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Automated Natural Ventilation for School Projects

To the SRVEVR Project Management Team,

At WindowMaster Clearline Inc., we know how important a healthy indoor climate is for student learning, development and overall well-being. As the market leaders in natural ventilation solutions, weâ€™d like to highlight the multiple benefits of natural ventilation, and hope that you will consider and prioritize this in the projects going forward throughout California. Attached you find a short presentation on our company expertise and natural ventilation solutions that I hope will serve as inspiration. Having worked with several educational institutions in California already, we are happy to offer our knowledge and any assistance possible to this ambitious and very timely program.

We look forward to following the program closely.

Best Regards,
Mia Brondum,
Sales Director at WindowMaster Clearline, San Jose CA

Additional submitted attachment is included below.

Automated Natural and Hybrid Ventilation Solutions

Bring fresh air into schools for a healthier indoor climate and a reduce energy consumption at the same time!

Advantages of Natural and Mixed Mode Ventilation

Why school projects should consider it…

Energy savings

47-79 %

in HVAC energy savings, by replacing or supplementing mechanical ventilation with natural ventilation or mixed mode air conditioning[1]

24-71%

reduction in carbon emissions with natural ventilation instead of mechanical ventilation

Healthier environment

0.8-1.3%

reduction in health cost savings[1]

3.2% points

reduction in absenteeism in a building with operable windows and natural ventilation compared to sealed windows and mechanical ventilation.

65%

reduction in SBS symptoms by utilizing natural or mixed mode ventilation[3]

Perform even better

7-8%

improvement in test scores for school children in classrooms with operable windows compared to children in classrooms with fixed windows.

Up to 18%

in productivity gains annually with natural ventilation or mixed mode air conditioning[3]

77%

user satisfaction **with naturally ventilated** spaces compared to **50%** with mechanical ventilation[4]

Reduced costs

ROI of less than 1 year

8 case studies have shown that natural ventilation and mixed mode systems can **pay for themselves in less than 1 year due to energy and productivity benefits**[1]

5 x lower lifetime cost

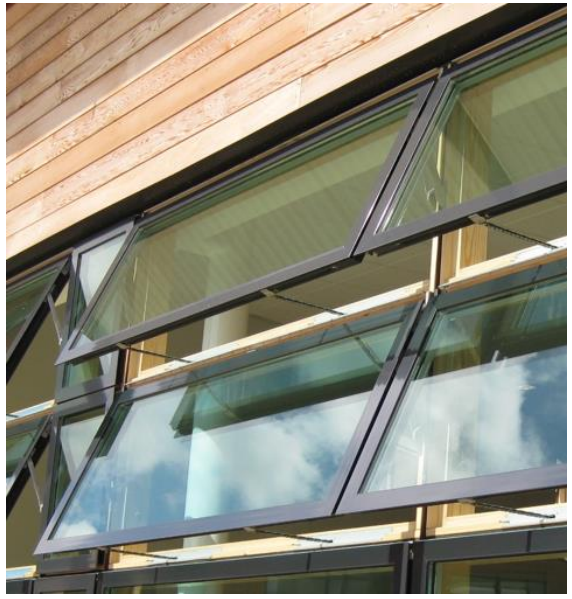
using natural ventilation compared to mechanical ventilation (capital, operation and maintenance cost) [1]

Sources:
1. Carnegie Mellon (2004), Guidelines for high performance in building
2. Carbontrust.com
3. cbpd.arc.emu&ebids
4. R.T. Hellwig et. Al. Thermal comfort in offices
5. Fraunhofer IBP report RK 013&2012&295

What is Automated Natural & Hybrid Ventilation?

Intelligent control of windows/vents – much more than JUST the window actuators!

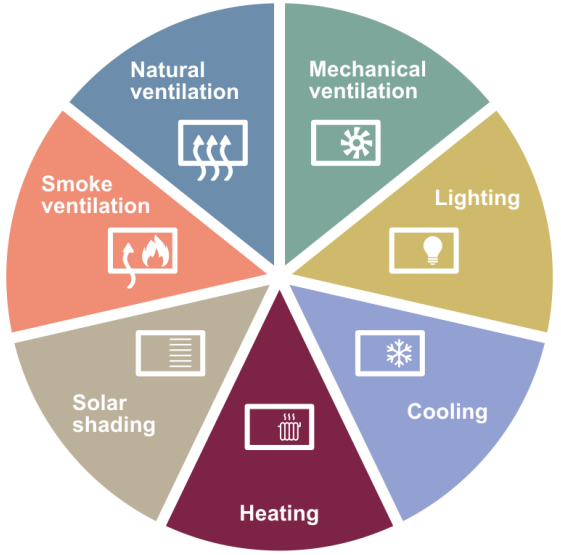
Using 24vDC actuators on Windows & Vents



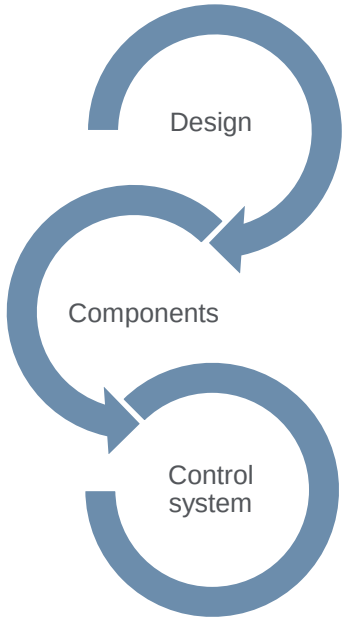
Control operation based on

- Indoor air temperature
- Indoor CO_2 levels
- Relative humidity
- Outdoor air temperature
- Wind speed and direction
- Rain
- Other parameters.

Linked to other control systems



Complete solution

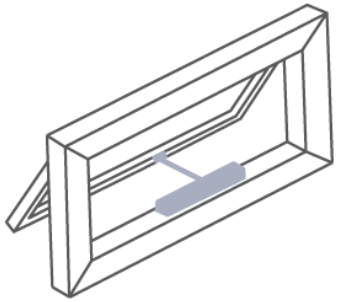


Retrofits

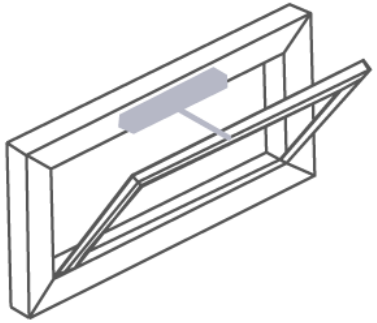
Natural ventilation can save space! No need for ducts/filters/piping in retrofit projects.

Brings fresh air into a school building automatically without large space requirements.

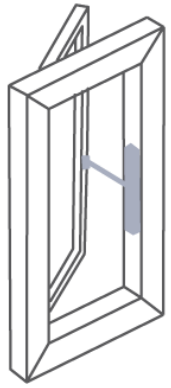
Motorized Operable Window Types



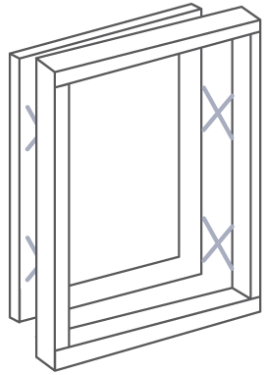
Top hung



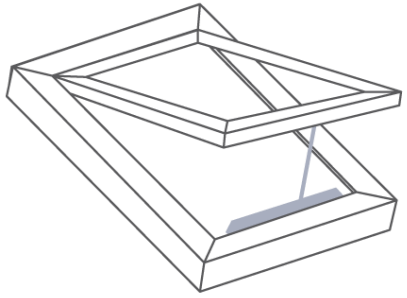
Bottom hung



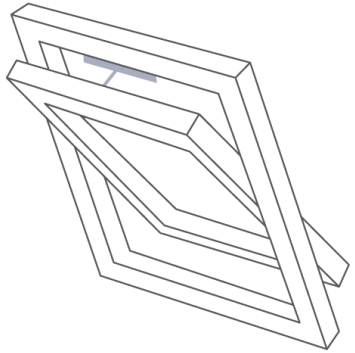
Casement/side hung



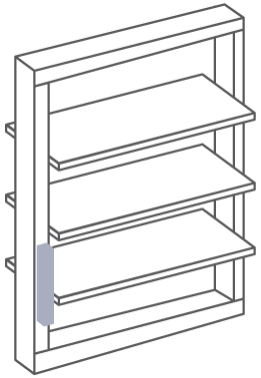
Parallel pop-out



Skylight



Center pivot

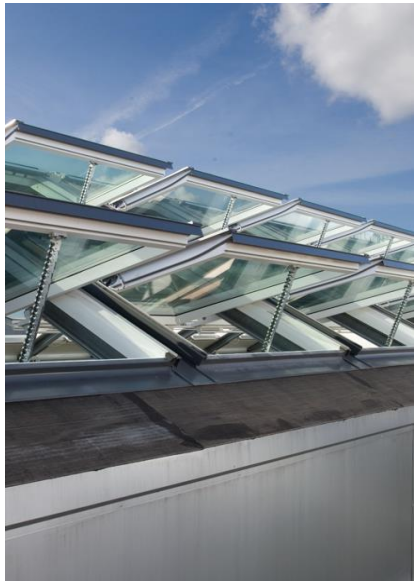


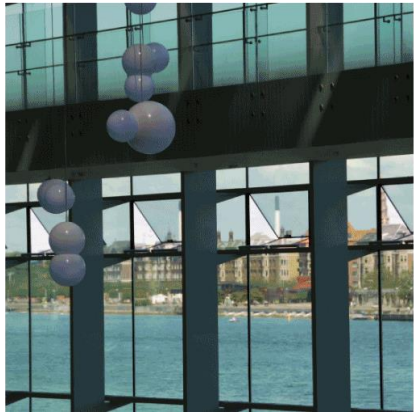
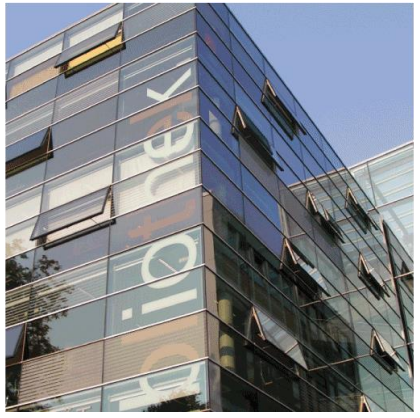
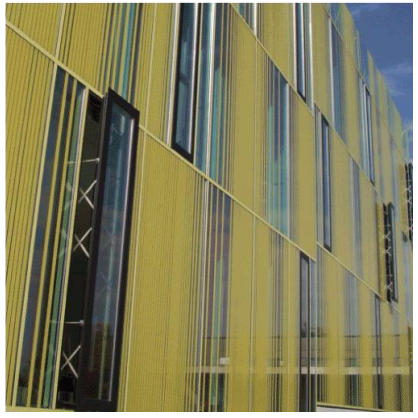
Louvre

Operable Windows – Project Cases

Variety of solutions applied globally both surface mounted & concealed



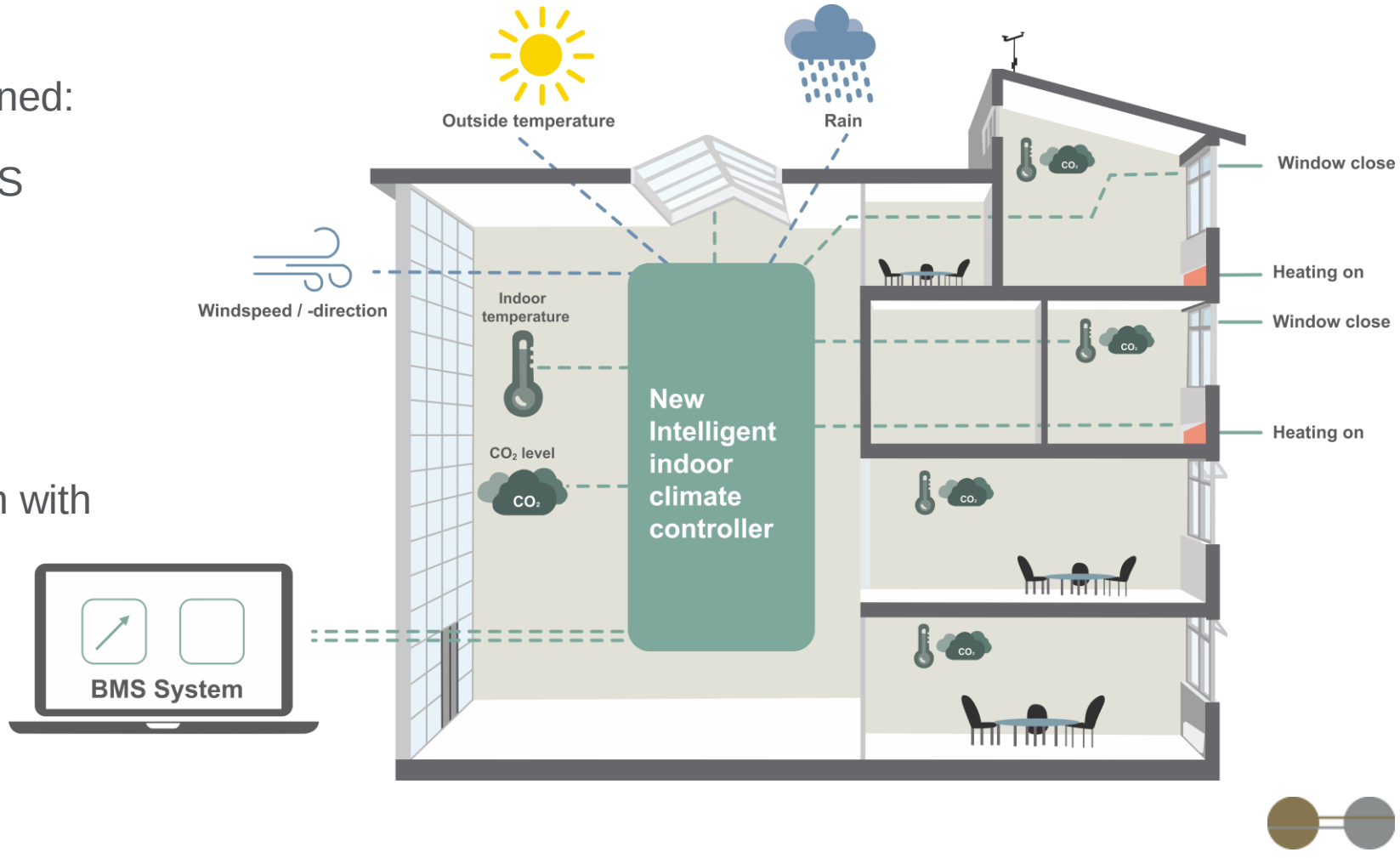
NV Embedded ® – Solution Overview

2 different applications can be imagined:

- **A stand alone solution** – no BMS integration at all

OR

- **Part of a BMS solution** – the configuration of the NVE system determines the level of integration with the BMS.

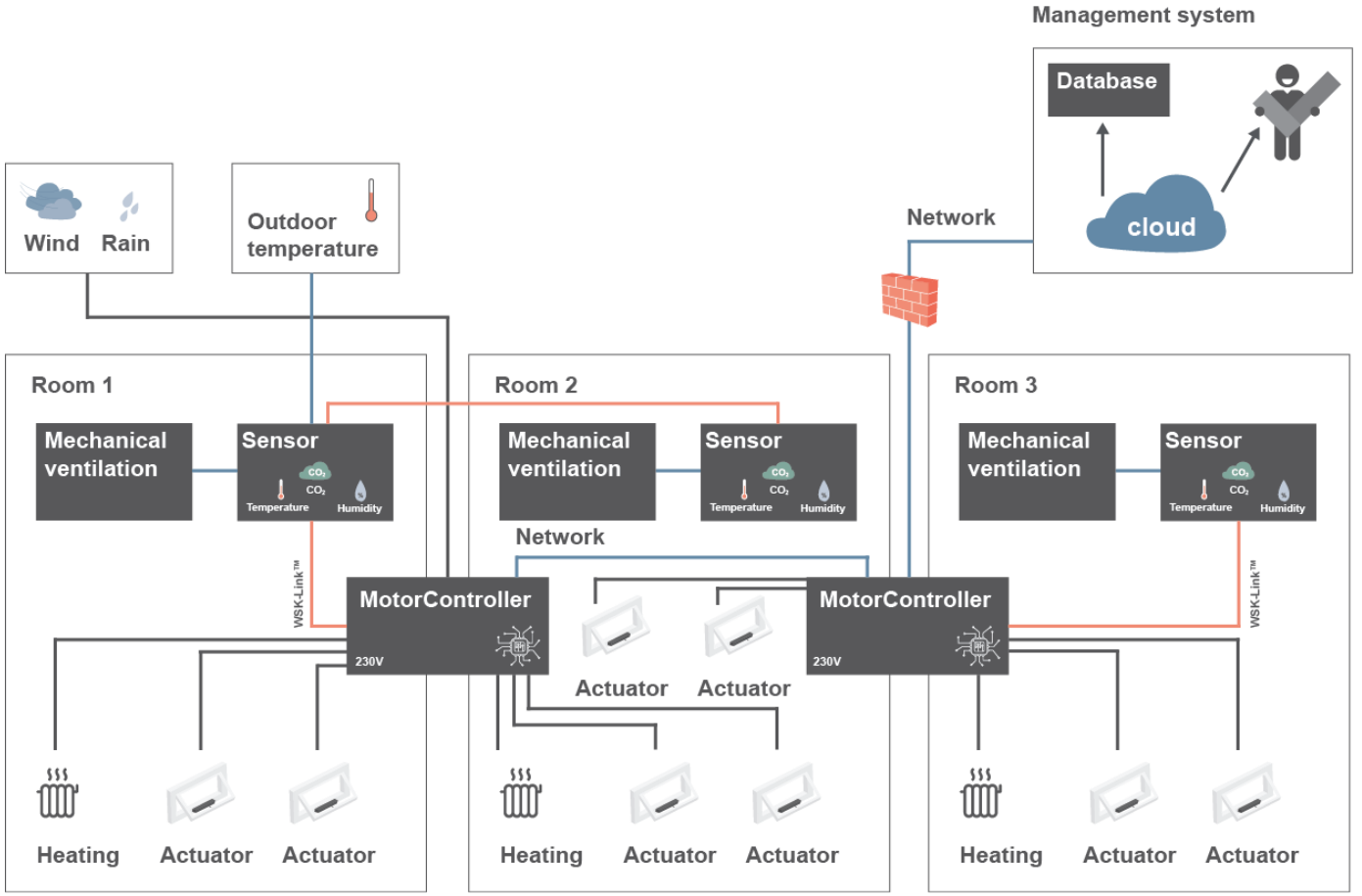


NV Embedded ® - A Stand Alone Solution

- no BMS integration needed/wanted

Control of natural ventilation, mixed mode ventilation (incl. mechanical ventilation), heating and solar shading*.

- Indoor sensors are connected directly to the MotorController via WSK-Link™ - no additional power supply is required.
- Weather station is connected directly to the MotorController
- Outdoor temperature sensor is connected directly to the room sensor
- Log data is saved in the cloud
- Configuration is done on the MotorController's display and / or from a PC.



*4th release

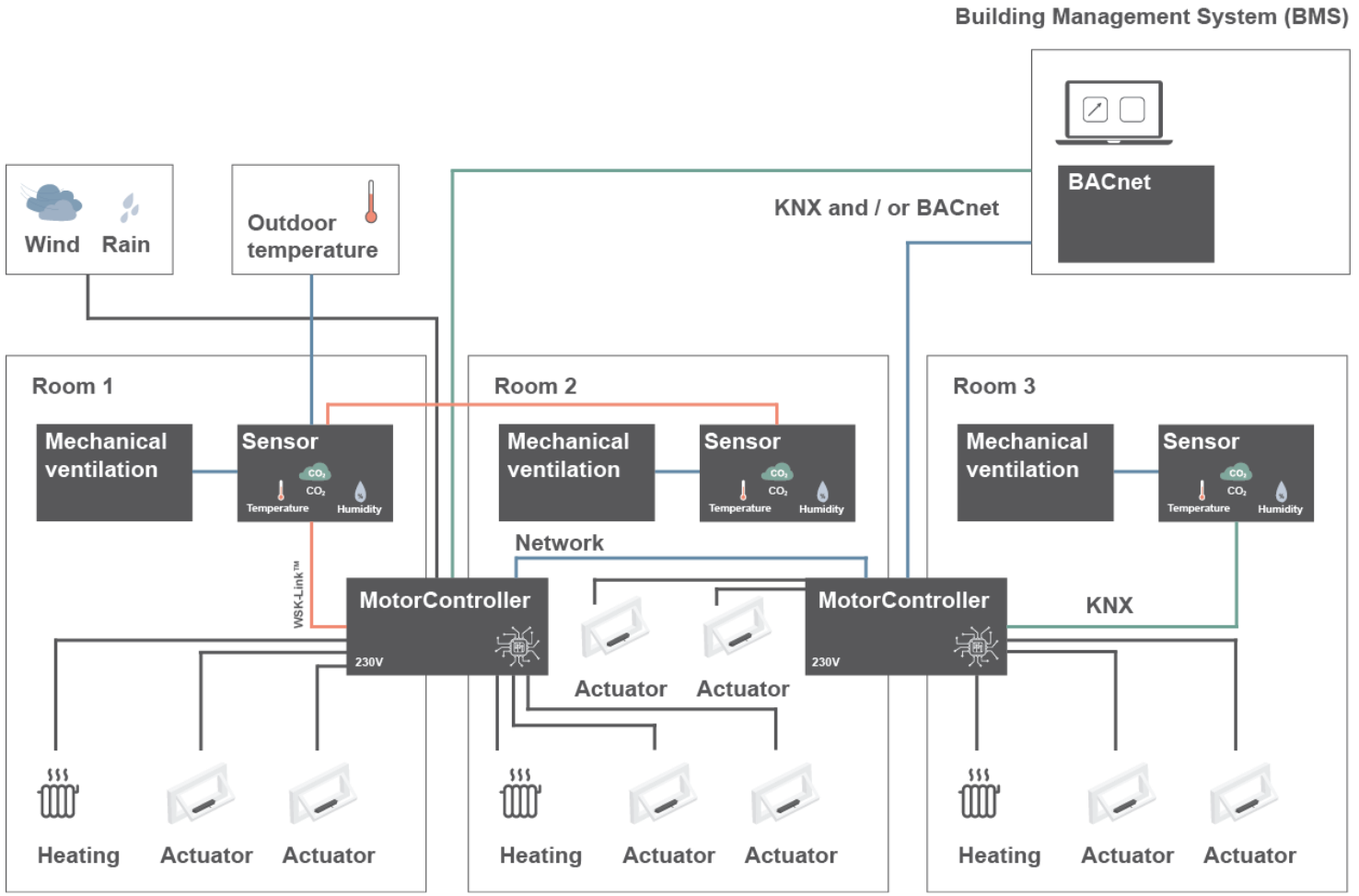
NV Embedded – A Part of a BMS Solution

- Through BACnet, KNX or Modbus

- Depending on the configuration, NVE can anything from interface to BMS through KNX, BACnet or Modbus to be fully integrated in the BMS through BACnet.

- NVE controls natural ventilation, mixed mode ventilation (incl. mechanical ventilation), heating and solar shading*.

- Or BMS decides ventilation schedules, set points and how much the MotorController's indoor climate control functionality to employ.



*4th release

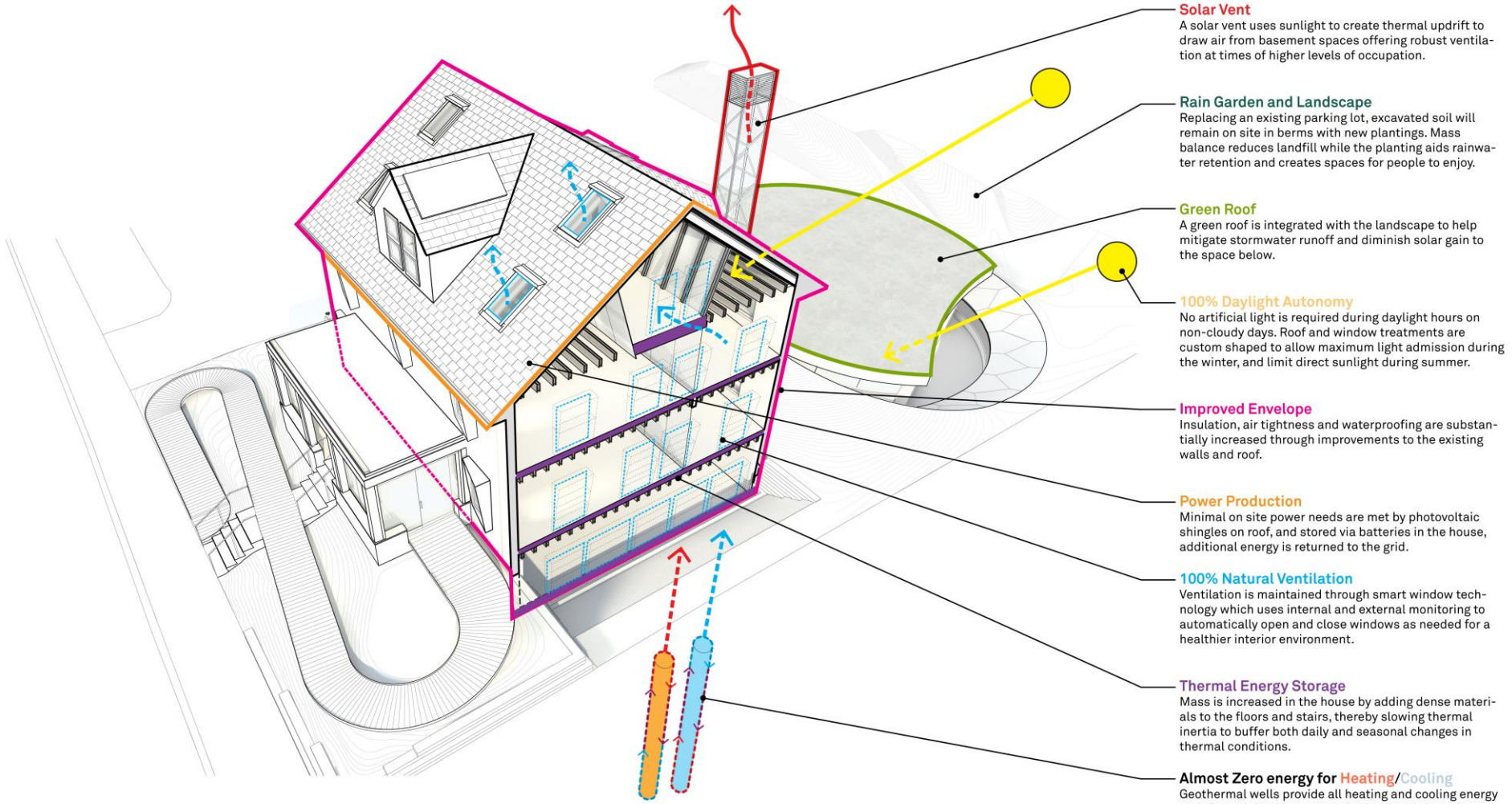
San Diego Continuing Education Mesa College Campus

Natural ventilation | MotorLink®

The facility has been awarded LEED silver certification by the U.S. Green Building Council. Natural ventilation and daylighting played a big part to the green qualifications.

WindowMaster was selected to supply the more than 100 motors for the natural ventilation solution because of its MotorLink® technology.

HouseZero, Harvard University – 1st NV Advanced System in the US



Solar Vent
A solar vent uses sunlight to create thermal updrift to draw air from basement spaces offering robust ventilation at times of higher levels of occupation.

Rain Garden and Landscape
Replacing an existing parking lot, excavated soil will remain on site in berms with new plantings. Mass balance reduces landfill while the planting aids rainwater retention and creates spaces for people to enjoy.

Green Roof
A green roof is integrated with the landscape to help mitigate stormwater runoff and diminish solar gain to the space below.

100% Daylight Autonomy
No artificial light is required during daylight hours on non-cloudy days. Roof and window treatments are custom shaped to allow maximum light admission during the winter, and limit direct sunlight during summer.

Improved Envelope
Insulation, air tightness and waterproofing are substantially increased through improvements to the existing walls and roof.

Power Production
Minimal on site power needs are met by photovoltaic shingles on roof, and stored via batteries in the house, additional energy is returned to the grid.

100% Natural Ventilation
Ventilation is maintained through smart window technology which uses internal and external monitoring to automatically open and close windows as needed for a healthier interior environment.

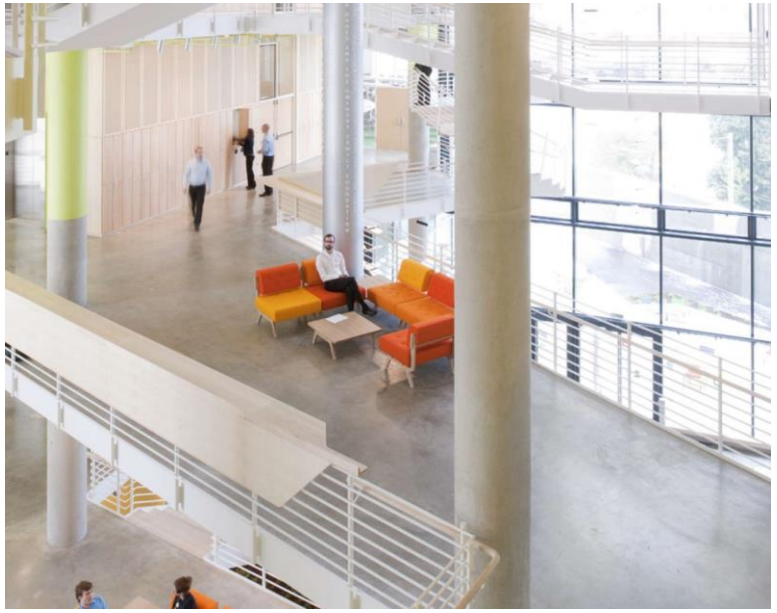
Thermal Energy Storage
Mass is increased in the house by adding dense materials to the floors and stairs, thereby slowing thermal inertia to buffer both daily and seasonal changes in thermal conditions.

Almost Zero energy for Heating/Cooling
Geothermal wells provide all heating and cooling energy and via a minimal heat pump is circulated through radiant slabs in the house. A solar thermal panel on the roof provides all domestic hot water and can switch over to heat certain areas of the house.

University of Baltimore School of Law

Natural ventilation can be utilized 40% of the time.

“The facade and atrium design led to passive and active strategies that typically aren't applied in this climate. The building's passive design strategies achieve very high performance and flexibility without the use of PV or solar thermal systems.”

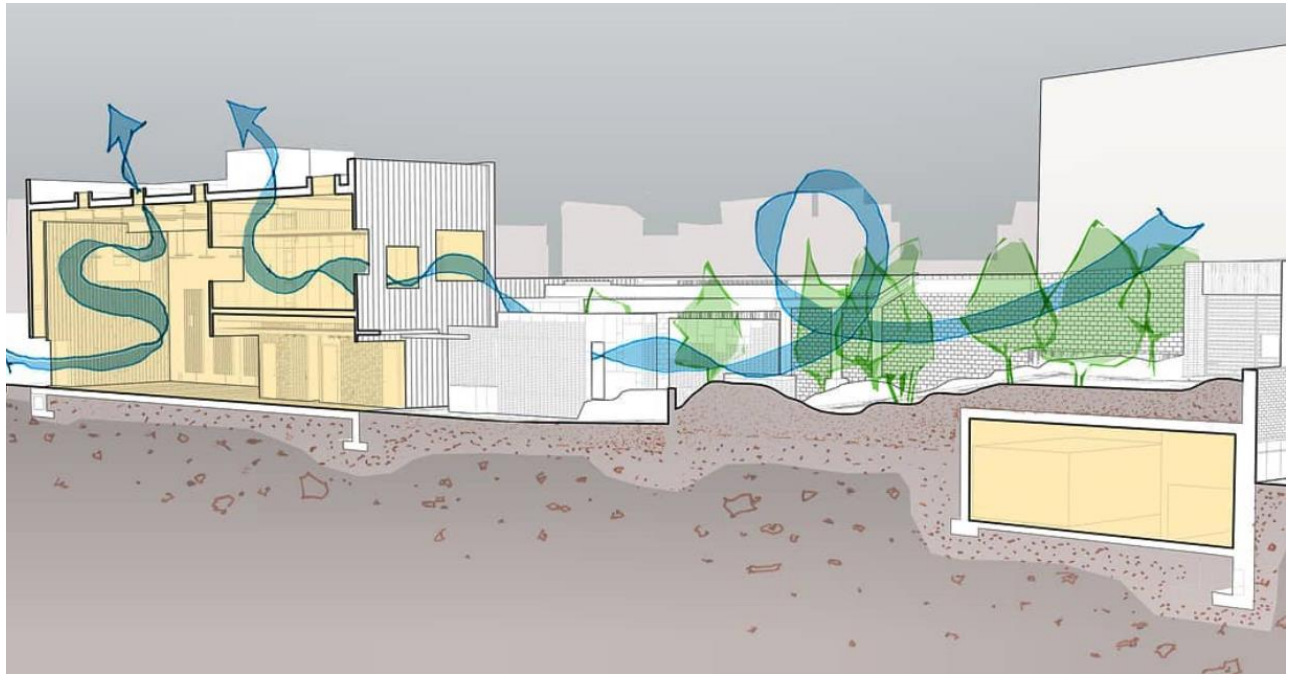


The windows will be automatically closed when the air condition is on and made available for the users to open and close at will by the manual override switches, when the air condition is off. This saves energy.

The law center does have a **mechanical AC system**, but it is **consuming 50% less than** would be required for a normal building of its size.

30 Morgan Ave, Brooklyn, NY

1st NV Comfort System in the US



2 zoned mixed-mode natural ventilation system in a facility that both houses indoor and outdoor space. The indoor space is a private event space & the outdoor space is a botanical garden.

The project will use:
22 units of our WMX 804-26100S U3,
4 units WMU 861-1 UL 0300 0104
actuators with our MotorLink technology together with the NV Comfort system.

Link to more information

School project reference cases and deeper information on benefits -

San Deigo Mesa College Campus, CA

https://www.windowmaster.com/project-references/san-diego-continuing-education-mesa-college-campus/

John Lo Schiavo Innovation and Science Center, San Francisco, CA

https://www.windowmaster.com/project-references/john-lo-schiavo-s-j-center-for-science-and-innovation/

Newton Primary School, UK

https://www.windowmaster.com/project-references/newton-primary-school/

.. And many more throughouth the world!

Read also here about **the benefits** of passive ventilation: https://www.windowmaster.com/expertise/natural-ventilation-and-mixed-mode-ventilation/passive-ventilation/

Questions?

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