

# TOWARDS CARBON ZERO HOTELS

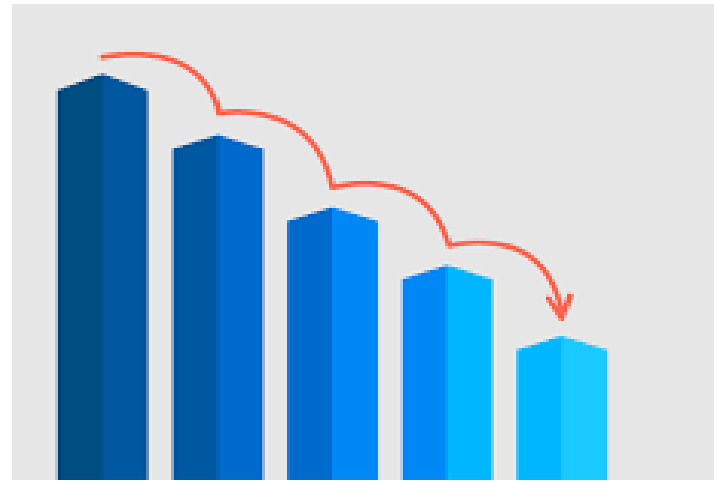
- Carbon offset



- REDUCE

- REUSE

- RECYCLE

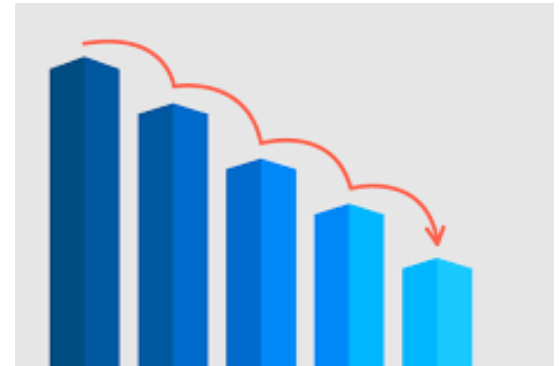


# TOWARDS CARBON ZERO HOTELS

- Carbon offset or ...



- **REDUCE** (during design)
- REUSE (during construction)
- RECYCLE (during operation)



# TOWARDS CARBON ZERO HOTELS

## A. REDUCE

Stages of a hotel building's life:

1. Development of Brief (Type and Location)
2. Design
3. Construction
4. Operation



# TOWARDS CARBON ZERO HOTELS

## B. REUSE

### Stages of a hotel building's life:

1. Development of Brief (Type and Location)
2. Design
3. **Construction**
4. Operation



# TOWARDS CARBON ZERO HOTELS

## C. RECYCLE

### Stages of a hotel building's life:

1. Development of Brief (Type and Location)
2. Design
3. Construction
4. **Operation**



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# Reduce with Environmental Design

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# TOWARDS CARBON ZERO HOTELS

## Environmental Design in Architecture

- Energy and water saving
- Comfort
- Materials embodied energy
- Waste management



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# Tools

1. Simulation studies
  2. Certification
-



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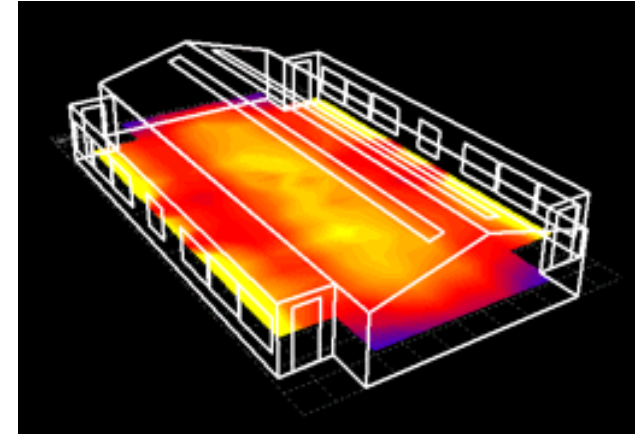
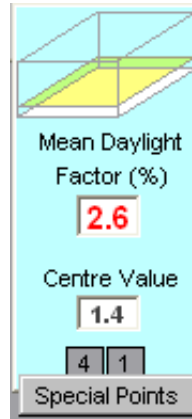
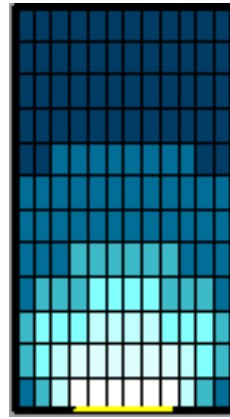
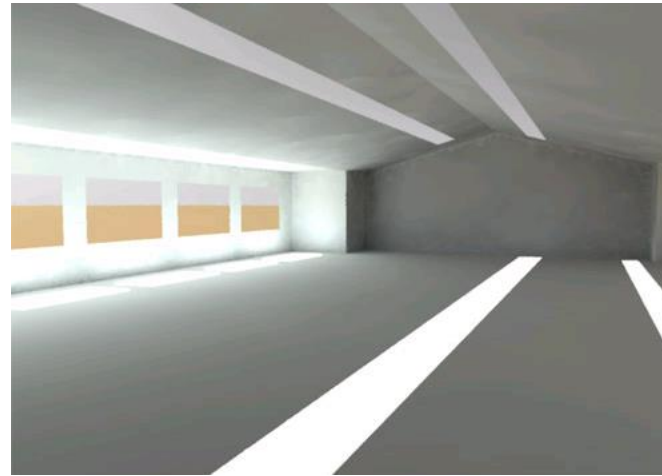
# Tools

1. Simulation studies
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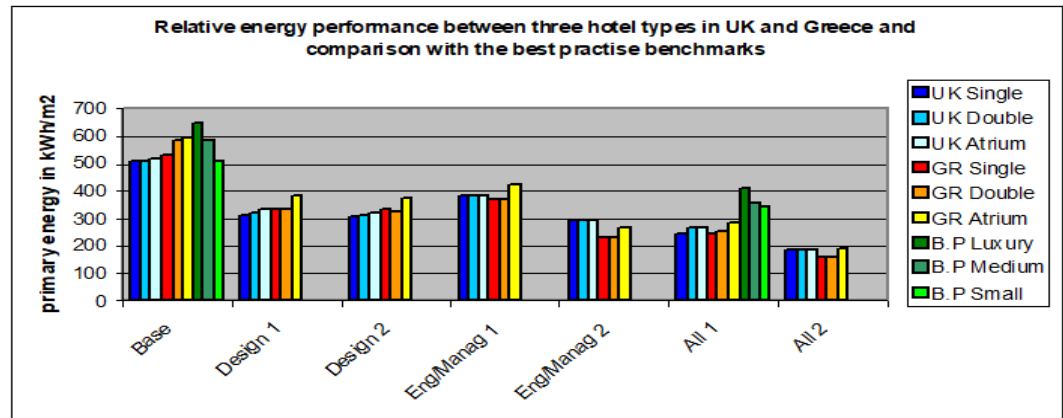
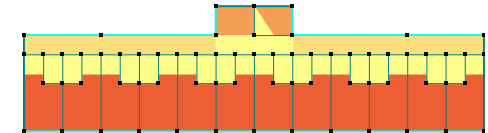
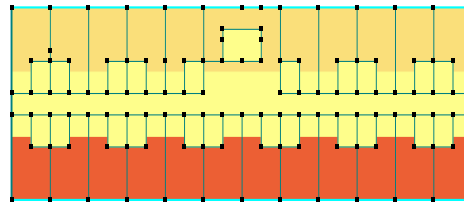
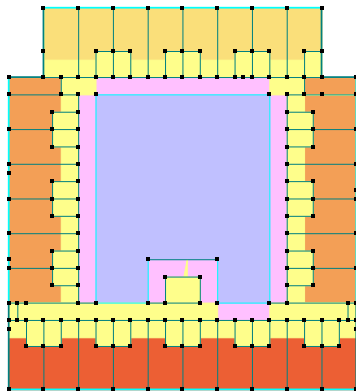
Software tools to provide all prior energy simulations and development analysis to building models are already common, towards:

- Energy saving
- Thermal, Daylight and Acoustic comfort



# TOWARDS CARBON ZERO HOTELS

Research on building types and strategies



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# Tools

1. Simulation studies
  - 2. Certification**
-

# TOWARDS CARBON ZERO HOTELS

FOR A MORE STRUCTURED PROCESS AND QUALITY ASSURANCE:

USE A CERTIFICATION OF ENVIRONMENTAL DESIGN, AS A TOOL:








Leadership in Energy & Environmental Design



# TOWARDS CARBON ZERO HOTELS

ENGAGES ALL STAKEHOLDERS FOR ALL THE LIFE CYCLE OF THE BUILDING

**LEED® for New Construction**

<b>Total Possible Points** 110*</b>	
 Sustainable Sites	26
 Water Efficiency	10
 Energy & Atmosphere	35
 Materials & Resources	14
 Indoor Environmental Quality	15

*\* Out of a possible 100 points + 10 bonus points*  
*\*\* Certified 40+ points, Silver 50+ points, Gold 60+ points, Platinum 80+ points*

 Innovation in Design	6
 Regional Priority	4



# LEED certified “Green Hotel Chains”



MANDARIN ORIENTAL  
THE HOTEL GROUP

SM



INTERCONTINENTAL.  
HOTELS & RESORTS



starwood  
Hotels and  
Resorts



element  
BY WESTIN



Sheraton®



Hilton



HYATT

Radisson   
HOTELS & RESORTS



# US\_ LEED certified “Green Luxury Hotels”

bardessono  
NAPA VALLEY

LEED  
Platinum



LEED  
Gold



LEED Gold





# TOWARDS CARBON ZERO HOTELS

## Electra Metropolis First LEED Hotel in Greece



**Electra Metropolis****LEED BD+C: New Construction (v2009)**

CERTIFIED, AWARDED FEB 2017

**SUSTAINABLE SITES**

AWARDED: 19 / 26

Code	Description	Requirement	Score
SSp1	Construction activity pollution prevention	REQUIRED	
SSc1	Site selection		1 / 1
SSc2	Development density and community connectivity		5 / 5
SSc3	Brownfield redevelopment		0 / 1
SSc4.1	Alternative transportation - public transportation access		6 / 6
SSc4.2	Alternative transportation - bicycle storage and changing rooms		1 / 1
SSc4.3	Alternative transportation - low-emitting and fuel-efficient vehicles		3 / 3
SSc4.4	Alternative transportation - parking capacity		2 / 2
SSc5.1	Site development - protect or restore habitat		0 / 1
SSc5.2	Site development - maximize open space		0 / 1
SSc6.1	Stormwater design - quantity control		0 / 1
SSc6.2	Stormwater design - quality control		0 / 1
SSc7.1	Heat island effect - nonroof		1 / 1
SSc7.2	Heat island effect - roof		0 / 1
SSc8	Light pollution reduction		0 / 1

**WATER EFFICIENCY**

AWARDED: 2 / 10

Code	Description	Requirement	Score
WEp1	Water use reduction	REQUIRED	
WEc1	Water efficient landscaping		2 / 4
WEc2	Innovative wastewater technologies		0 / 2
WEc3	Water use reduction		0 / 4

**ENERGY & ATMOSPHERE**

AWARDED: 3 / 35

Code	Description	Requirement	Score
EAp1	Fundamental commissioning of building energy systems	REQUIRED	
EAp2	Minimum energy performance	REQUIRED	
EAp3	Fundamental refrigerant Mgmt	REQUIRED	
EAc1	Optimize energy performance		2 / 19
EAc2	On-site renewable energy		0 / 7
EAc3	Enhanced commissioning		0 / 2
EAc4	Enhanced refrigerant Mgmt		0 / 2
EAc5	Measurement and verification		1 / 3
EAc6	Green power		0 / 2

**MATERIAL & RESOURCES**

AWARDED: 6 / 14

Code	Description	Requirement	Score
MRp1	Storage and collection of recyclables	REQUIRED	
MRc1.1	Building reuse - maintain existing walls, floors and roof		2 / 3
MRc1.2	Building reuse - maintain interior nonstructural elements		0 / 1
MRc2	Construction waste Mgmt		0 / 2
MRc3	Materials reuse		0 / 2
MRc4	Recycled content		2 / 2

**MATERIAL & RESOURCES**

CONTINUED

Code	Description	Score
MRc5	Regional materials	2 / 2
MRc6	Rapidly renewable materials	0 / 1
MRc7	Certified wood	0 / 1

**INDOOR ENVIRONMENTAL QUALITY**

AWARDED: 5 / 15

Code	Description	Requirement	Score
EQp1	Minimum IAQ performance	REQUIRED	
EQp2	Environmental Tobacco Smoke (ETS) control	REQUIRED	
EQc1	Outdoor air delivery monitoring		0 / 1
EQc2	Increased ventilation		1 / 1
EQc3.1	Construction IAQ Mgmt plan - during construction		1 / 1
EQc3.2	Construction IAQ Mgmt plan - before occupancy		0 / 1
EQc4.1	Low-emitting materials - adhesives and sealants		0 / 1
EQc4.2	Low-emitting materials - paints and coatings		0 / 1
EQc4.3	Low-emitting materials - flooring systems		0 / 1
EQc4.4	Low-emitting materials - composite wood and agrifiber products		0 / 1
EQc5	Indoor chemical and pollutant source control		0 / 1
EQc6.1	Controllability of systems - lighting		0 / 1
EQc6.2	Controllability of systems - thermal comfort		0 / 1
EQc7.1	Thermal comfort - design		1 / 1
EQc7.2	Thermal comfort - verification		1 / 1
EQc8.1	Daylight and views - daylight		0 / 1
EQc8.2	Daylight and views - views		1 / 1

**INNOVATION**

AWARDED: 6 / 6

Code	Description	Score
IDc1	Innovation in design	5 / 5
IDc2	LEED Accredited Professional	1 / 1

**REGIONAL PRIORITY**

AWARDED: 3 / 4

Code	Description	Score
EAc1	Optimize energy performance	1 / 1
EAc5	Measurement and verification	1 / 1
WEc1	Water efficient landscaping	1 / 1
WEc3	Water use reduction	0 / 1

**TOTAL**

44 / 110

40-49 Points CERTIFIED	50-59 Points SILVER	60-79 Points GOLD	80+ Points PLATINUM
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# TOWARDS CARBON ZERO HOTELS

## The example of Electra Metropolis Site selection and transportation



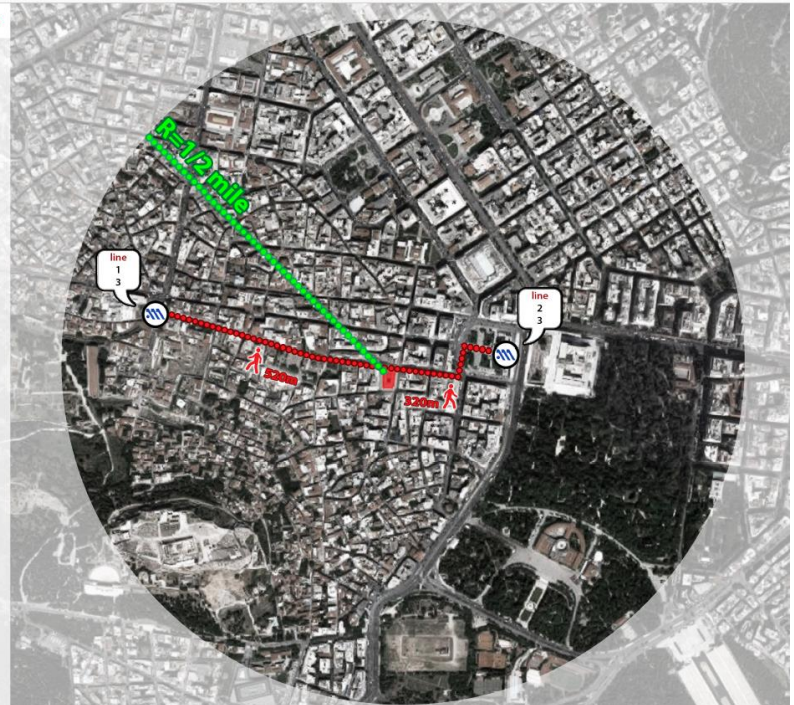
### Public Transportation Access

#### Requirements

- Subway Station Syntagma\_line 2 & 3

#### Exemplary Performance

- Subway Station Monastraki\_line 1 & 3



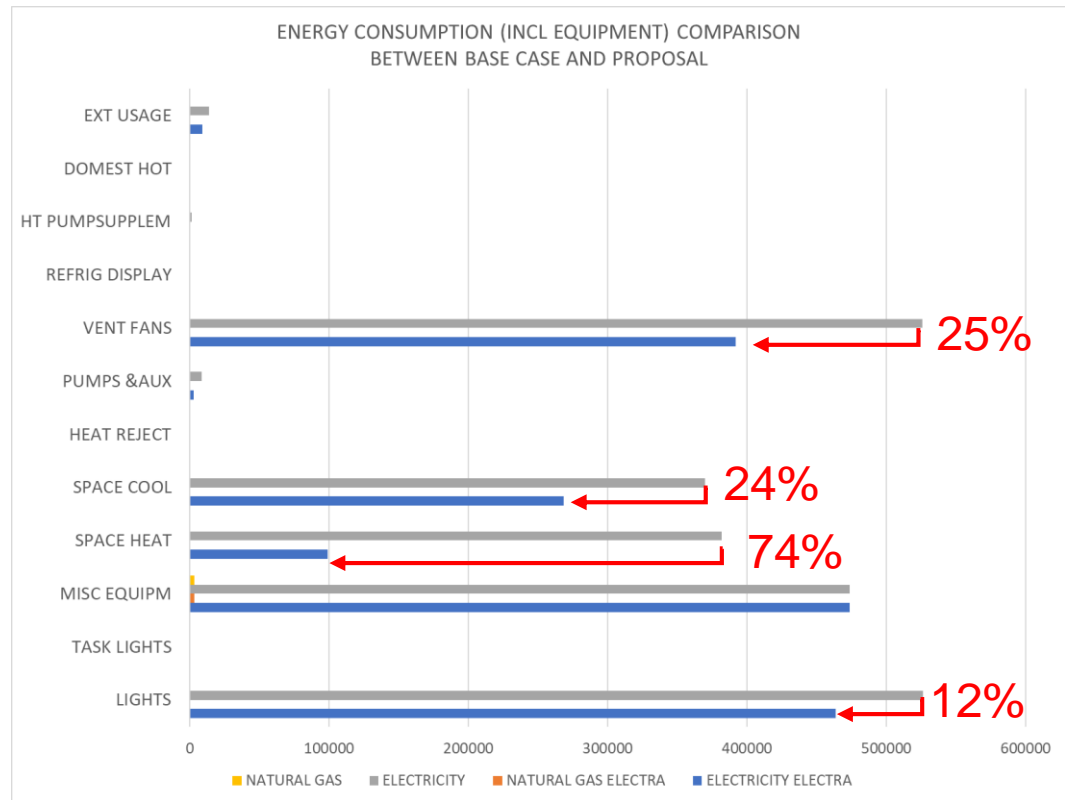
# TOWARDS CARBON ZERO HOTELS

## The example of Electra Metropolis

### Energy improvements from a baseline building

The energy **cost** performance of the building of the project is **25% better** than the baseline building according to ASHRAE 90.1-2007 appendix G.

The baseline U-values are documented according to the national code “Technical Directive 20701 – 1/2010” and correspond to the previous building uninsulated elements



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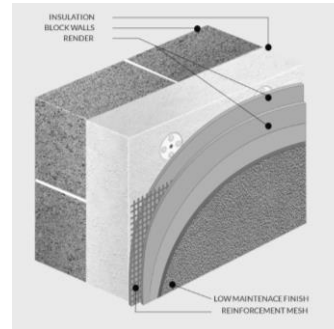
## The example of Electra Metropolis Building envelope improvements



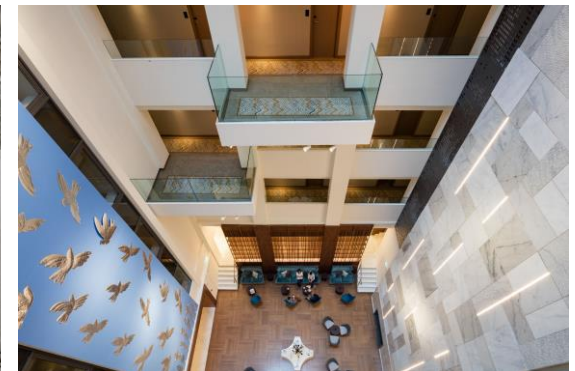
From ...no insulation



To ...high external thermal insulation  
and thermal windows



From ...uninsulated external atrium



To ...internal covered atrium

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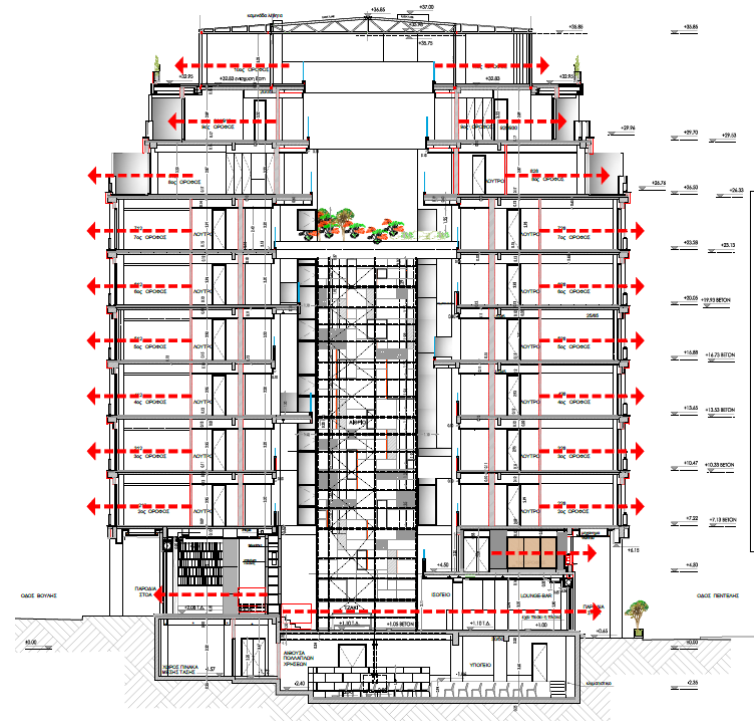
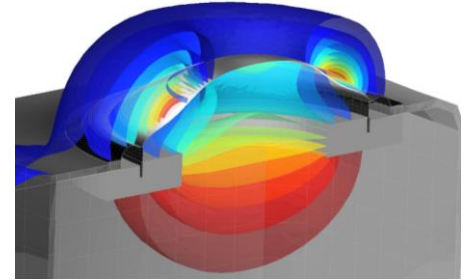
## The example of Electra Metropolis

Local materials and materials with recycled content (steel, concrete, gypsum board, marble)



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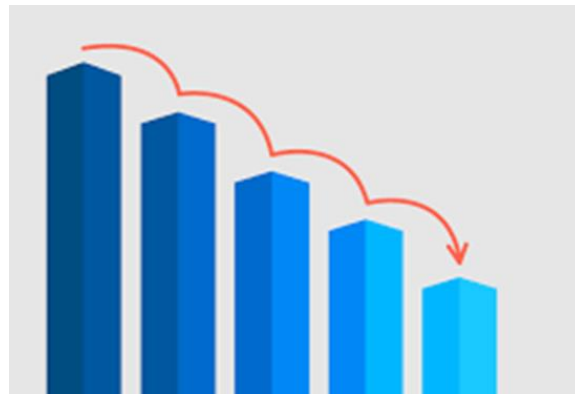
The example of Electra Metropolis  
Acoustic, Thermal and Light comfort



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Conclusion: Reduce!

Less Carbon to offset





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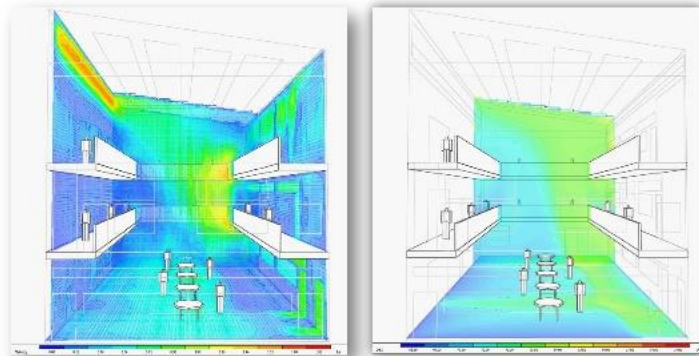
## Environmental Design in Architecture



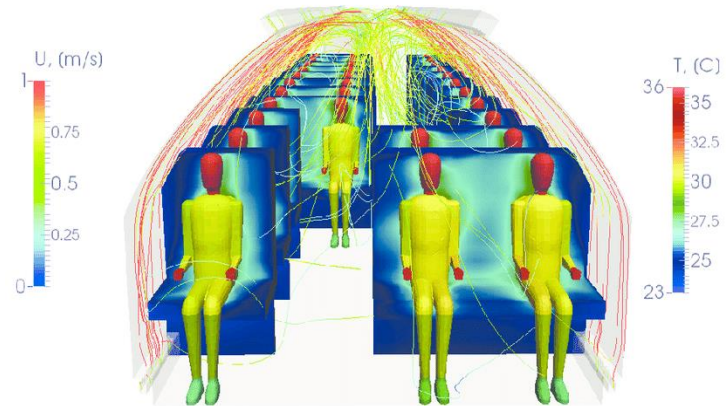
### ECM: Atrium Design

#### Zero-Net Energy Design Model

- Proof of Concept:



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Thank you!