

The SageGlass logo consists of a solid yellow square with the text "SageGlass" in a dark grey, sans-serif font positioned in the upper left corner of the square.

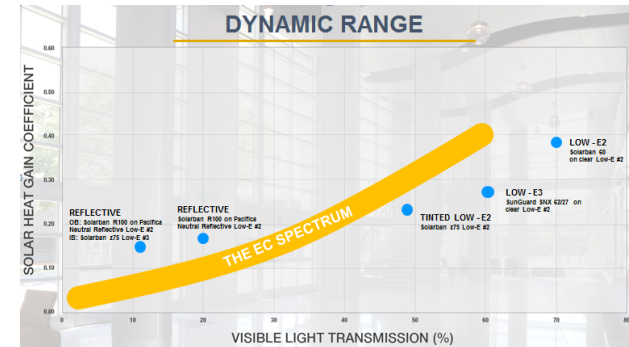
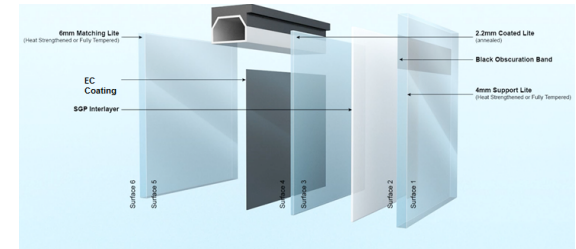
SageGlass®

Analysis of Reflected Glare: Electrochromic Glazing Performance in an Office Building

Ahoo Malekafzali, PhD - **SageGlass** | **Saint-Gobain**



Overview of Electrochromic Glass



CLEAR
TINT

LIGHT
TINT

MID
TINT

FULL
TINT

GLASS AT DIFFERENT TINT LEVELS

4 States Ranging From 60% Visible Light Transmission Down To 1%

EC Control Criteria



Glare Control



Daylight Control

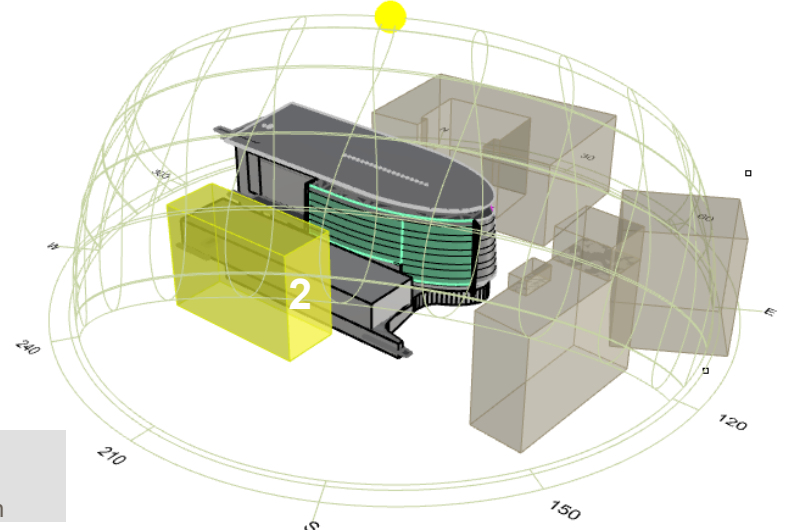
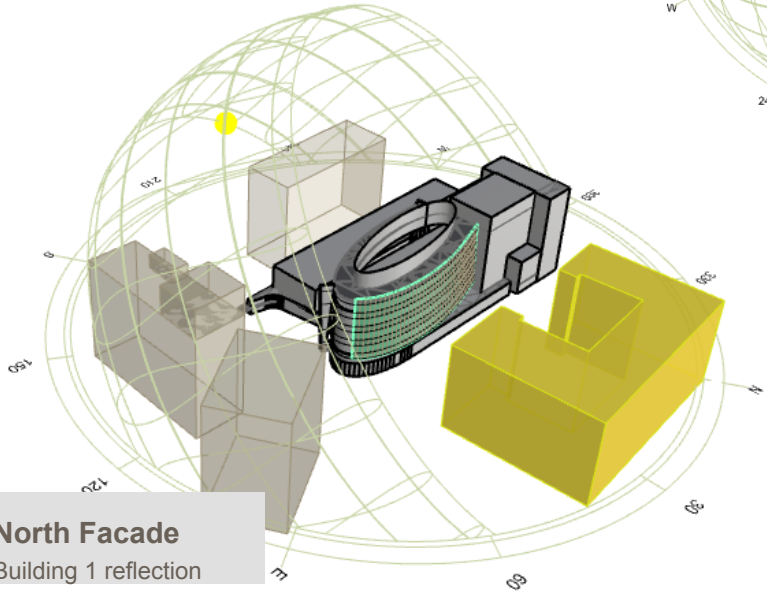
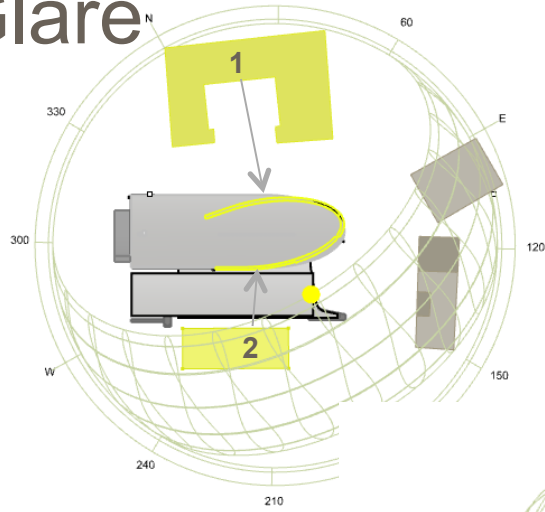


Color Rendering



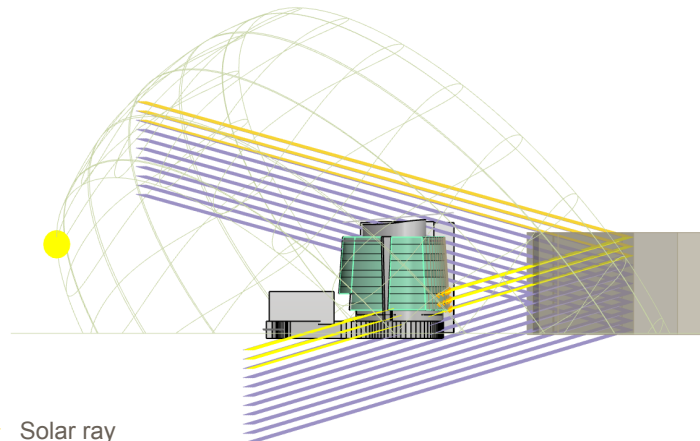
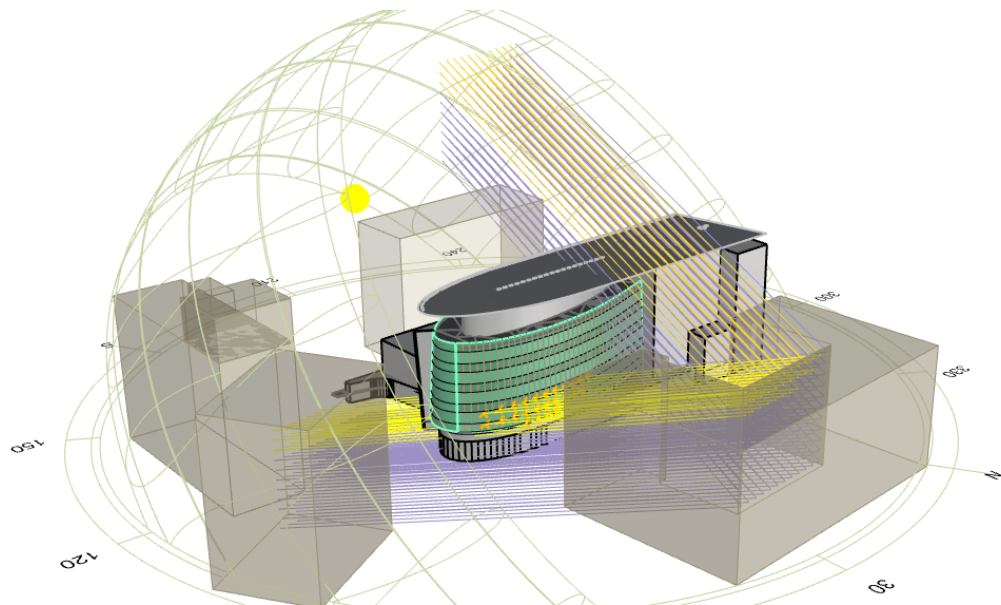
Thermal comfort





Reflected Glare

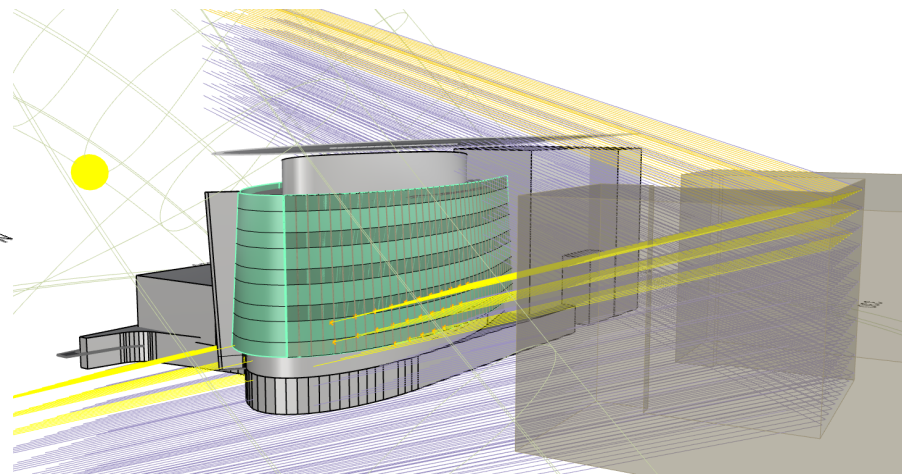


Raytracing Algorithm

North Facade



-  Solar ray
-  Reflected ray
-  Blocked solar ray
-  Area with risk of reflected glare

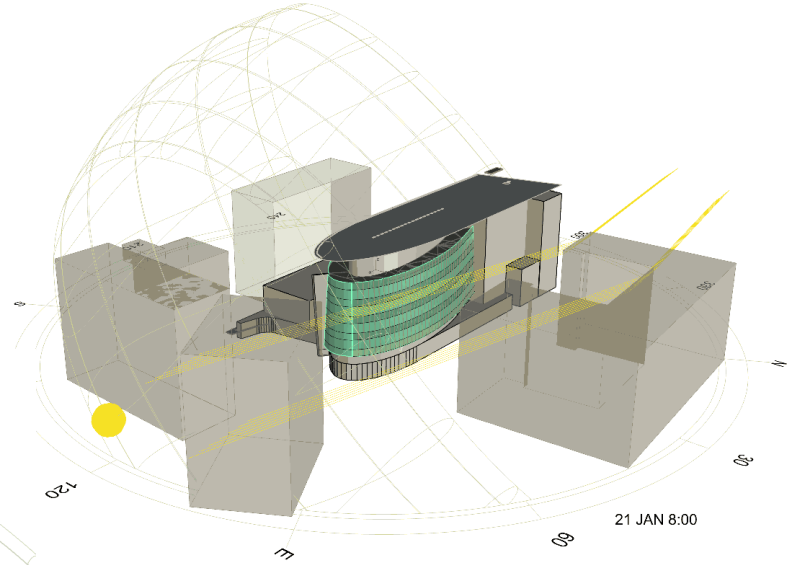


Reflected Glare

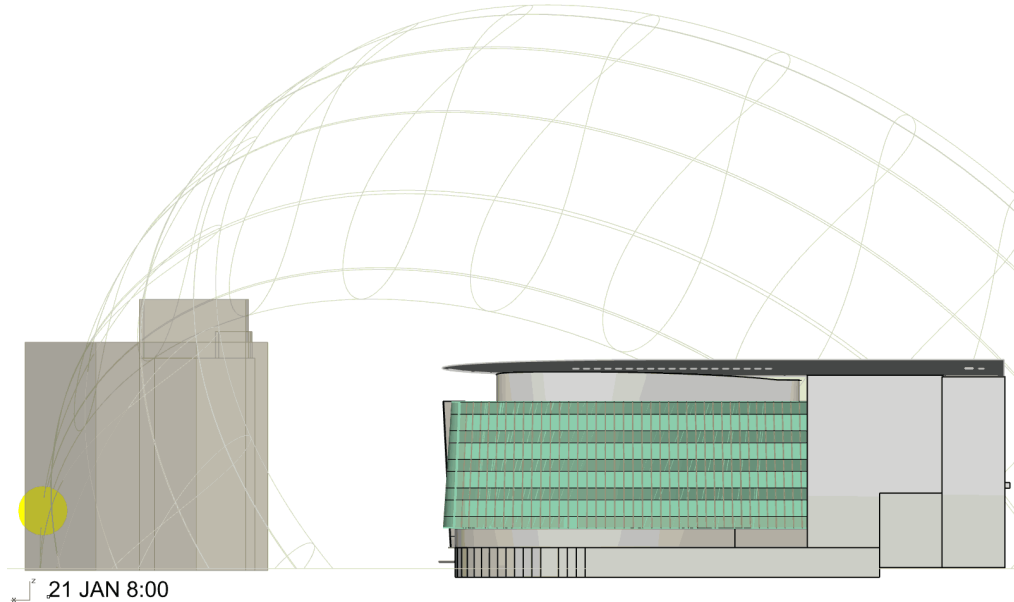
North Facade

Analysis of reflected glare from building one to UT north facing façade.

January to June



* The solar rays that are blocked by site obstruction are not shown in this animations.

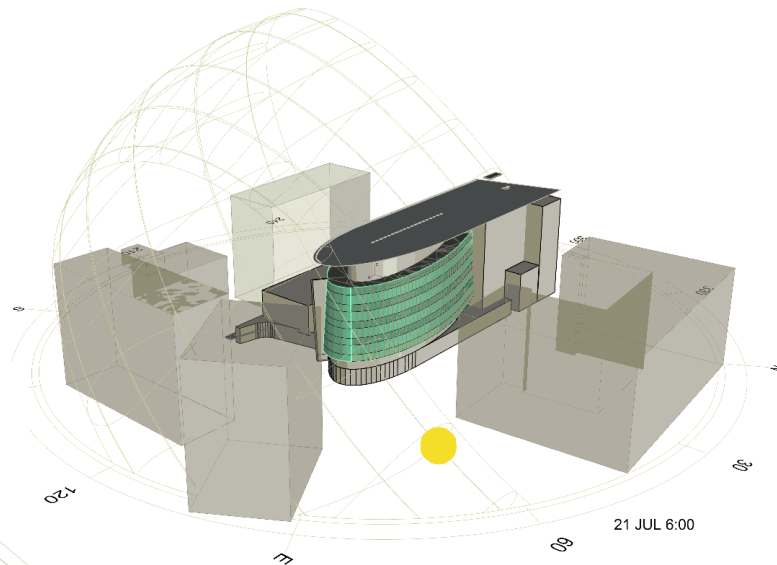
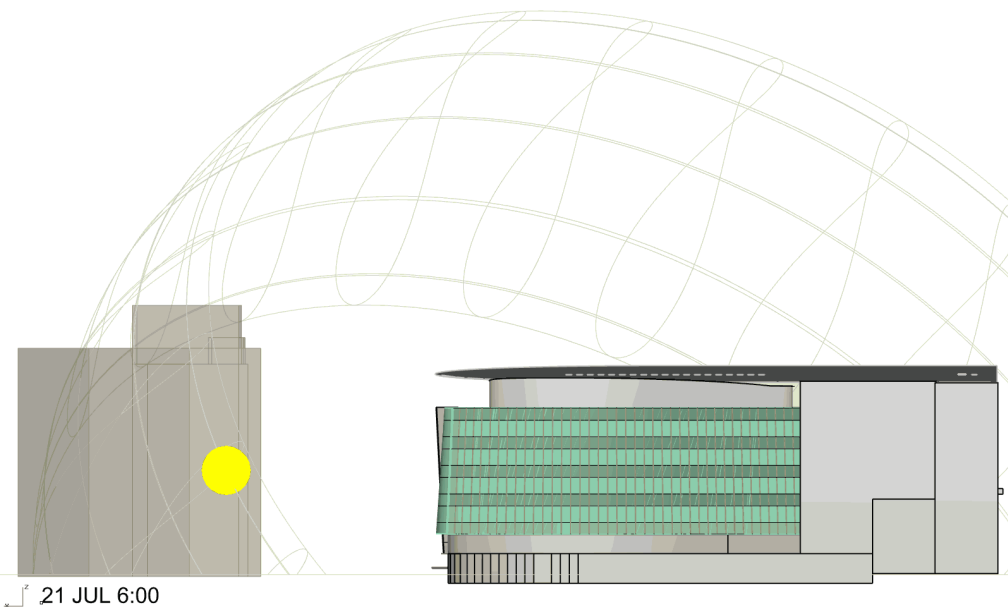


Reflected Glare

North Facade

Analysis of reflected glare from building one to UT north facing façade.

July to December

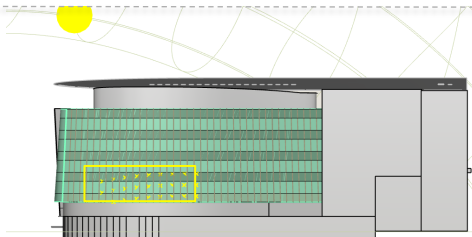


* The solar rays that are blocked by site obstruction are not shown in this animations.

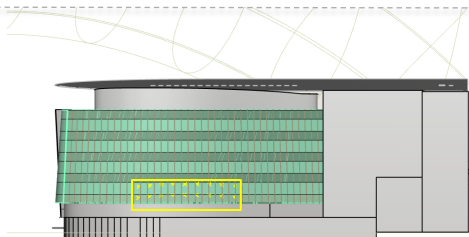
Hours with Risk of Reflected Glare

North Facade

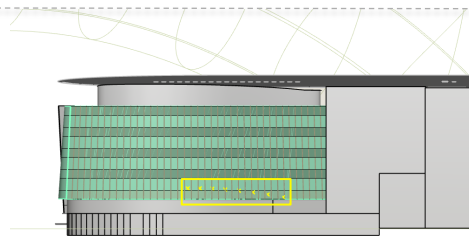
Jan.



Jan 21st 13:00

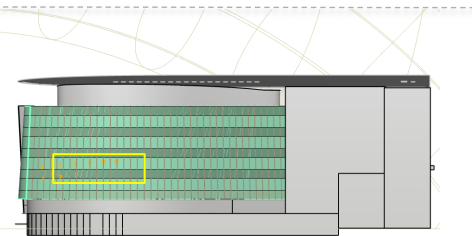


Jan 21st 12:00

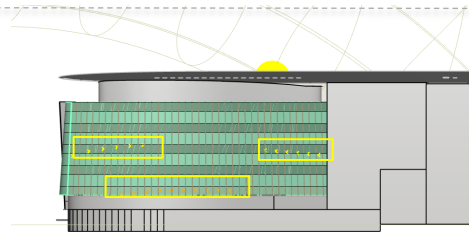


Jan 21st 11:00

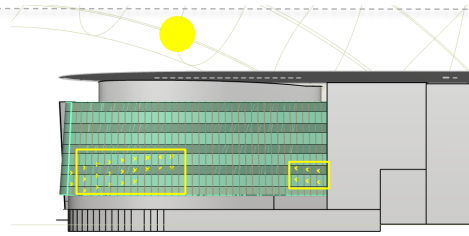
Jan.



Jan 21st 16:00



Jan 21st 15:00

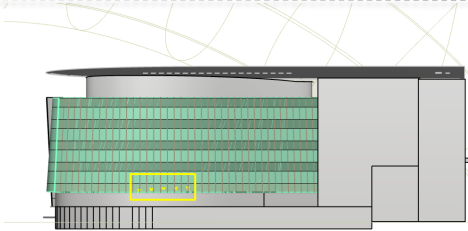


Jan 21st 14:00

Hours with Risk of Reflected Glare

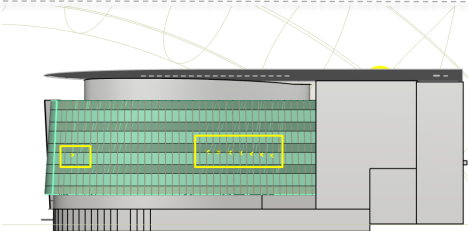
North Facade

Feb.

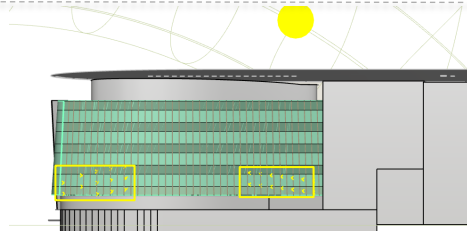


Feb 21st 13:00

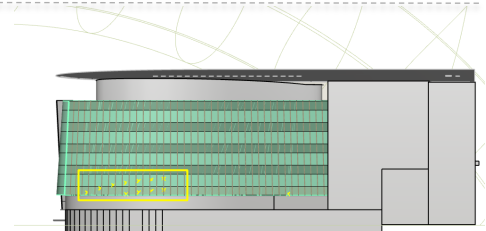
Feb.



Feb 21st 16:00



Feb 21st 15:00

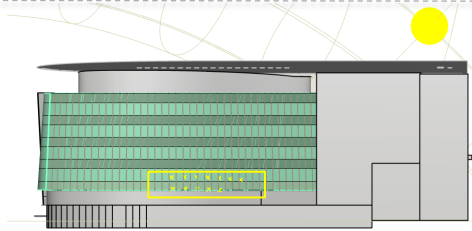


Feb 21st 14:00

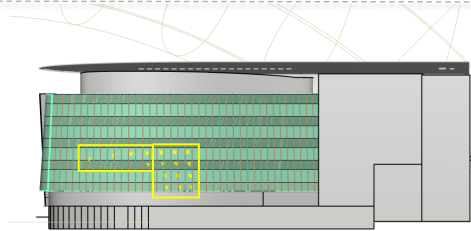
Hours with Risk of Reflected Glare

North Facade

Mar.

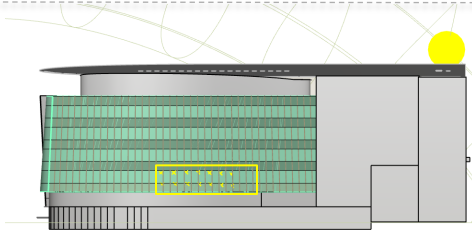


Mar 21st 16:00

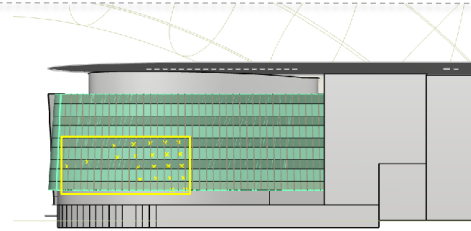


Mar 21st 17:00

Sep.



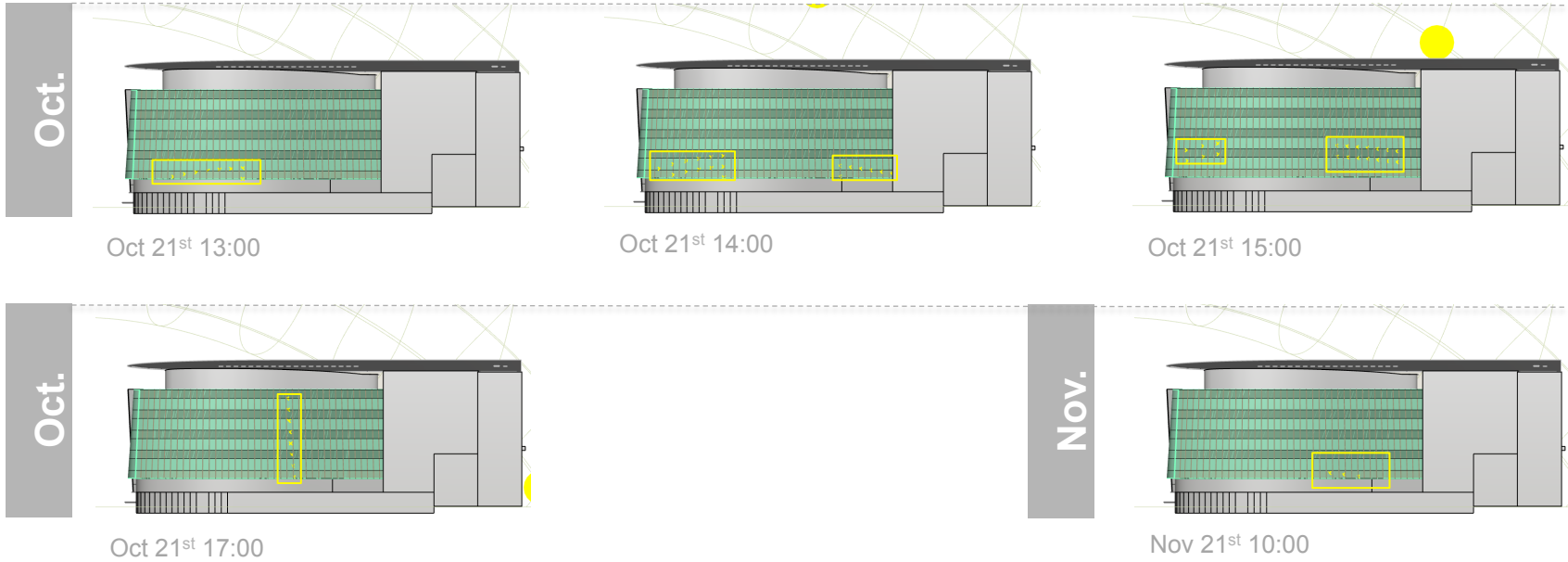
Sep 21st 16:00



Sep 21st 17:00

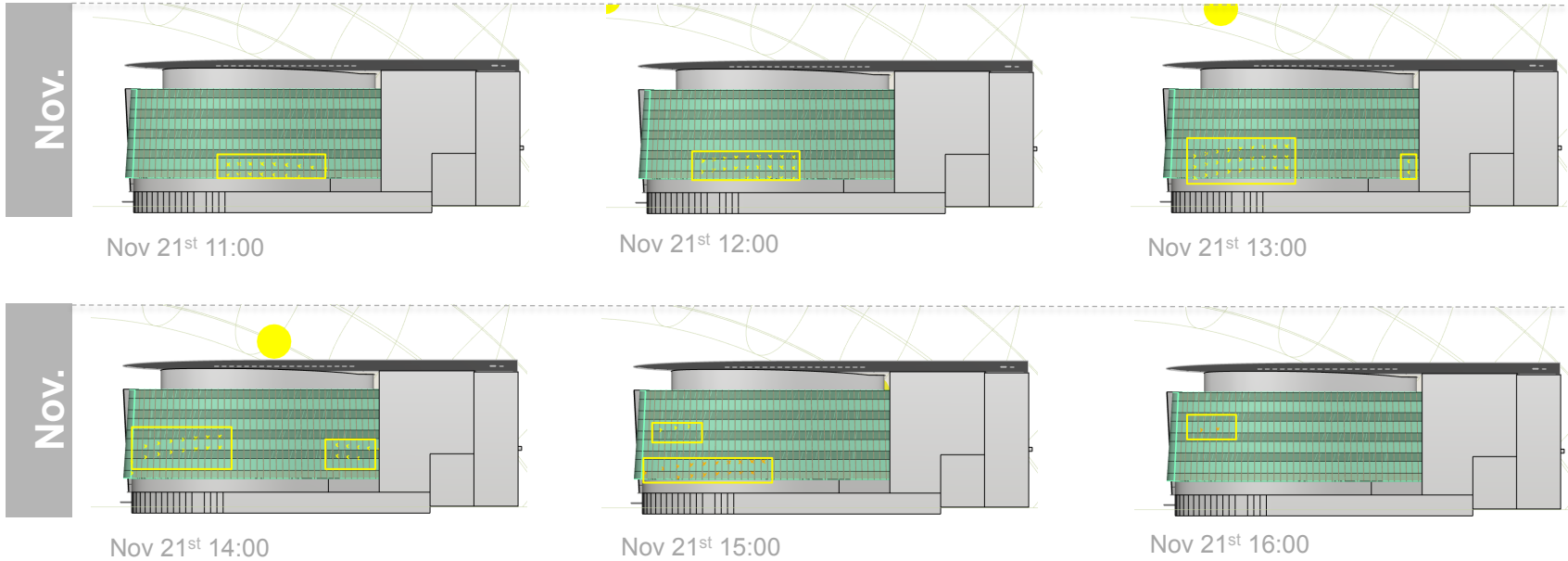
Hours with Risk of Reflected Glare

North Facade



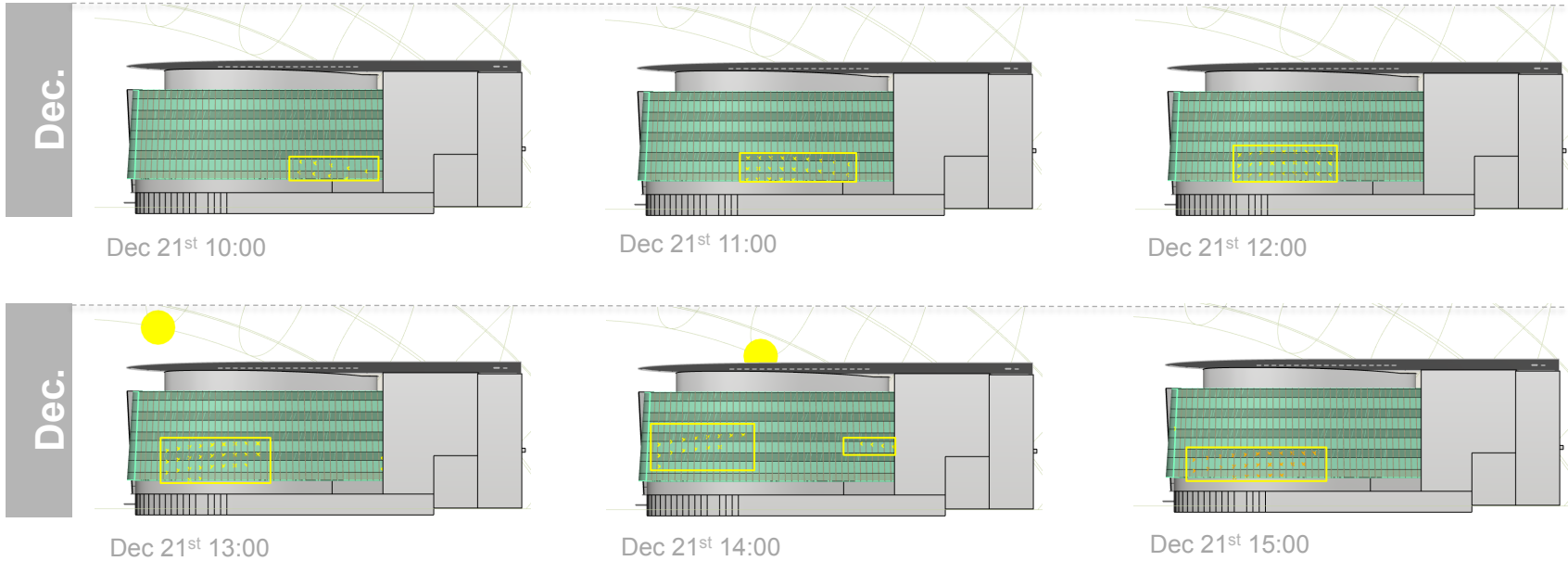
Hours with Risk of Reflected Glare

North Facade



Hours with Risk of Reflected Glare

North Facade



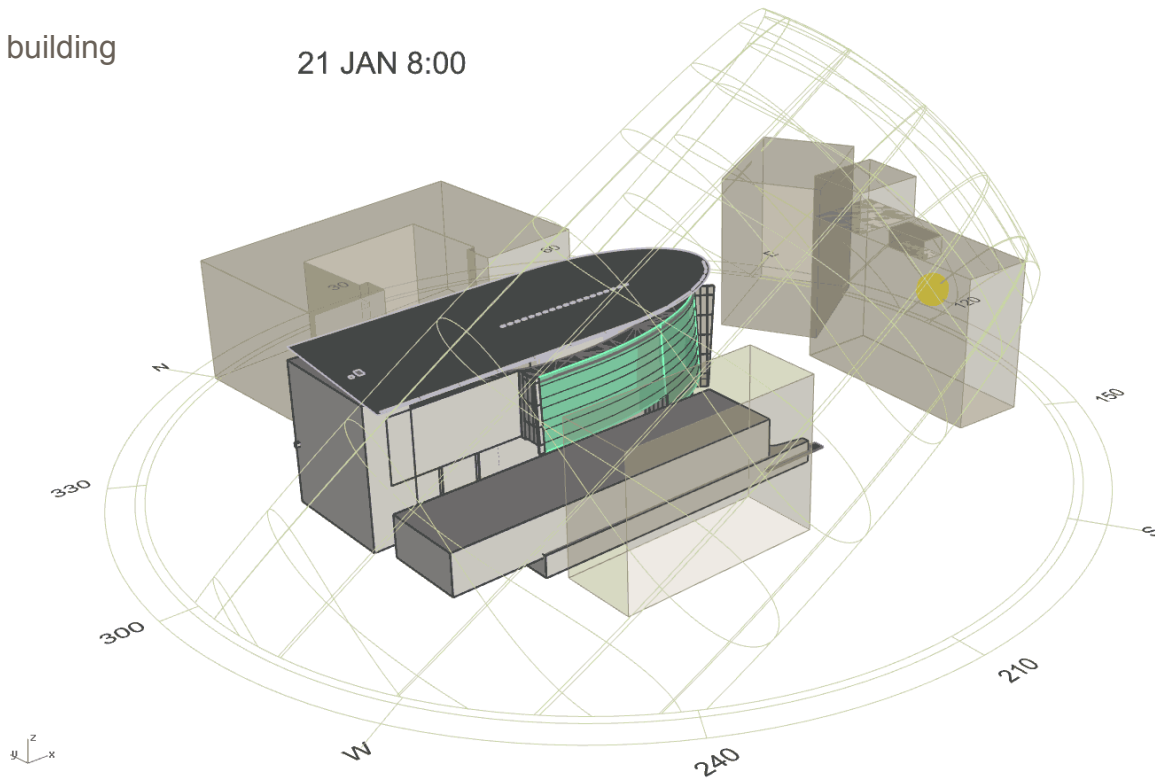
Reflected Glare

South Facade

Analysis of reflected glare from building two to UT south facing façade.

January to December

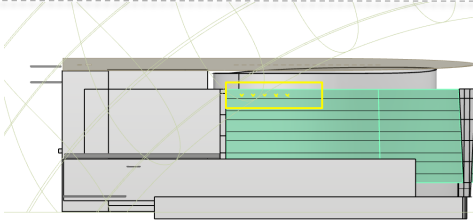
21 JAN 8:00



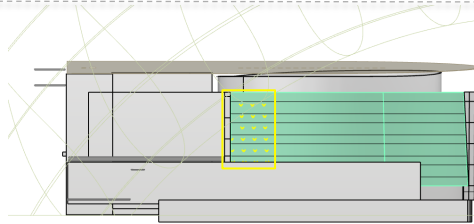
Hours with Risk of Reflected Glare

South Facade

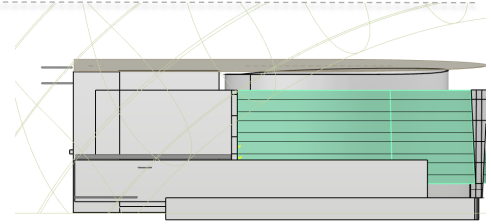
Jun.



Jun 21st 5:00

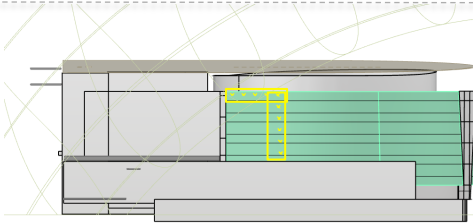


Jun 21st 6:00

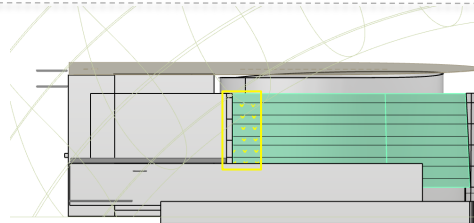


Jun 21st 7:00

May.



May 21st 5:00

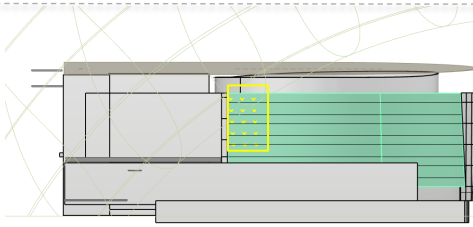


May 21st 6:00

Hours with Risk of Reflected Glare

South Facade

Jul.



Jul 21st 6:00

Analysis Summary

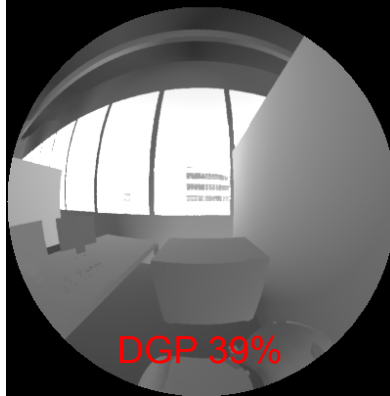
- All the identified hours and zones are an over-estimation of reflected glare hours, because the whole façade of Building 1 and 2, was assumed to be reflective.
- Among the identified hour, only times that solar ray hit the occupant eyes, there would be reflected glare problem.
- In south facing façade among some of the hours with risk of reflected glare, the reflected solar ray may get blocked by external shading.

DGP Analysis

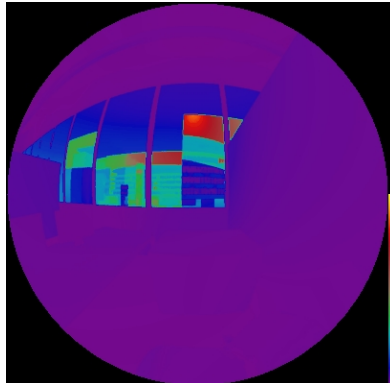
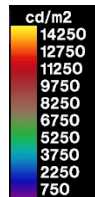
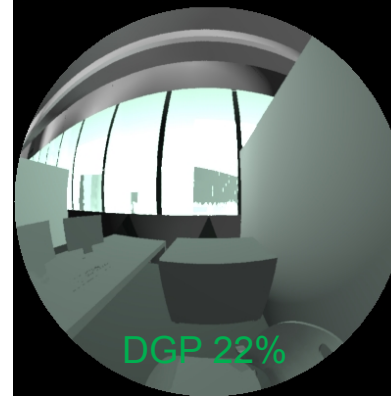
Analysis of EC performance

Feb 21st 13:30

2/21 1:30 PM Perceptible Glare (39% DGP)



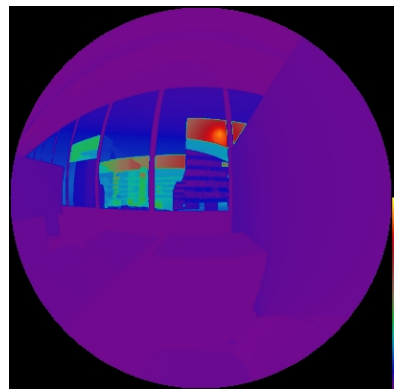
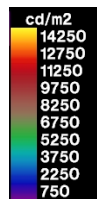
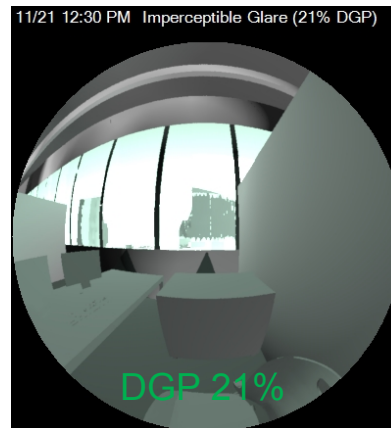
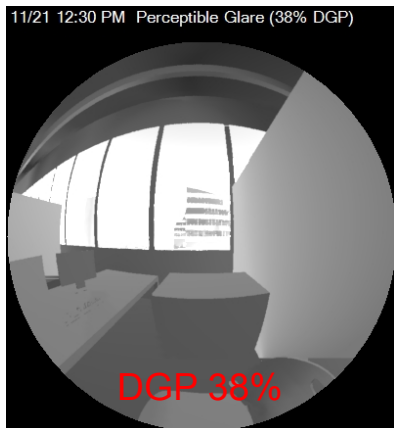
2/21 1:30 PM Imperceptible Glare (22% DGP)



DGP Analysis

Analysis of EC performance

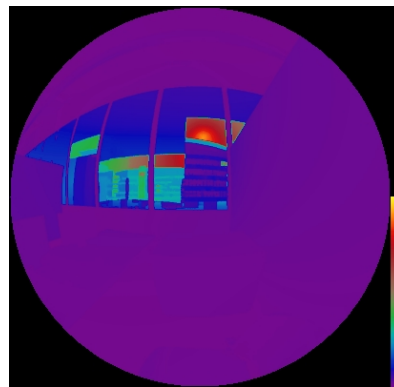
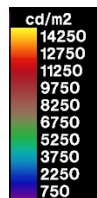
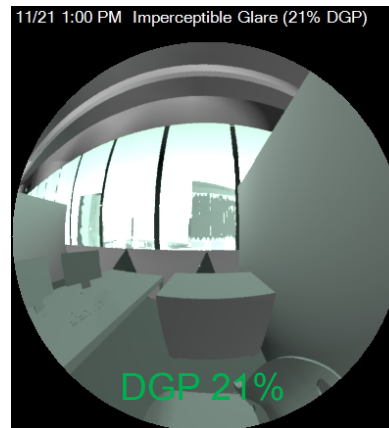
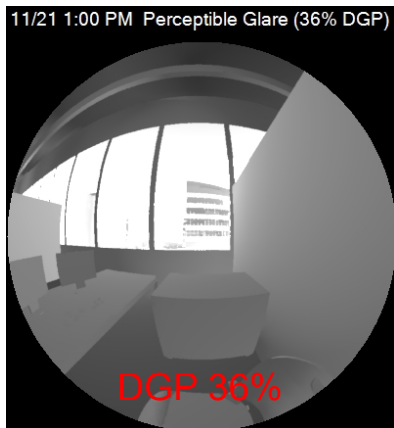
Nov 21st 12:30



DGP Analysis

Analysis of EC performance

Nov 21st 13:00



Thank You

Reference

- Selkowitz, S., Jakubiec, J.A., Pekdemir, A.E., (2017) “Sunlight and reflected glare analysis 5 views from the world of design and simulation” ,2017 Building Simulation Conference
- Reinhart, C., Lagios, K., Niemasz, J. and Jakubiec, A. 2012. Diva for Rhino.
- Roudsari, M.S., Pak, M. and Smith, A., 2013, August. Ladybug: a parametric environmental plugin for grasshopper to help designers create an environmentally-conscious design. In Proceedings of the 13th International IBPSA Conference Held in Lyon, France.
- Labib, L., (2017) Shading and reflection analysis-Plugins