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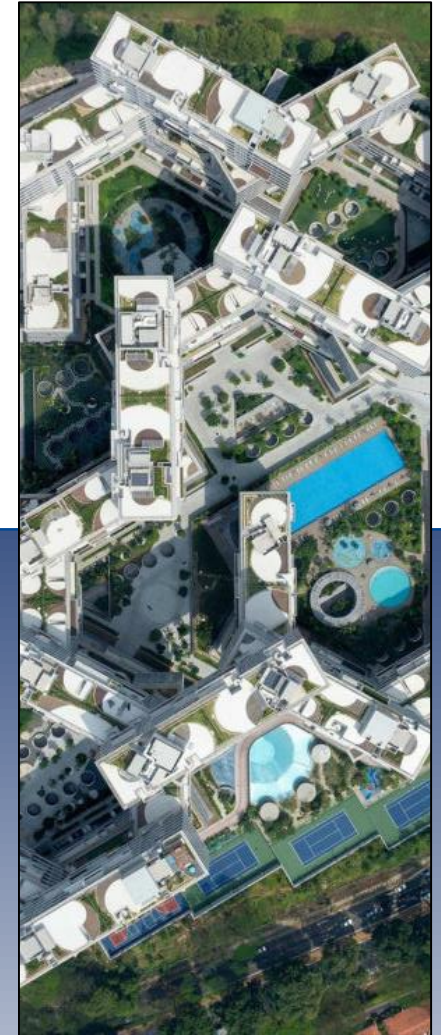
**NTNU**  
Norwegian University of  
Science and Technology

# Perimeter Blocks in Nordic Towns - How latitude affect daylighting

**Bengt Sundborg<sup>1,2</sup>**

**Barbara Szybinska Matusiak<sup>1</sup>**

**Shabnam Arbab<sup>1</sup>**



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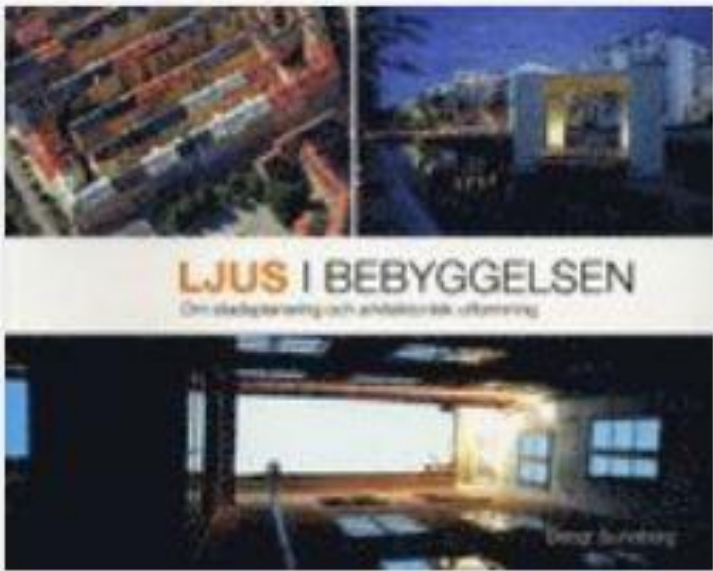
1

**NTNU**

Norwegian University of  
Science and Technology

# Perimeter Blocks in Nordic Towns - How latitude affect daylighting

**Daylighting Simulations of 3D-models**

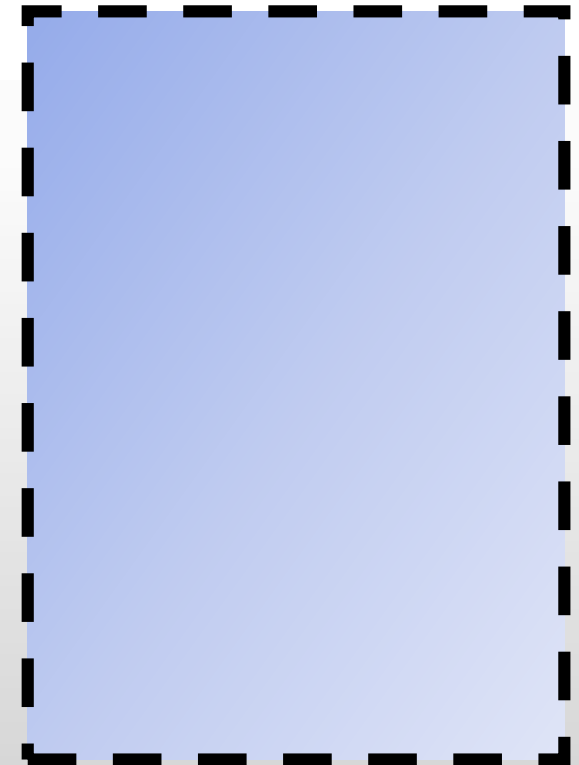
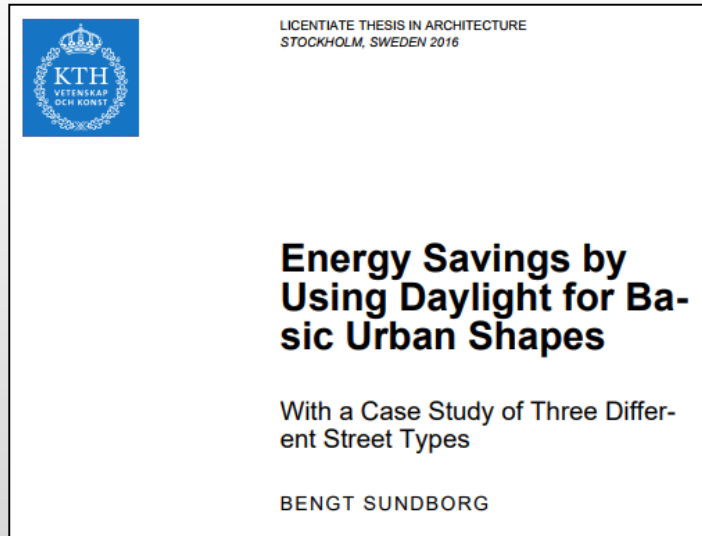
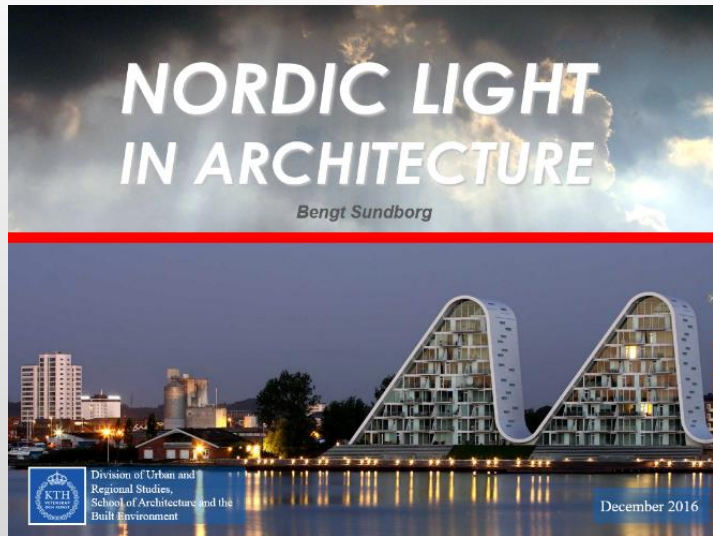


# Ljus i bebyggelsen : om stadsplanering och arkitektonisk utformning

av **Bengt Sundborg**

HÄFTAD Svenska, 2010-10-25

**Slutsåld**

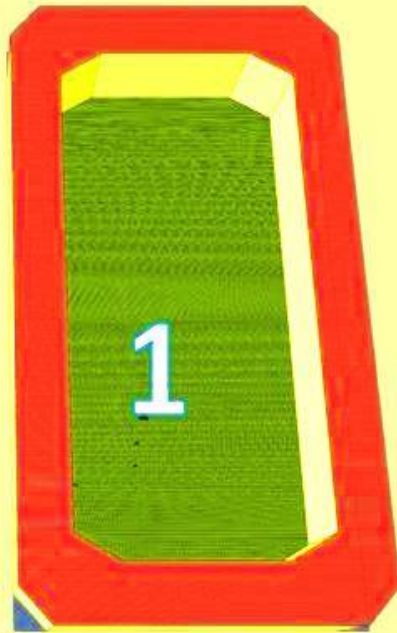
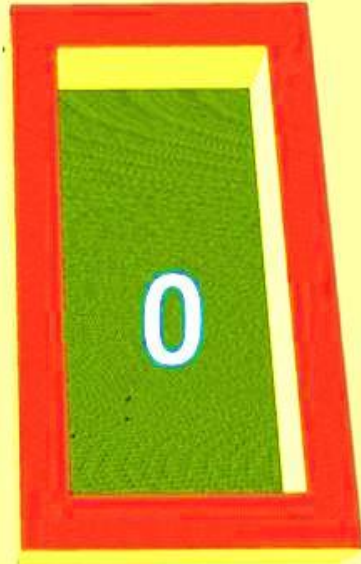


# LATITUDE

65.0 Oulu Mo i Rana Jokkmokk Rovaniemi  
63.4 Trondheim Reykjavik Östersund Vaasa  
59.3 Stockholm Oslo Helsinki Tallinn Saint Petersburg Anchorage  
55.7 Copenhagen Malmö Glasgow Moscow

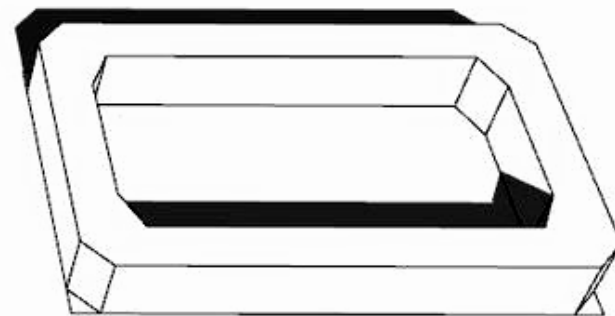
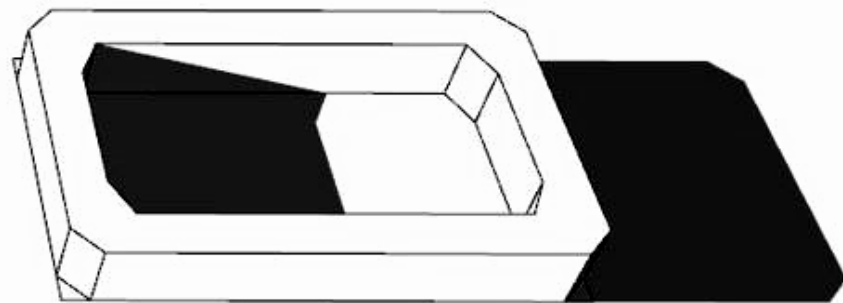


56 million people  
25 000 Polar Bears

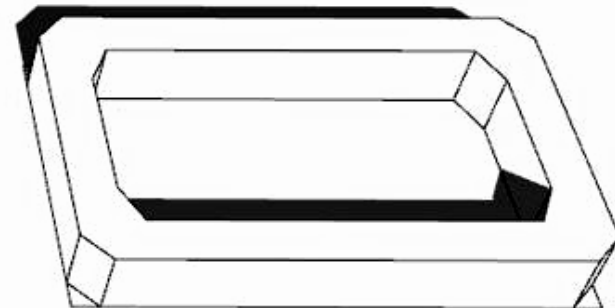
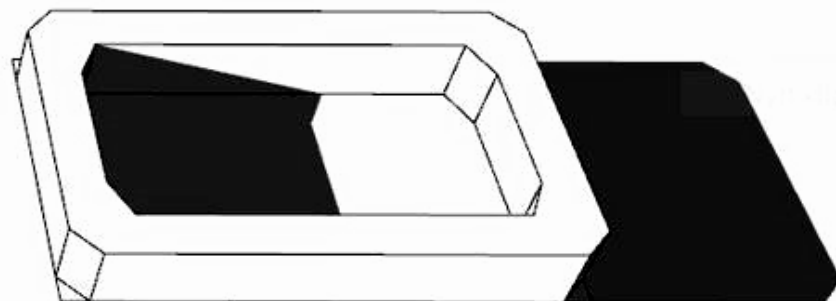


FAR=1.33

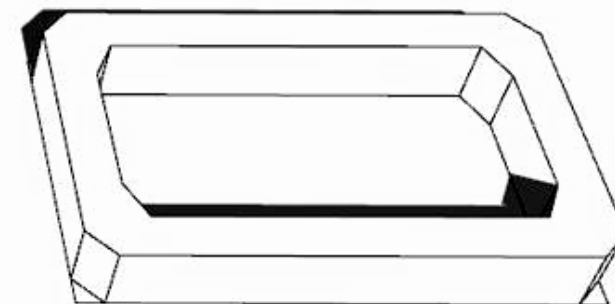
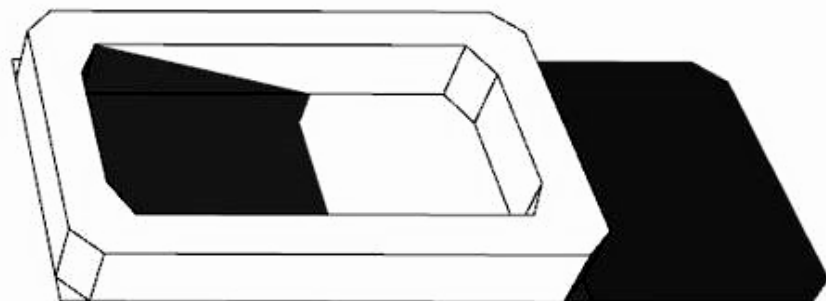
Oulu



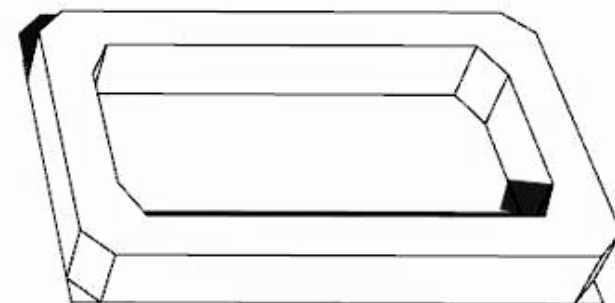
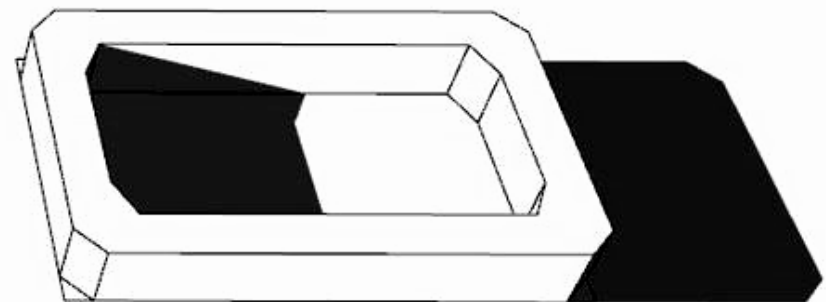
Trondheim



Stockholm



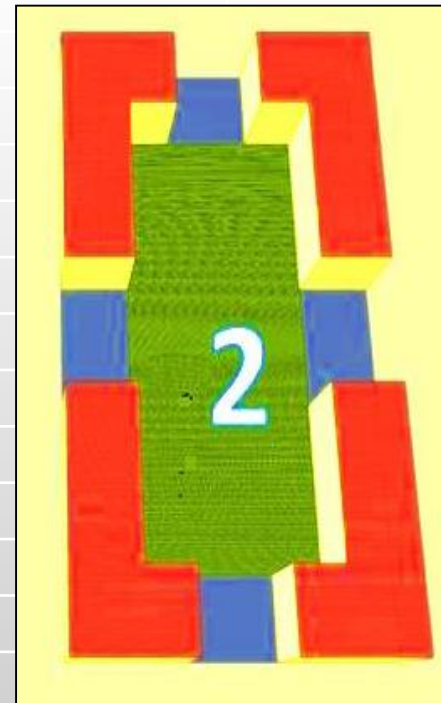
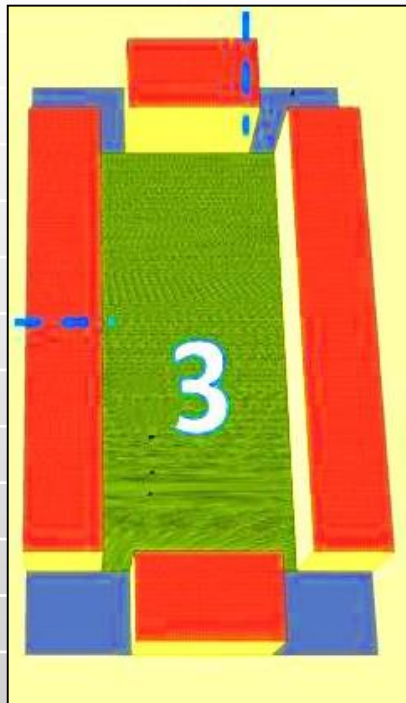
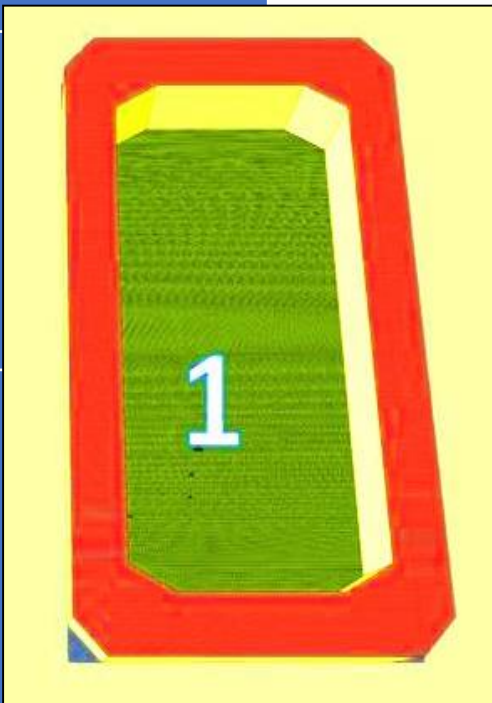
Copenhagen



Radiation (kWh/m2) Model:	Cloudy Sky. First floor.	Clear Sky. First floor.	Cloudy as % of Clear. First floor.	Cloudy Sky. Courtyard	Clear Sky. Courtyard.	Cloudy as % of Clear. Courtyard.
	Alt. 0	2.41	2.96	81	3.42	4.02
Alt. 1	2.47	3.03	82	3.41	3.97	86
Alt. 2	2.45	2.98	82	3.65	4.29	85
Alt. 3	2.47	3.04	81	3.07	3.81	81
Alt. 4	2.32	2.85	81	3.32	3.88	86
Alt. 5	2.33	2.86	81	3.55	4.17	85

Radiation (kWh/m2)	Model	1 <sup>st</sup> of May	Year
Oulu 65.0	Alt 0	2.63	519.69
	Alt 1	2.71	536.62
	Alt 2	2.67	538.09*
	Alt 3	2.72	551.63
	Alt 4	2.49	502.47
	Alt 5	2.52	499.38
Trondheim 63.4	Alt 0	2.88	570.37
	Alt 1	2.97	591.52
	Alt 2	2.92	596.92*
	Alt 3	2.98	613.73
	Alt 4	2.74	562.58
	Alt 5	2.77	561.55
Stockholm 59.3	Alt 0	2.96	613.1
	Alt 1	3.03	634.68
	Alt 2	2.98	629.27
	Alt 3	3.04	633.09
	Alt 4	2.85	611.17
	Alt 5	2.86	605.99
Copenhagen 55.7	Alt 0	2.85	650.75
	Alt 1	2.91	672.33
	Alt 2	2.86	669.85
	Alt 3	2.94	684.71
	Alt 4	2.82	632.59
	Alt 5	2.83	627.12

Facades on the first floor



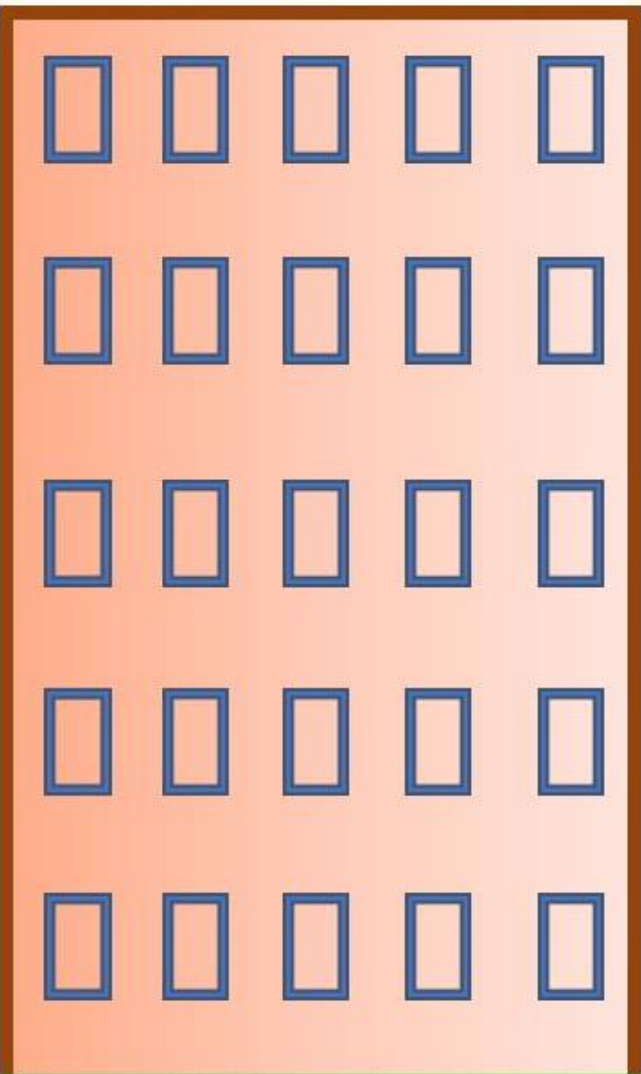




Oulu

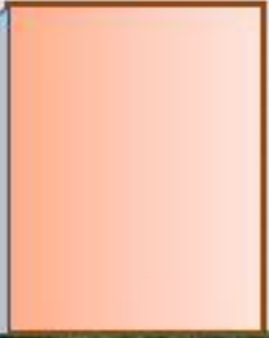
Copenhagen

Malta





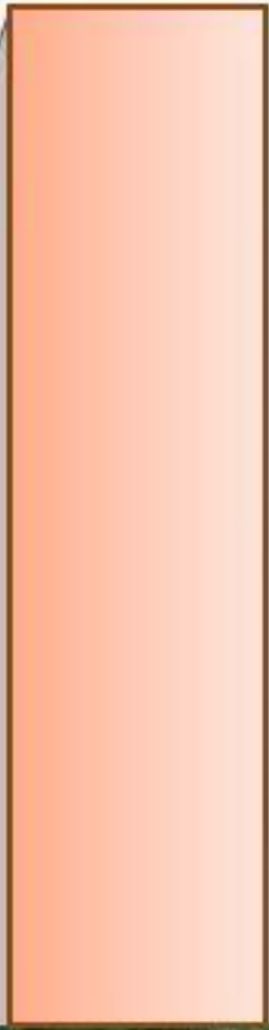
*Oulu*



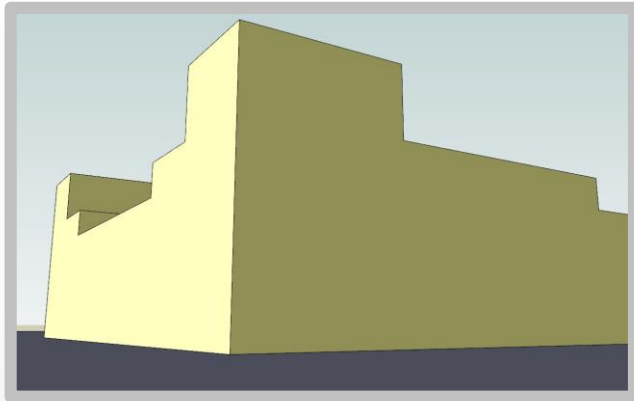
*Copenhagen*



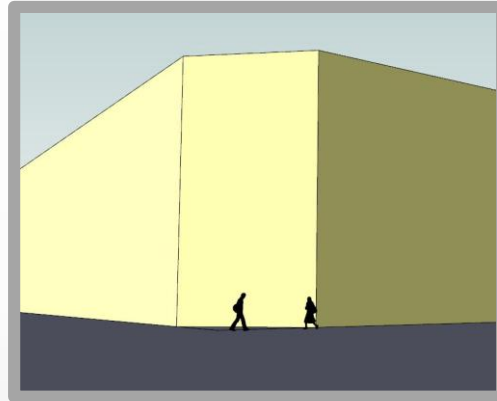
*Malta*



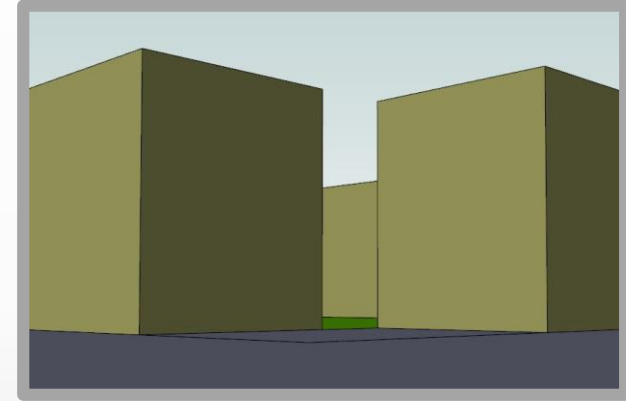
# *Design by Iterative Simulations*



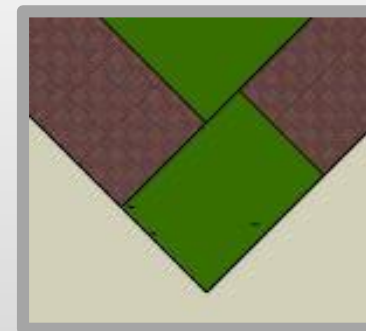
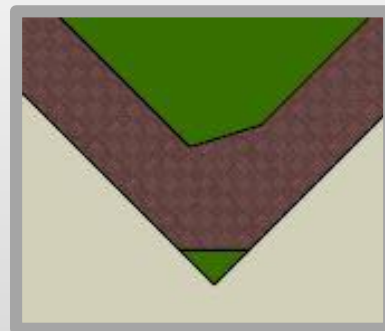
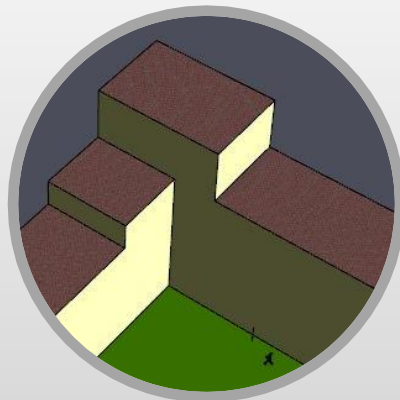
**Tower + Immersion**



**Chamfer**

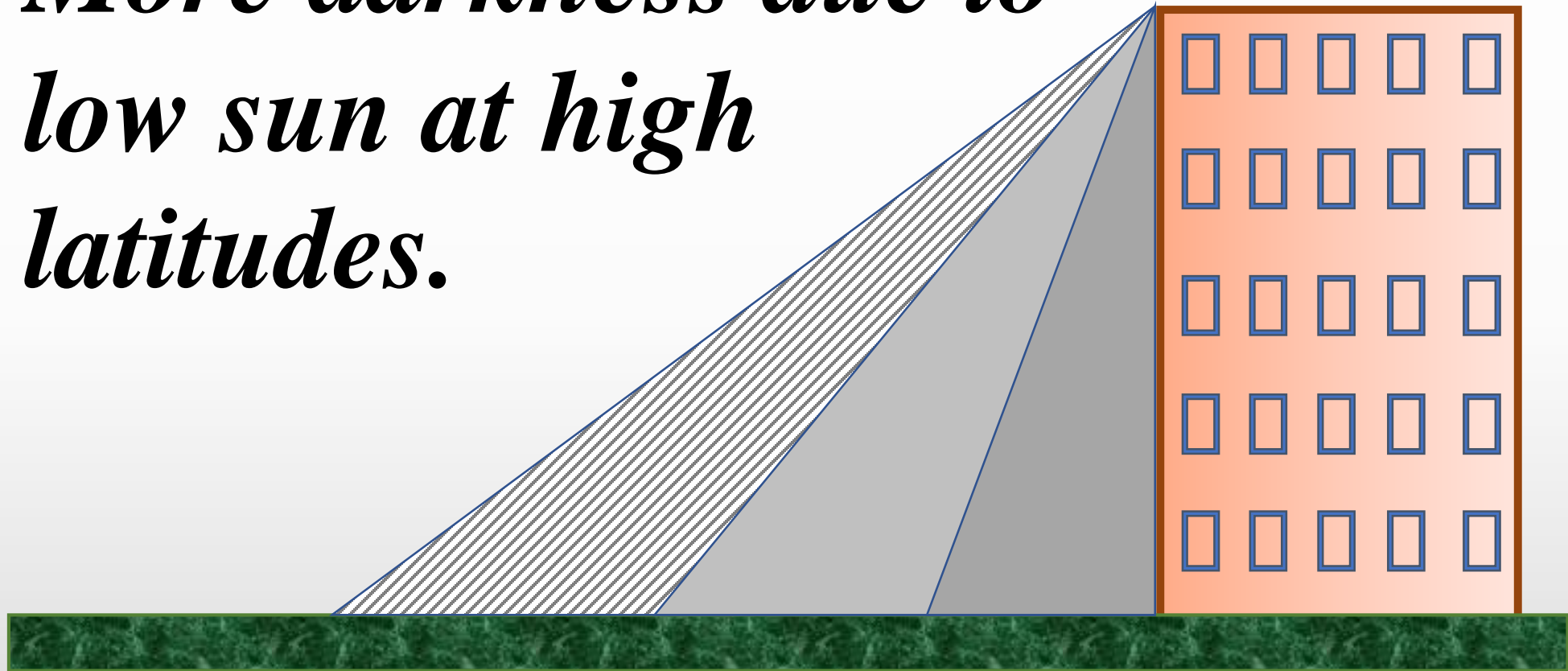


**Opening**



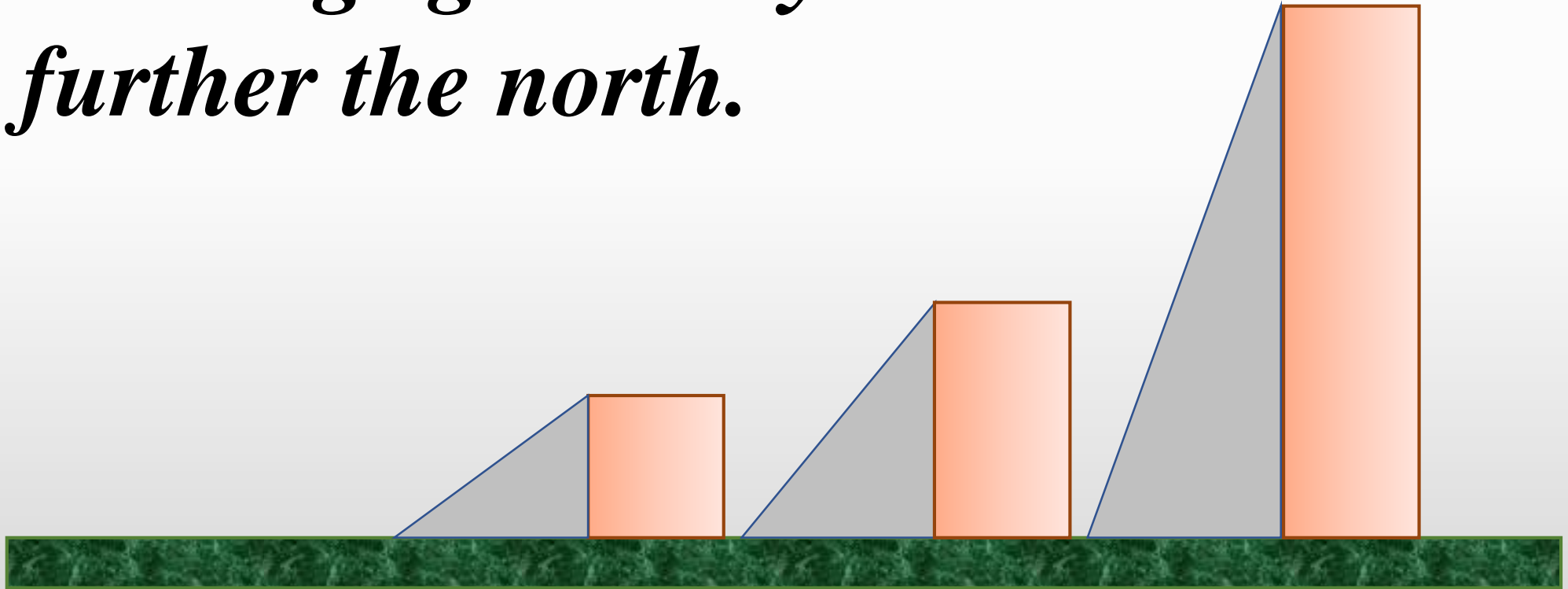
1.

*More darkness due to  
low sun at high  
latitudes.*



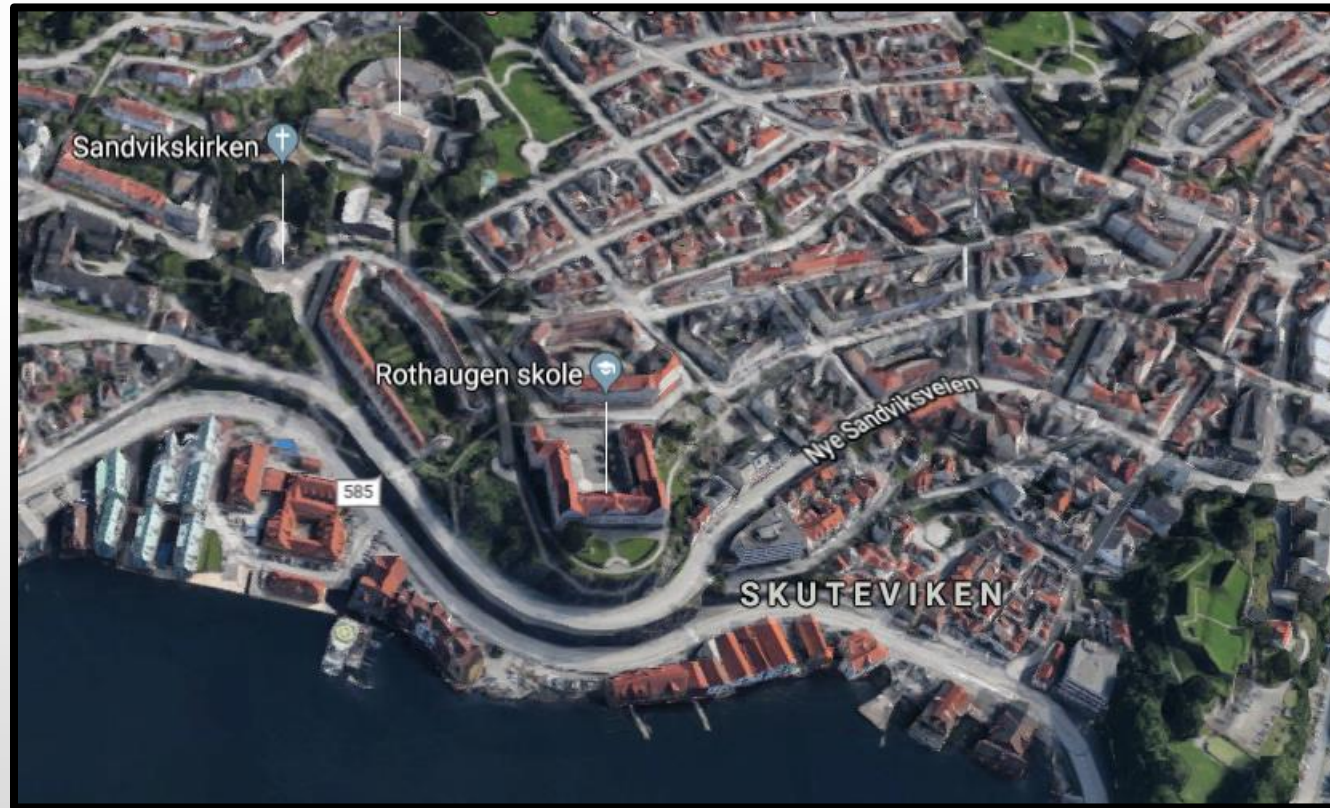
2.

*Limit the heights of the buildings gradually the further the north.*



3.

*Adapt to local conditions as  
wind, noise, topography, etc.*



# THE TEAM

Architect/PhD Student Bengt Sundborg.....Sweden

Professor Barbara Matusiak.....Norway

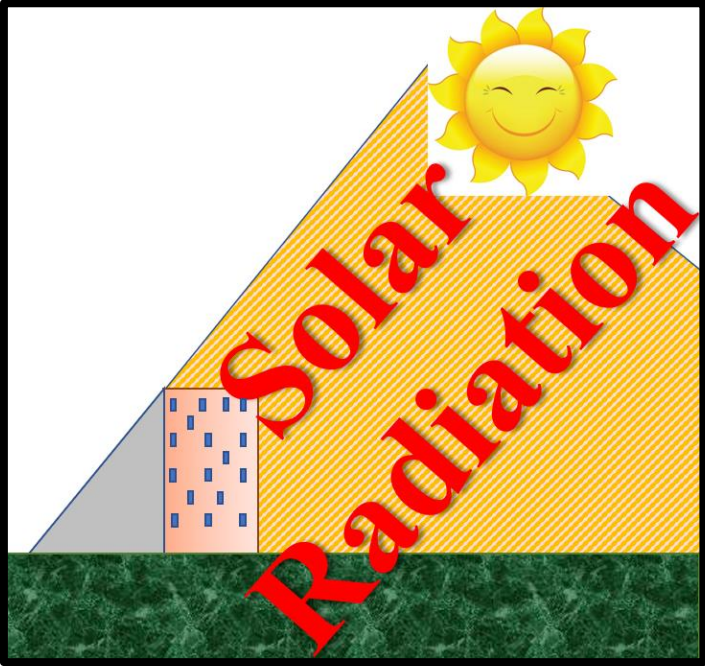
Post Doctoral Fellow Shabnam Arbab.....Norway

Professor em. Ivor Samuels.....England

Ph.D Per Olof Hedekvist, RISE.....Sweden

Consultant Majid Miri, Sweco Architects.....Sweden

# THE RESEARCH - Daylighting



## Daylight Strategies

