TOP 10 REASONS your Entertainment Venue **NEEDS** a Retractable Roof

OpenAire
Add sky to your design

35 YEARS & 1200 **GLOBAL** PROJECTS

OPENAIRE DESIGNS, ENGINEERS, FABRICATES, SHIPS AND INSTALLS RETRACTABLE ROOFS, WALLS AND SKYLIGHTS. **ONE STOP SHOP**

YOU DESIGN IT - WE MAKE IT **MOVE**

Trends for Architecture & Construction

- Increased efficiency of building materials like aluminum
- More resilient buildings able to handle the weather
- Increase in offsite construction methods to reduce construction time, waste and unnecessary expenditures: OpenAire builds in a Factory
- Emphasis on Eco Friendly processes and buildings that reduce energy costs and boost building efficiency[1]

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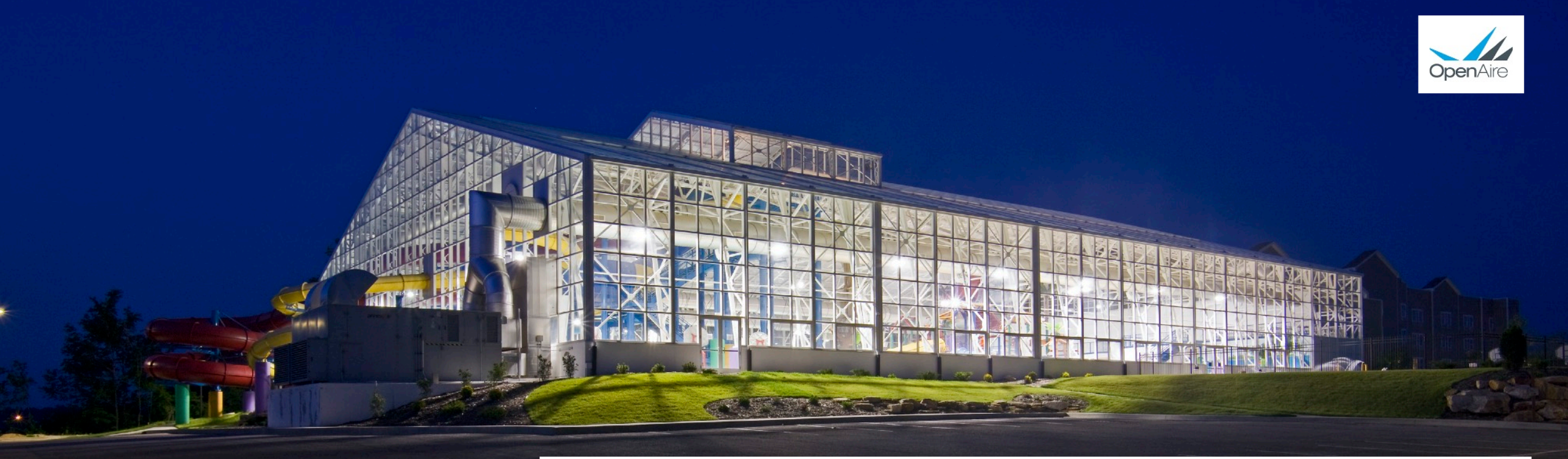
10 REASONS

A Retractable Roof can be used for any projects of any size

1. Natural Ventilation

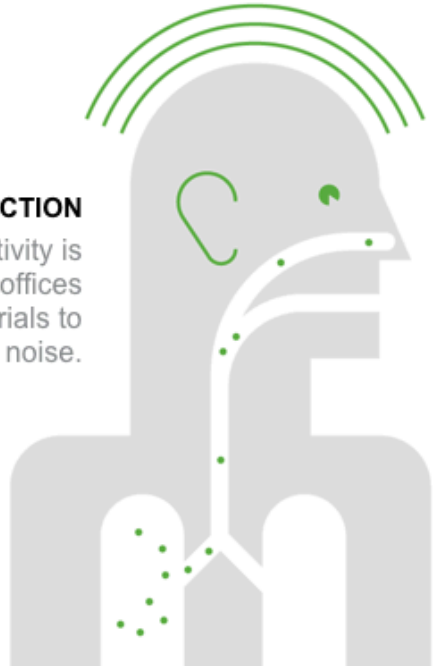
- Natural Ventilation can cool a building and occupants, and can significantly improve the energy efficiency of buildings by reducing reliance on air-conditioning[2]
- Natural ventilation is effective because exposure to a light breeze removes heat from the human body by convection and evaporation[2]
- Natural Ventilation = reduced reliance on mechanical air handling systems which result in:[2]
    - Save money (due to reduced running costs) can be up to 30% every year [3]
    - Reduce peak electricity load and improve the resilience of electric supply
    - Reduce greenhouse gas emissions



In a recent Japan study, the odds of a primary case transmitting COVID-19 in a closed environment was 18.7x greater compared to an open-air environment.[4]

2. Health

- Natural ventilation/Fresh Air: recommended to reduce the spread of airborne viruses[5]
- Many studies suggest that insufficient ventilation increases disease transmission.[6]
- Natural ventilation is able to deliver large ventilation rates/volume with a low energy consumption.
- Compared with mechanical ventilation, natural ventilation can provide much higher ventilation rates[7]



PRODUCTIVITY

In one study, cognitive function doubled with enhanced ventilation.

NOISE REDUCTION

Productivity is improved in offices using materials to reduce noise.

MAXIMIZE NATURAL LIGHT

Workers who sit near windows get more light and sleep an extra 46 minutes at night. Light helps regulate sleep cycles.

FEWER AIR POLLUTANTS

Green buildings can reduce illnesses caused by air quality issues.

Regulatory efforts focus on outdoor air, even though people spend most of their time indoors, where air quality and other aspects can impact both physical health and mental functioning[8].

90%

TIME SPENT INDOORS

Workers in green buildings have fewer complaints about air quality and humidity.

3. Energy Efficiency

- Global warming has increased desire for air conditioning = increased energy use
- Building Codes Globally Say: **Use less Energy**
- Open Roof + Open Walls means Air handling systems are turned off.
- When the roof is closed, thermal breaks and vapor barriers help control condensation and air filtration.
- In northern climates, some of the solar heat gain through a transparent or translucent roof can offset some of winter heating requirements (ambient heat gain)
- Savings can be up to 30% on energy bills

4. Lower life-cycle costs

- Maintenance-free aluminum truss structure means reduced operations/maintenance costs
- Aquatic Retractable roof:
    - Exhausts chloramines, Eliminates odor, Reduces illness for staff & Guests, Reduces Staff time off / turnover (sick leave) due to environment
- Daylight via a translucent roof (polycarbonate/glass/ETFE)
    - A bright roof means less reliance on electrical lighting
    - Reduced reliance on local/regional power grid
    - Can reduce up to 1/3 electrical lighting costs[7]
    - Daylight increases retail revenue[8]
- Reduced overall building emissions
- Eliminates weather related closures = improved revenue opportunities

5. Energy Savings

Sample Site: Boys & Girls Club Massachusetts 31% savings on electrical, 27% overall energy bills $40,000 y.o.y. on maintenance costs*

eQUEST results processing

Boys and Girls Dorchester Clubhouse - Comparison of energy use by traditional and OpenAire buildings

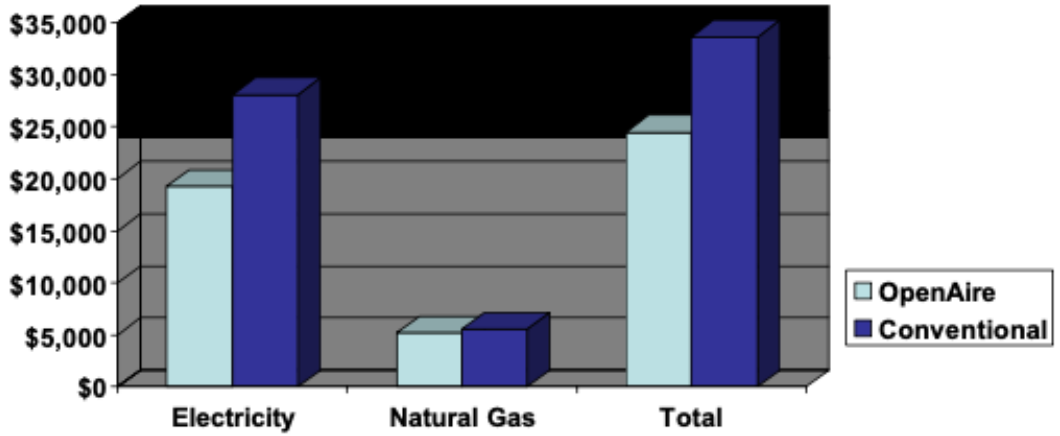
Building type	Electricity use	Electricity cost	Natural gas use	Natural gas cost	Dehumidif. load	Dehumid reheat gas equiv. use	Dehumid reheat gas equiv. cost	Net natural gas use	Net natural gas cost	Net total utilities cost
	kWh/year	*$/year*	*therm/year*	*$/year*	*Btu/year*	*therm/year*	*$/year*	*therm/year*	*$/year*	*$/year*
Traditional	135,846	$ 28,037	13,099	$ 18,614	735,517,504	9,194	$ 13,065	3,905	$ 5,549	$ 33,586
OpenAire	89,839	$ 19,264	12,266	$ 18,460	704,542,848	8,807	$ 13,254	3,459	$ 5,206	$ 24,470
Annual energy savings	**46,007**	**$ 8,773**						**446**	**$ 343**	**$ 9,116**
Annual energy % savings	**34%**	**31%**						**11%**	**6%**	**27%**

Assumed average seasonal gas furnace efficiency		80%
Virtual gas rate-traditional building	$	1.42
Virtual gas rate-OpenAire building	$	1.50

** Results from Study by Third Party - not OpenAire*

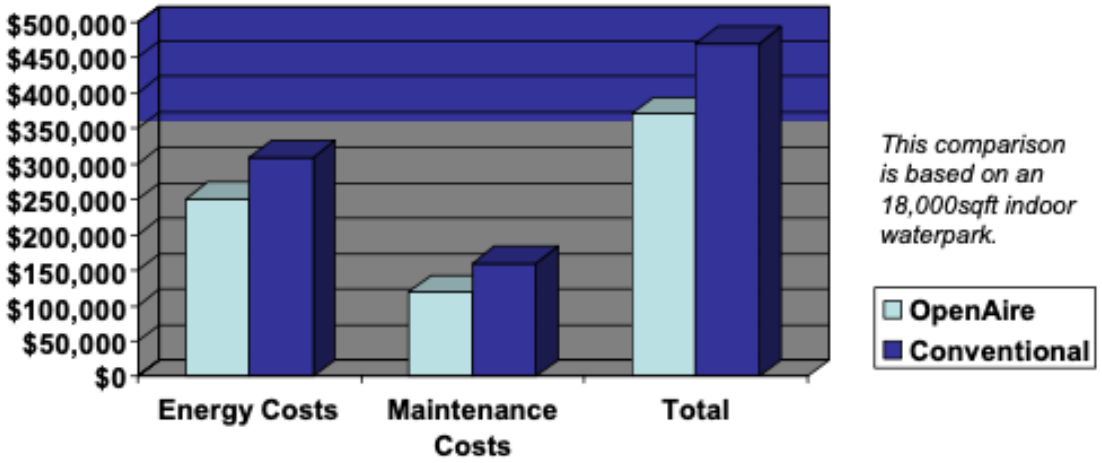
5. Energy Savings

Example Boys & Girls Club Massachusetts 31% savings on electrical, 27% overall energy bills
$40,000 y.o.y. on maintenance costs*



The BlueHill Boys & Girls Club, Boston, MA commissioned this independent energy analysis.

For the 60' x 100' freestanding building the analysis shows an astounding 31% annual savings in electricity and an overall 27% savings in annual energy consumption, with a net total utilities cost savings of over $9,000 a year.



This comparison is based on an 18,000sqft indoor waterpark.

Based on analysis by JLC Hospitality and Andelman & Lelek Engineering an OpenAire structure can save over $58,000 in Energy costs annually.
Assuming that 25% of maintenance cost is devoted to maintaining the waterpark building, OpenAire's maintenance free structure offers a savings of $40,000 annually.

** Results from Study by Third Party - not OpenAire*

Energy Savings Case Study Location Photo

Blue Hills Boys & Girls Club,
(60x100) 6000 sf bldg, Boston, MA

** Results from Study by Third Party - not OpenAire*

6. Daylight

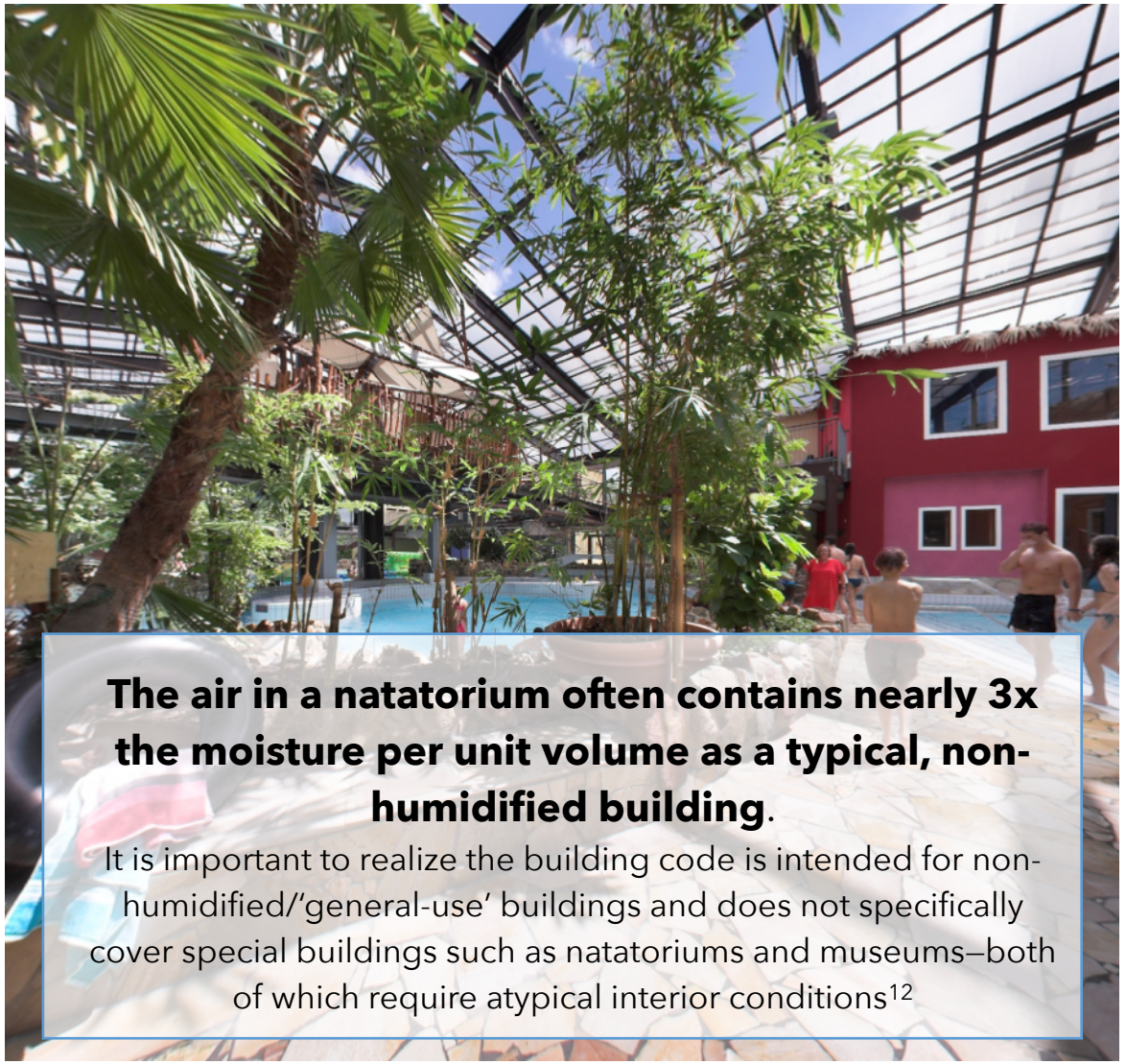
- Daylighting = controlled admission of natural light, direct sunlight, and diffused-skylight into a building to reduce electric lighting and save energy.
- Day-lit spaces hold the potential to yield substantial benefits:
    - Increased energy savings
    - Reduced lighting loads on power grids
    - Increased revenue in retail applications,
    - Improvements to human health, mood, behaviour and productivity[9]
- Mandated by global buildings codes :
    - Daylighting helps create a visually stimulating and productive environment for building occupants, while reducing as much as one- third of total building energy costs[10]
- Daylight is the third most important factor in improving retail sales, behind hours of operation and years since last renovation[9]

6. Hygiene

- CDC: Normal routine cleaning with soap and water will decrease how much of the virus is on surfaces and objects, which reduces the risk of exposure[11]
- Reducing the use of porous materials used for seating, leaving some doors open to reduce touching by multiple people, opening windows to improve ventilation, or removing objects in your common areas.[11]
- A Structure that will never corrode and is easy to clean is critical for public health

7. Maintenance Free

- No more closures and maintenance days. Aluminum is:
  - Corrosion Resistant - Will not rust
  - Does not need finish to be corrosion resistant[13]
  - Critical for aquatic centers
- No maintenance aside from standard day to day cleaning, upkeep
- All required service covered by OpenAire's 5-15 year warranty



The air in a natatorium often contains nearly 3x the moisture per unit volume as a typical, non-humidified building.

It is important to realize the building code is intended for non-humidified/'general-use' buildings and does not specifically cover special buildings such as natatoriums and museums—both of which require atypical interior conditions[12]

8. Speed of Construction

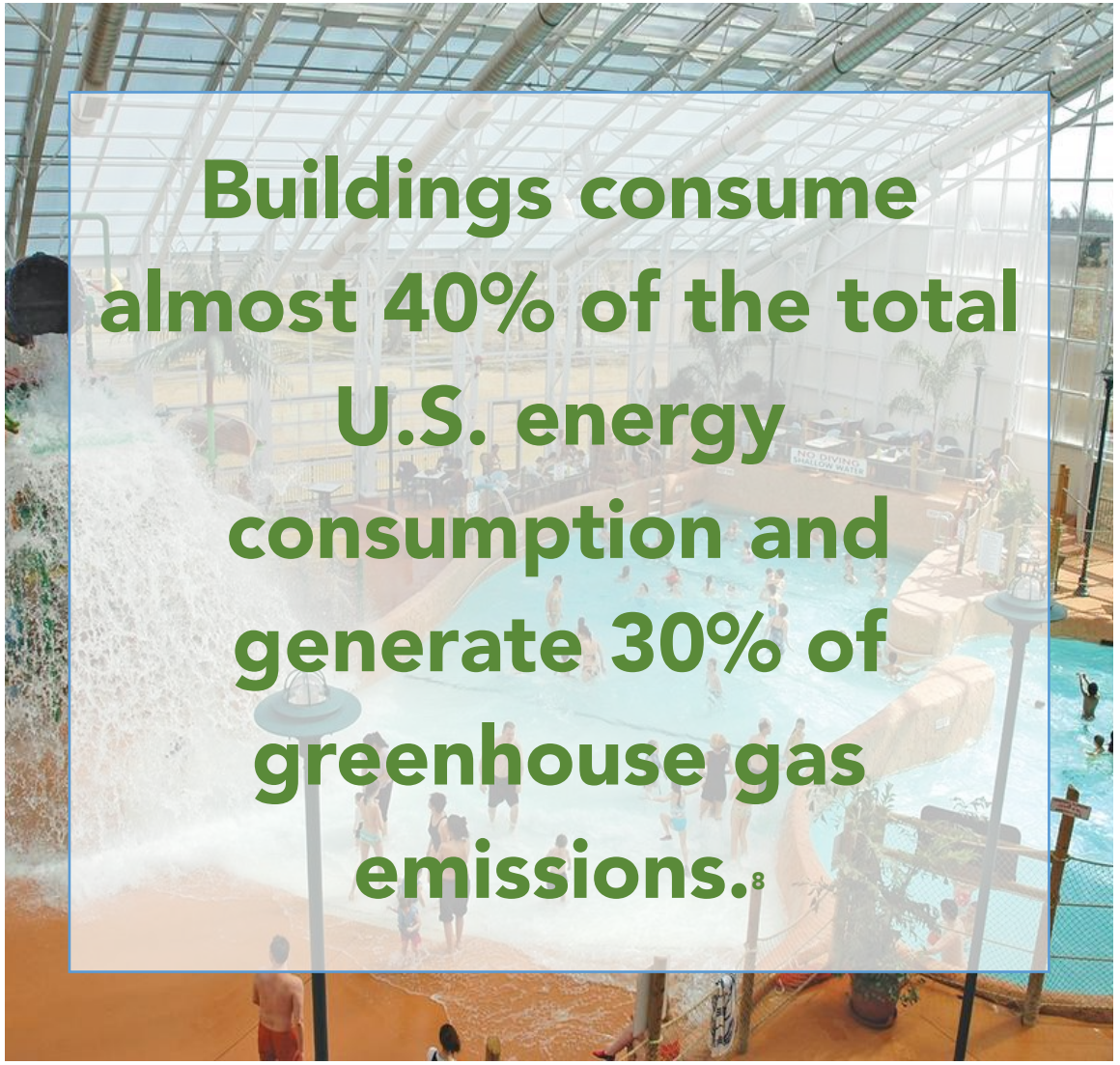
- Trend towards pre-fabricated elements designed, built in warehouse ensures:
  - Better upfront planning, improved consistency
  - Elimination of on-site weather factors
  - Elimination of subcontractor scheduling delays
  - Quicker fabrication as multiple pieces can be constructed simultaneously
  - Green Building: less waste

9. Carbon Reduction

- In the US alone, nearly 40% of greenhouse gases can be attributed to carbon produced by buildings during construction and everyday heating, cooling, and lighting[14]
- When the roof and walls are open, the mechanical systems for heating and cooling are turned off. An indoor space becomes outdoor. Greenhouse gas emissions are reduced

WHAT MAKES A GREEN BUILDING?

- Though standards for green buildings vary, they are generally designed to use less energy and water and improve the indoor environment, including air quality.[8]



10. Max. Space & Revenue

- Naturally, adding an enclosure can increase the physical space you occupy (and therefore occupant loads)
- Even a simple transformation, like cutting a hole in a roof and adding a skylight to an existing space will simply convert a formerly dark environment to one with sunshine and fresh air.
- Seasonal spaces can become a thing of the past
- Covid Impact: the first places that citizens will be allowed to congregate will be open and outside. Both as a mandate from local governments and as citizens express their concern for personal safety, small enclosed spaces are simply being avoided due to perceived health risks. A retractable roof changes the picture.

3 BONUS Extras...

1. Occupant Satisfaction

- People in brightly lit spaces are more inclined to act in a socially conscious manner. Meaning they have will have an increased tendency to act more in accordance with others views rights and needs. Specifically, the findings suggest that, assuming a friendly social environment, placing people in brightly lit spaces can lead to more focus on others' needs, rights and views[15]
- This can lead to the development of more effective public policies promoting pro-social behaviour, tackling the obesity epidemic, decreasing risky behaviour among vulnerable populations, improving consumer welfare guidelines, and providing crucial recommendations for buildings and product design

2. Perfect Conditions

- You will never again be at the mercy of bad weather.
- Business owners can expect to: reduce Cancellations, refunds, returns
- Allow the retractable space to be conditioned separately from areas not under the retractable roof, creating temperature zones for maximum comfort and usability
- Treat the indoor space as outdoor when the roof is open!

3. Ideal Materials

Aluminum Custom Extrusions

- Custom Extrusions, thermally broken frames
- Light weight, High strength, Widely Recycled
- Easily formed, highly conductive, highly reflective, non-toxic, durable
- Aluminum is a key component in LEED-certified green buildings
- No risk of aquatic SCC failures[16]

Hardware

- 316 stainless steel hardware

Painted finish

- Baked on – never needs repainting
- Can reflect up to 95% solar energy[17]

Glazed Building envelope

- Can include: Glass, Polycarbonate, ETFE, Photovoltaic, Tilt-up, Insulated Metal Panels as required

BONUS

Aluminum is lightweight, high-strength, corrosion-resistant and widely recycled. It maximizes building efficiency by balancing the functions of heating, cooling, lighting, shading and ventilation. In addition, aluminum in buildings has been proven to last for multiple decades with minimal maintenance, lowering the lifecycle footprint of a building.[18]

Learn & Earn

OpenAire now offers a Continuing Education Credit for Architects = 1 AIA LU-HSW

LEARN:

- How they can be added to new & existing buildings
- The health, safety, benefits for occupants
- How retractable roofs can save energy costs $$
- The benefits of a Naturally Ventilated Space
- How large volumes of air will potentially reduce the load of airborne disease pathogens
- How retractable roofs are a sustainable and can reduce the carbon footprint of a building
- How they can your reduce building yearly operating costs

https://openaire.com/continuingeducation/

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