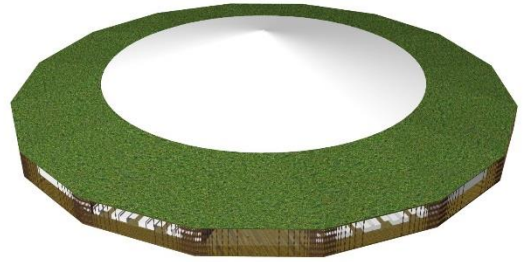
Buffer zone



Double roof

Movable wall

Umbrella shading



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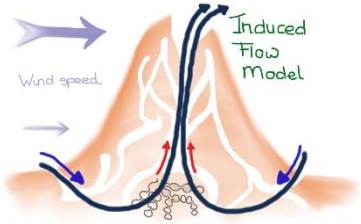
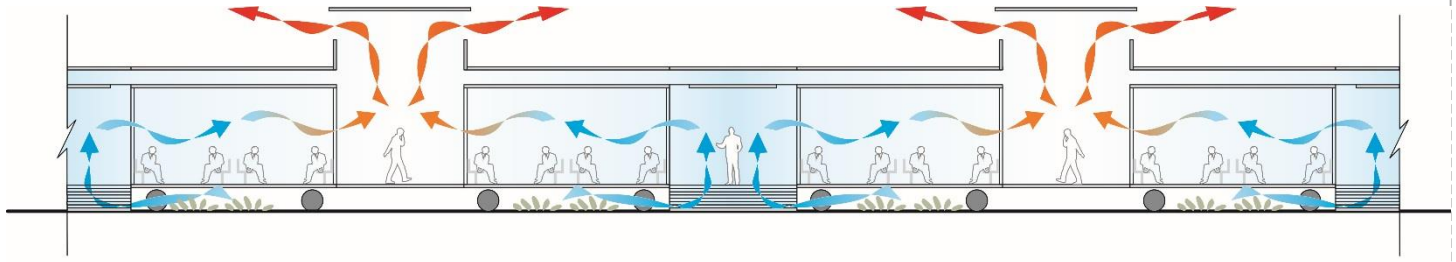
The closed view arrangement reduces the heating and cooling demand by saving thermal zone.

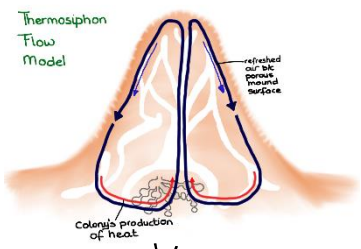
This excludes the courtyard, but includes the inner circle ring, which serves as the meeting zone.

BUFFER AREA

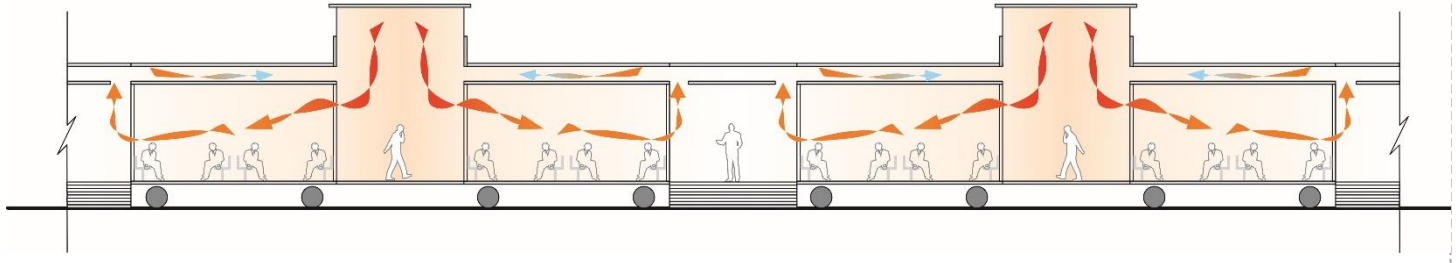


Summer





Winter

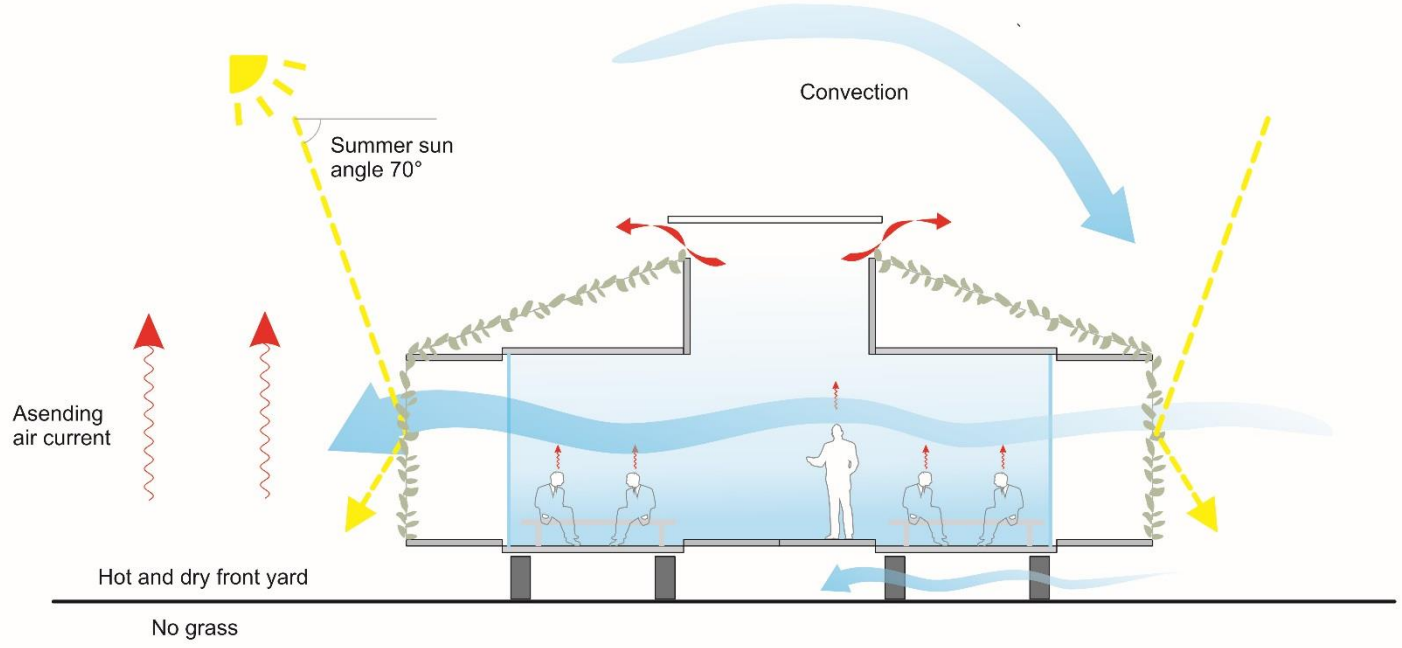


In order to reduce the cooling and heating demand, supply air is pre-cooled or pre-heated, depending on the season, before entering the thermal zone.

Pre-cooling is done by guiding summer air towards cool shaded areas under the building, and pre-heating the cold winter air by a solar chimney on top of the building.

Pic Source : https://insectsdiditfirst.files.wordpress.com/2013/09/2013-09-04-08-40-10.png

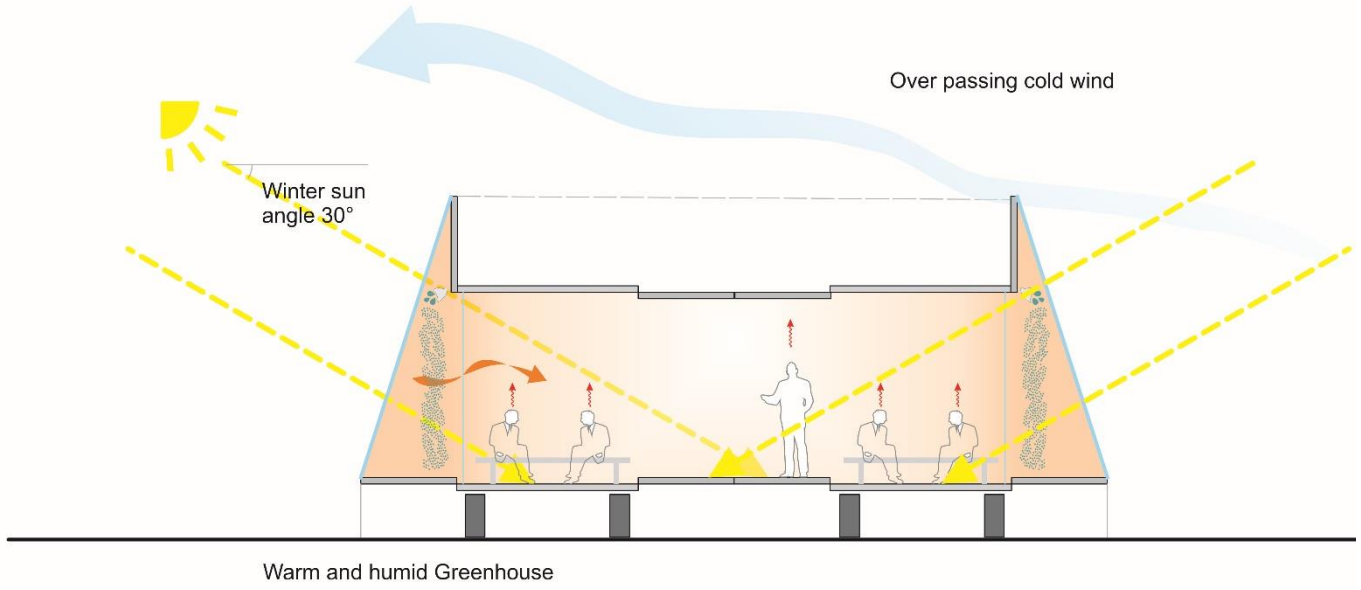
WEST-SUMMER



Seasonal configuration of air buffer zone by shipping container's door position.

Subsequently, the shipping container's doors are adjusted to serve as shading in summer and to reduce solar internal gains.

WEST-WINTER

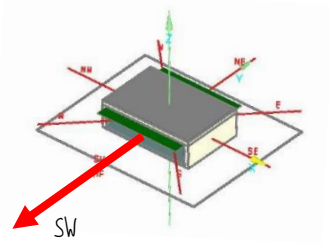


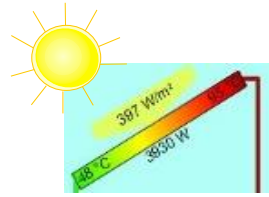
Seasonal configuration of air buffer zone by shipping container's door position.

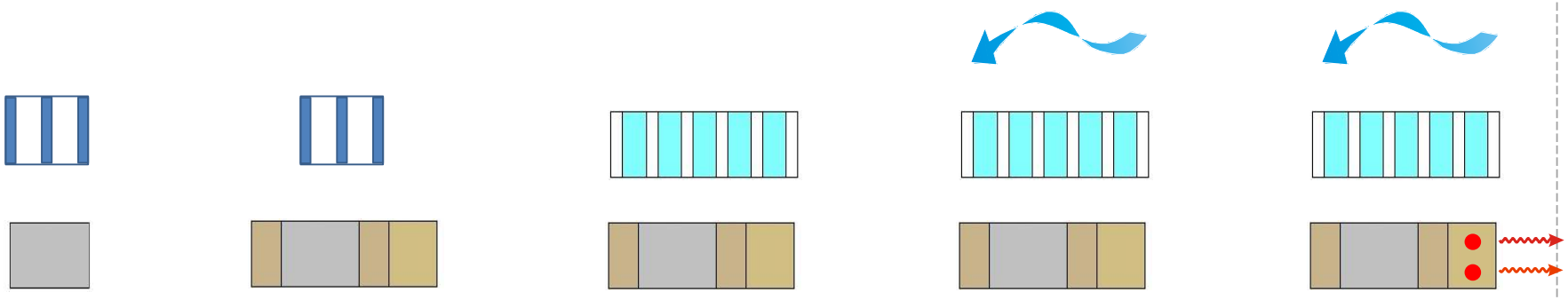
In winter, the opening serves to maximise solar gain in order to heat up the air.

COMFORT SIMUATION-VARIANTS

WUFI®







BASE CASE VAR1 VAR2 VAR3 VAR4

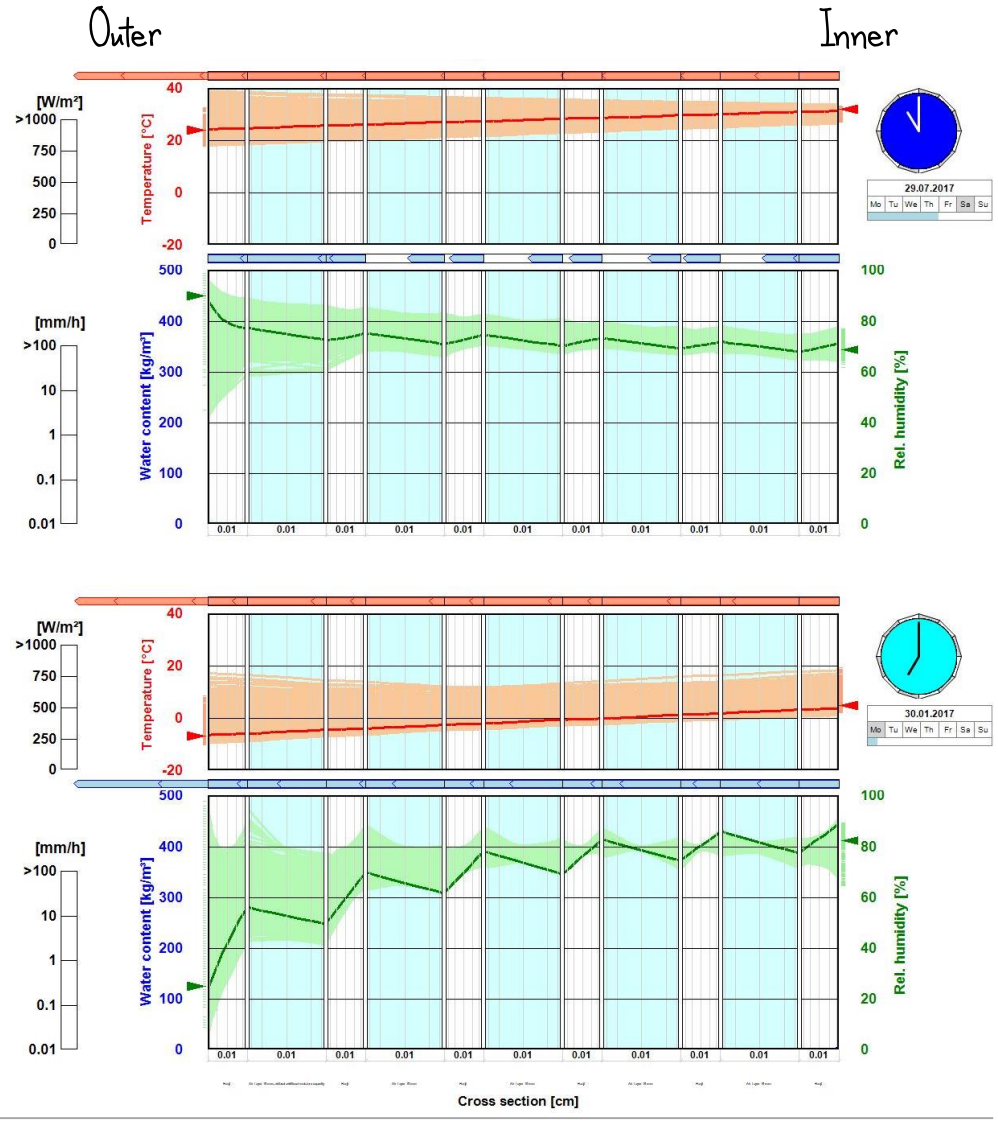
The variant simulations have four different material combinations with ventilation and solar thermal. The simulation zone (12 x 8 x 3m) is facing south-west, which is the worst case for solar gain

Pic Source : WUFI software

PAPER WINDOW

Summer

Winter



There is the positive impact of paper window in combination with Hanji and air layers for both summer and winter (simulation by WUFI hydrothermal software).

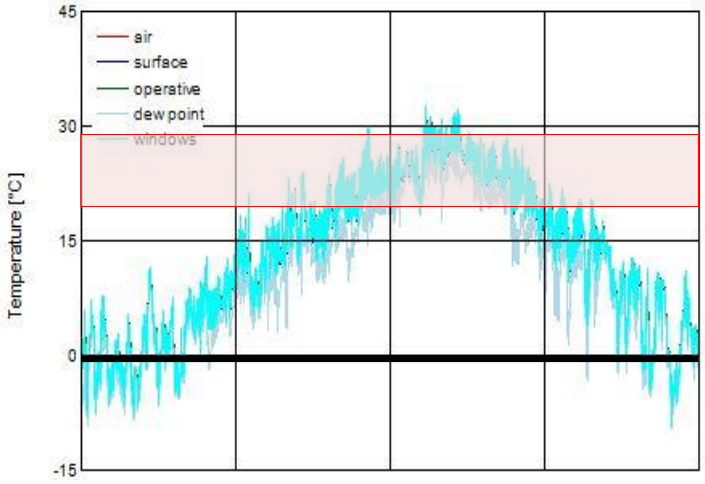
There is an improvement in humidity comfort and thermal comfort both summer and winter season.

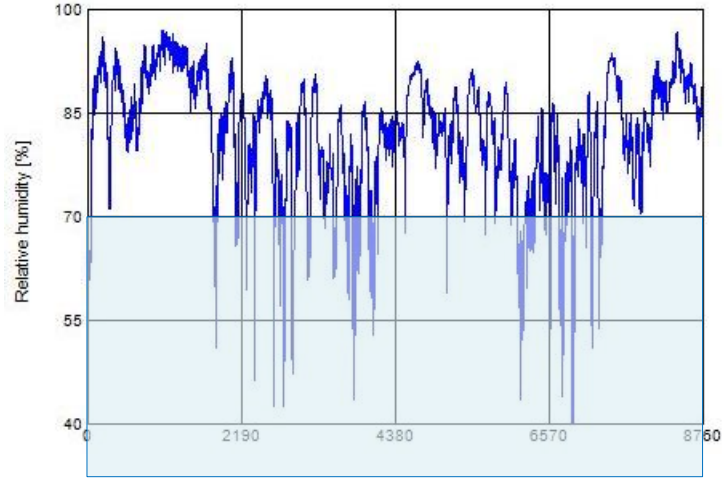
Pic Source : http://english.chosun.com/site/data/html_dir/2013/07/09/2013070900750.html

Pic Source : WUFI software

BASE CASE

Aluminium Glass





☐ Tamb : 20 — 28°C

☐ R. Humidity : 30 — 70%

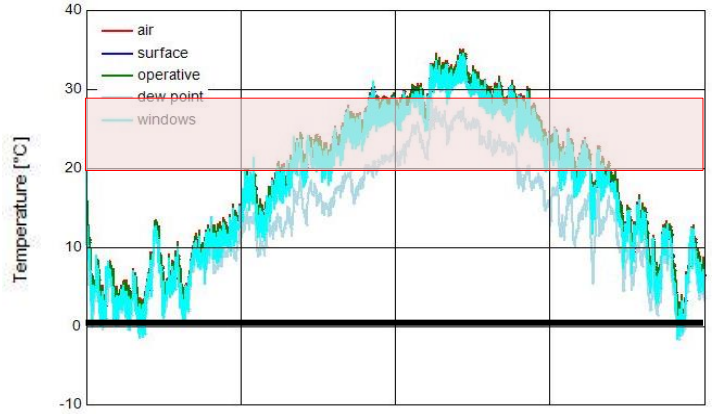
The target is to maintain indoor temperature between 20°C and 28°C, and relative humidity between 30% and 70% to achieve the comfort range for elders using a passive strategy.

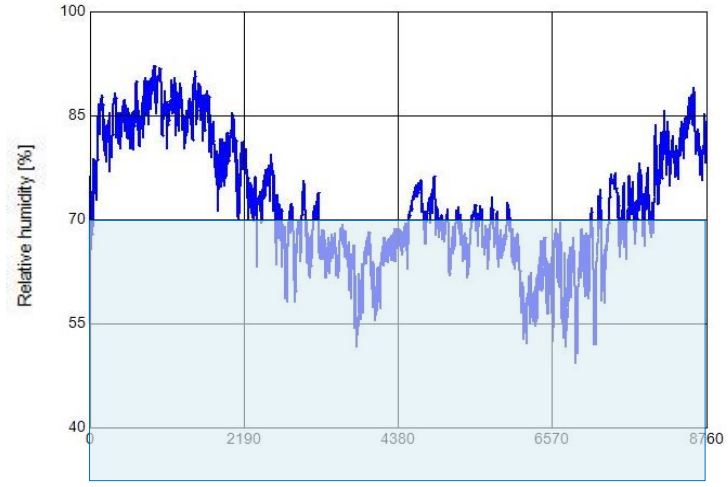
This shows the base-case with its indoor climate conditions combined with only aluminium (as shipping container and glass window).

Pic Source : WUFI software

VAR1

Clay + Glass





☐ Tamb : 20 – 28°C

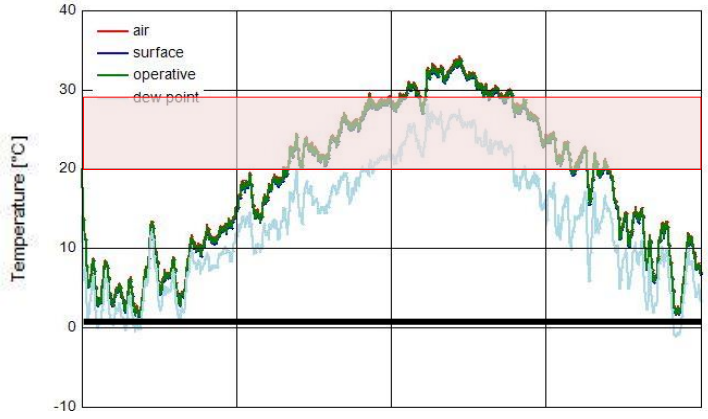
☐ R. Humidity : 30 – 70%

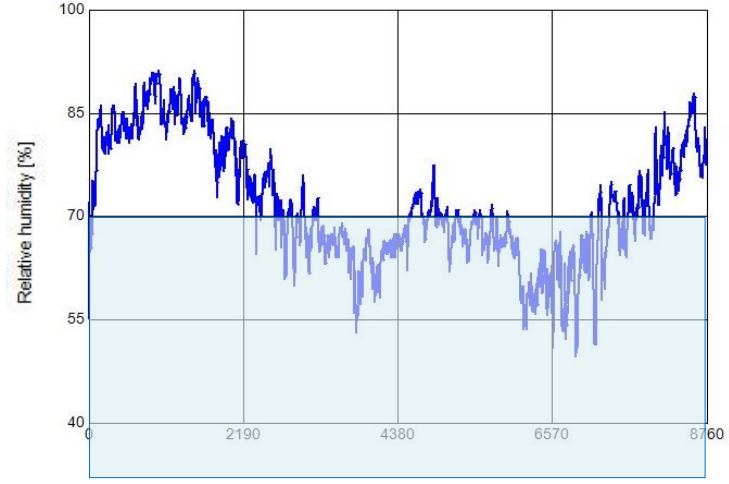
Clay with heat insulated clay (U-value: 0.72W/m^2) and glass window) have positive impacts than glass hydrothermally in Korea climate condition.

Pic Source : WUFI software

VAR2

Clay + Paper





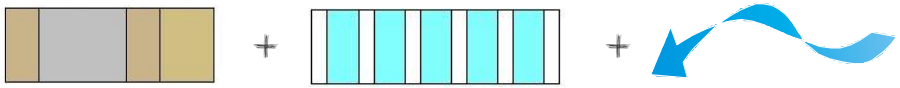
☐ Tamb : 20 — 28°C

☐ R. Humidity : 30 — 70%

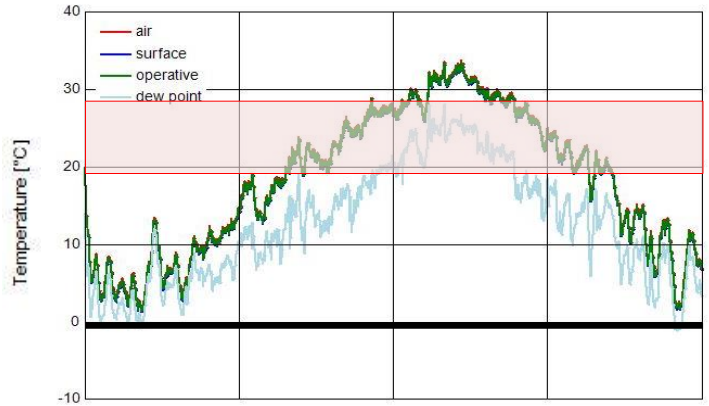
Clay with heat insulated clay (U-value: 0.72W/m^2) and Hanji paper window (U-value: 0.89W/m^2) have positive impacts than glass hydrothermally in Korea climate condition.

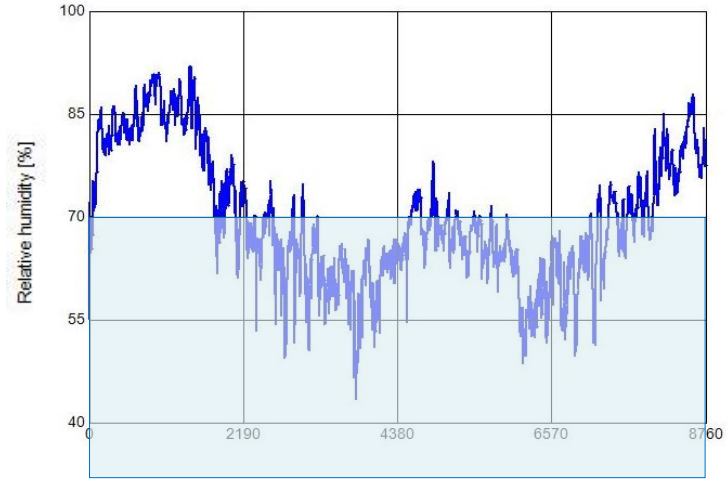
Pic Source : WUFI software

VAR3



Clay + Paper + N.ventilation





☐ Tamb : 20 — 28°C

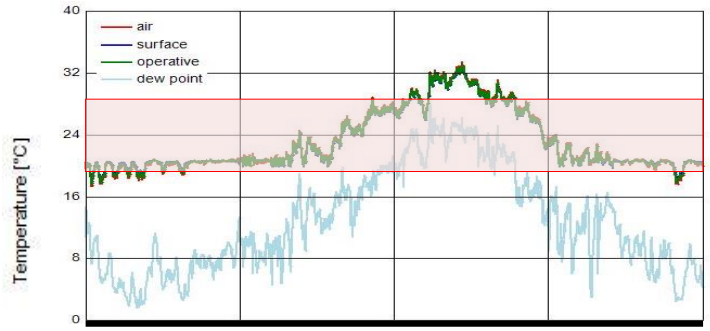
☐ R. Humidity : 30 — 70%

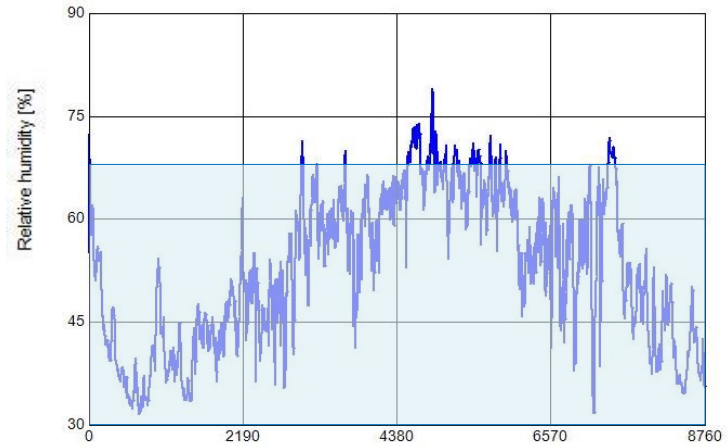
This demonstrates the positive impact of added higher ventilation rate (summer 1.3 ach, shoulder 1 ach, and winter 0.5 ach) than 1 ach whole year duration.

Pic Source : WUFI software

VAR4

Clay + Paper + N.ventilation + Solar Thermal





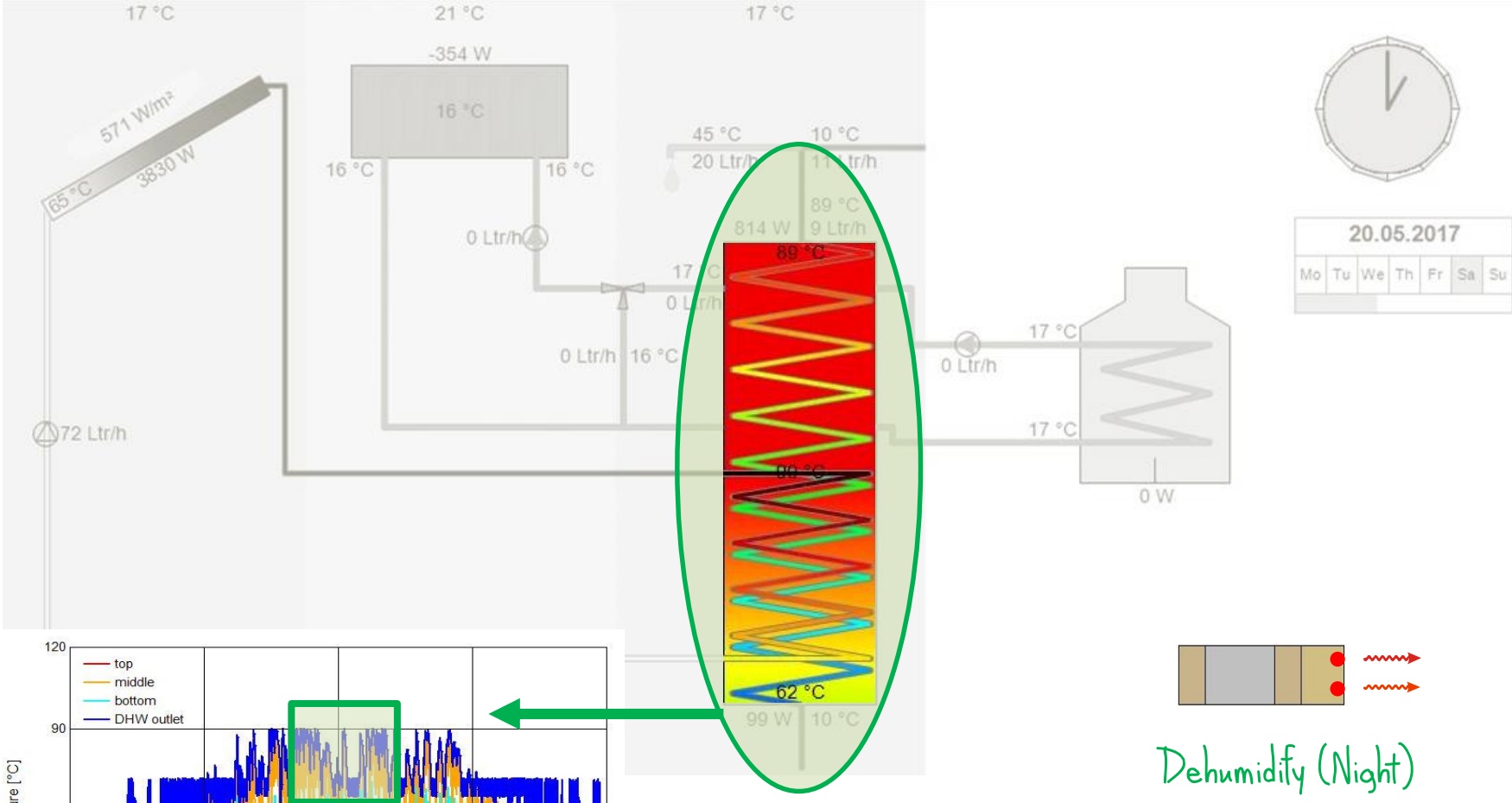
☐ Tamb : 20 – 28°C

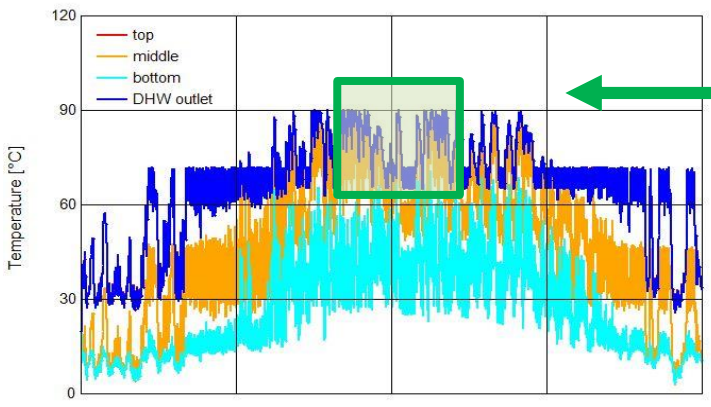
☐ R. Humidity : 30 – 70%

This demonstrates the positive impact of added solar thermal to save energy in water tank for floor heating. By this, indoor ambient temperature and relative humidity can be in the comfort range during the whole year except some summer periods, which need fan supported cooling and dehumidification.

Pic Source : WUFI software

SOLAR THERMAL



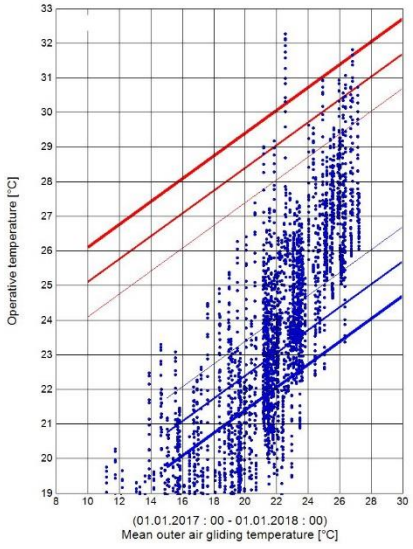


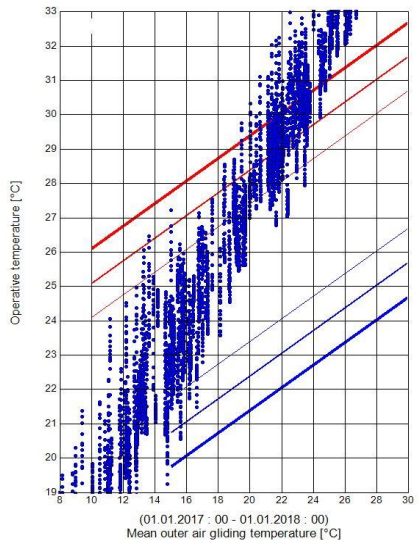
Dehumidify (Night)

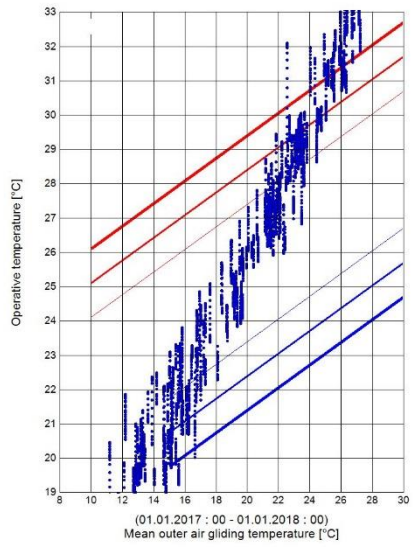
This shows the positive solar collecting potential on site by simulating solar thermal with heat water tank. This green energy serves as floor heating during the cold season; however, it can also be used during the hot season as night dehumidification to discharge clay moisture contents.

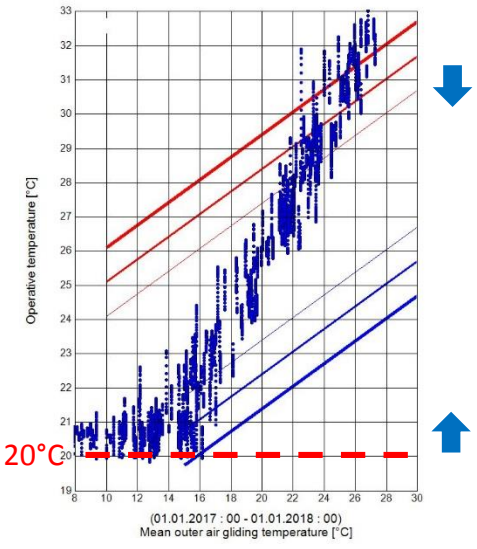
Pic Source : WUFI software

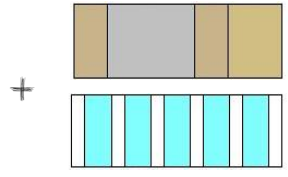
COMFORT-EN15251

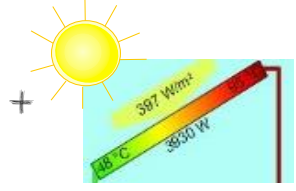












This shows that the addition of improving material assembly, higher air change rate and solar thermal can adjust temperatures toward adaptive thermal comfort by using passive strategy with wind and sun.

Pic Source : WUFI software

Prepared by:

Sun Kim

With the help of:

Elmira Reisi

THANK YOU

Pic Source :
https://www.theguardian.com/world/2015/oct/19/korean-family-reunions-separation