Graduate thesis

NTNU
Norwegian University of Science and Technology
Faculty of Architecture and Design
Department of Architecture and Technology

Md. Muhtasim Galib Inan

Study of Colored Facade-integrated PVs with physical scale modeling

in cooperation with IFE that is in the process of developing new material samples

Graduate thesis in Sustainable Architecture
Supervisor: Barbara Szybinska Matusiak
July 2022

NTNU
Norwegian University of
Science and Technology

Md. Muhtasim Galib Inan

Study of Colored Facade-integrated PVs with physical scale modeling

in cooperation with IFE that is in the process of developing new material samples

Graduate thesis in Sustainable Architecture
Supervisor: Barbara Szybinska Matusiak
July 2022

Norwegian University of Science and Technology
Faculty of Architecture and Design
Department of Architecture and Technology

NTNU
Norwegian University of
Science and Technology

Abstract

Implementing renewable energy sources and promoting clean energy has now been in practice to increase sustainability and to decrease greenhouse gas emission. Though using photovoltaics has been one of the most convenient ways to employ clean energy, its integration is quite limited to roof surfaces. For arctic countries like Norway, facade integrated photovoltaics have high probability due to lower sun elevation, eventually has the potential to change the urbanscape. The aim of this research is to study the light and colour performance of such sample materials through physical modelling in the city of Trondheim. the method adopted for the purpose includes making of scale models with samples provided by IFE and a questionnaire survey; leading to an analysis of perception of speculairty of the materials. The result obtained from surveying 70 participants show the preference towards the sandblasted texture over the smooth surface and inclination towards the green scheme compared with the yellow one. The study also confirms that the discomfort due to reflection is higher on a sunny clear sky than a cloudy overcast sky condition.

Acknowledgement

First and foremost, Alhamdulillah, thanks to Almighty who has helped me all this way to complete this degree.

I want to thank my supervisor, Barbara Szybinska Matusiak, who has guided me in best possible way from choosing the thesis topic to the very end of making this dissertation, answered all my queries and pathed out the way when I was clueless.

I extend my gratitude to “IFE – Institute for Energy Technology” for providing me with the samples to carry on the research, to “Trønsdal Farvehandel” for supporting me with the paints in whichever shade I needed, Jorg Siegfried Schauer, for helping me out with the model workshop while making the actual models, “EW glass & plast” for helping me with cutting of glass samples when I failed miserably doing it myself, “Royal Haircut Salon” to allow me to conduct the survey in front of their outlet, Rizvi Ahammed, for helping me with the transportation of models, to all the participants of the survey who took their time to be a part of the questionnaire survey, my dearest friends Mahalakhsmi, who was there whenever I needed her, Sakib, Rafi, Tuhi and Tanmoy who made this stay in Norway livable and this journey enjoyable.

This thesis work is dedicated to my parents, my dear father, who has been a constant source of support and encouragement, who never failed to give me whatever I needed, and my lovely mother, who developed my sense of moral and consciousness, trained me to accomplish my aim.

Contents

List of Figures 7

1 Introduction 10
1.1 Background 10
1.2 Research objective and questions 11

2 Literature Review 12
2.1 Architectural integration of FIPV 12
2.2 Colour in FIPV 13
2.3 FIPV in Norway 14
2.4 Colours of Trondheim 15

3 Methodology 18
3.1 Design of the model 18
3.1.1 The façade type 19
3.1.2 The façade scale 21
3.1.3 Colours of the models 23
3.2 Selection of location 24
3.3 Physical modelling 26
3.4 Questionnaire survey 29
3.5 The experiment 32

4 Results 34
4.1 Results of the survey 34
4.1.1 Results for Sunny condition 37
4.1.2 Results for cloudy condition 38
4.1.3 Comparison of results between sunny and cloudy condition 40
4.2 Research results 42

5 Discussion 45
5.1 Limitations of the experiment 45
5.2 Luminance abnormality in smooth sample 46
5.3 Further scope of work 47

6 Conclusion 48

7 Reference 49

8 Appendix 52

8.1 Appendix A 52

8.2 Appendix B 53

List of Figures

Figure 2.1 higher visibility of FIPV from public domain, collected from (Munari Probst & Roecker, 2011) 12
Figure 2.2 PV samples of different colours and texture (source :internet) 13
Figure 2.3 annual BIPV geographical potential (Gholami et al., 2021) 14
Figure 2.4 Solar Irradiation on horizontal surface of Norway in summer and winter(Tamrakar et al., 2019) 15
Figure 2.5: Traditional buildings around Nidelva in Trondheim has a specific colour scheme 16
Figure 2.6 The overall colour palette of Trondheim (Angelo & Booker, 2018) 16
Figure 2.7 on the left: selected NCS hues for cFIPV design; on the right: detailed NCS colour palette for cFIPV design (Xiang et al., 2022) 17

Figure 3.1traditional buildings of Trondheim 18
Figure 3.2 typical facades of buildings near bakklandet 19
Figure 3.3 different types of facades 20
Figure 3.4 Different scaled facades with the same size of samples yield in different outcomes. The horizontal orientation is selected for the least wastage and higher surface area available. 22
Figure 3.5 the colours chosen for the modeling of the facades. 23
Figure 3.6 the designed facades in the selected colour scheme. 24
Figure 3.7 the actual colours of the models with the samples 24
Figure 3.8 image showing probable locations for the experiment (image collected from Google maps) 25
Figure 3.9 photo taken around the location of Nygata 26
Figure 3.10 the samples provided by IFE (left: compared individually, right: compared as a whole model surface) 26
Figure 3.11preliminary models with MDF and Plyboard tried to test the colours 27
Figure 3.12 Doors and windows cut out of plyboard and lined with aluminium foil 27
Figure 3.13 photo taken at different stages of making the models 28
Figure 3.14 cutting of glass samples into required shape and size. 29
Figure 3.15 the models on two different weather condition (top: sunny, bottom: cloudy) 32
Figure 3.16 photo of the devices used for the experiment 33
Figure 3.17 Figure 10: photo showing the marked areas where the readings were taken by the luminance meter. 33

Figure 4.1 Charts showing percentage of Age group, gender and colour vision difficulty among the participants of the survey. 34
Figure 4.2 Charts showing the percentage of preference of the three models in respect of colour and glossiness. 34

Figure 4.3 charts showing the percentage of discomfort caused by the samples most preferred 35
Figure 4.4 pie charts showing the percentage of discomfort caused by the sample least preferred.....36
Figure 4.5Charts showing the percentage of preference on sunny day. 37
Figure 4.6 top view of the positions where the readings were taken by the luminance meter.37
Figure 4.7 Tables showing luminance of the models on a sunny condition for each colour nuance. 38
Figure 4.8 Charts showing the percentage of preference on a cloudy day. 39
Figure 4.9 Tables showing luminance of the models on a cloudy condition for each colour nuance. 40
Figure 4.10 Preference comparison for different sun conditions.....40
Figure 4.11 photos of the backdrop where the experiment was carried out, sunny day on left, overcast day on right. 41
Figure 4.12 green coloured and textured surfaces are preferred.....42
Figure 4.13 Discomfort is less in the sandblasted samples and higher in the smoother ones. 43
Figure 4.14 difference in visual perception between sunny and cloudy condition.....44
Figure 4.15 table showing luminance difference due to sandblasting of the samples.....44

Figure 5.1inaccuracy of cutting of samples 46
Figure 5.2 higher luminance level in darker nuance.....46
Figure 5.3 luminance level abnormality for smooth sample.....47

Abbreviations

PV	Photovoltaic
BIPV	Building Integrated photovoltaic
FIPV	Façade Integrated photovoltaic
NCS	Natural Colour System

1 Introduction

1.1 Background

According to International Energy Agency, buildings are the largest energy consumption sector accounting to one third of global energy usage and greenhouse gas emission (Xiang & Matusiak, 2022). The building sector in OECD countries is liable for approximately 40% of total final energy consumption (Athienitis et al., 2018). With the climate change in action and gradual rise of temperature, the Paris agreement act set the goal in 2015 to limit the global warming and reduce the temperature by 1.5 degree Celsius (Bell et al., 2015)To reduce the impact of global warming and save the world, alternative to fossil fuel is sought after throughout the world, looking for a cleaner form of energy, a sustainable approach towards energy production.

To reduce the annual CO2 emissions by 80% within 2050, aim set by EU, large scale implementation of various kinds of clean energy system is required (Xiang & Matusiak, 2021). Solar energy is the most abundant and inexhaustible form of renewable energy currently available (Jelle et al., 2012). Using Photovoltaics (PVs) to generate electricity has been a promising strategy which has attracted strong interest of researchers (Xiang & Matusiak, 2021). The concept of building integrated photovoltaics is thus one of the most convenient strategies to employ clean energy and have been studied and experimented on.

The conventional use of PV is mostly limited to its integration in roof as it is most efficient from the perspective of energy production (Xiang & Matusiak, 2019a). Due to limitation of roof area, it is often not sufficient to produce the electricity for domestic use (Freitas et al., 2017). So, utilizing the façade areas for energy production can compensate for the limited energy production on roof surface (Xiang & Matusiak, 2019b).Thus, building facades are now being explored to be used for energy production. When most of the previous studies deal with energy efficiency, performance and productivity, the architectural integration and the perception of people is yet to be explored (Saretta et al., 2019; Xiang et al., 2022).

In urban areas, the roof area is limited, thus increases the necessity to integrate PVs on building facades (Xiang et al., 2022). FIPVs are now regarded as a type of façade material like that of brick, wood or concrete (Xiang, Moscoso, et al., 2021), thus has a direct impact on the aesthetic of the building itself and also on the urban streetscape. in arctic countries

with lower sun elevation, like Norway, FIPVs are more feasible (Xiang, Matusiak, et al., 2021).

1.2 Research objective and questions

Research in FIPVs encompass different fields of architectural design, environmental aesthetics, architectural engineering, material science, energy efficiency and so on, as a result, a cross-disciplinary systematic method is required (Xiang, 2022). The studies on FIPV done so far deals with the energy performance, aesthetic environment and efficiencies of the materials, whereas the impact of gloss and texture of FIPV on aesthetic performance is yet to be studied (Xiang, 2022). There is a deficit in consideration of colour texture and pattern of the PVs which needs to be addressed by architects and urban designers (Farkus et al., 2013).

The specularity of the material or the reflection caused by the sunlight on the surface of the material can only be observed with physical modeling. Study of specularity with actual samples through physical modeling is yet to explored (Xiang, Matusiak, et al., 2021). The main aim of this thesis is to see the impact of gloss and texture of the surface of FIPV through physical modeling. The research questions are:

1. *What are the preferences of people in terms of colour and surface texture of the FIPVs?*
2. *How people react to the reflectance of the materials?*
3. *What are the differences in visual impression in sunny and cloudy weather?*
4. *How is the impact of sandblasted treatment of PVs on the final colour of the FIPV?*

2 Literature Review

It was 1839 when Alexandre Edmond Becquerel first observed the photovoltaic effect in a conductive solution (Bacquerel, 1839) and it took 44 years to invent the world's first working solar cell (Fraas, 2014) . Since then, Photovoltaics have been a topic of research interest and now solar PV systems are believed to be the most promising type of renewable energy system (Xiang, 2022). Although the systems are technologically promising, they have not been sufficiently used in architecture or building design (Munari Probst & Roecker, 2011).

2.1 Architectural integration of FIPV

Façade Integrated Photovoltaics or FIPVs are defined as architectural integrated photovoltaics replacing traditional materials on building façades, which can be viewed as a new type of façade materials like brick, wood or concrete (Xiang & Matusiak, 2021). These FIPVs if used in the buildings would form the external covering of the building, creating impact on the aesthetics of the neighbourhood.

Conventional integration of PVs on roofs not only have limited area but also have less visibility. When compared with roof integrated PV systems, FIPV systems have higher public visibility which requires careful architectural integration (Munari Probst & Roecker, 2011). Special focus on aesthetic quality is need in addition to functional and constructive aspects while using FIPV (Xiang, 2022). Additionally, PV façade colours, texture, pattern and glare should also be taken into consideration to improve its integration into urban environment (Sánchez-Pantoja et al., 2018).

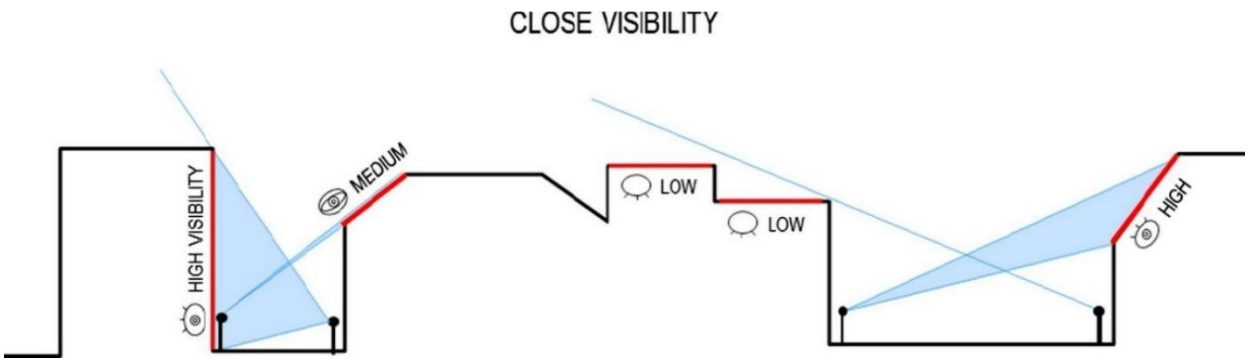


Figure 2.1 higher visibility of FIPV from public domain, collected from (Munari Probst & Roecker, 2011)

Originally the PVs were dark blue and blackish in colour as darker colours yield in higher absorption of light and better performance in production of energy. However, city planners and architects agree that the dark colours create hindrance in applying PVs to building facades (Xiang, Matusiak, et al., 2021). Since people's perception of urban environment is

influenced by the colours of the façades (Lynch, 1960) it is crucial that the colours of the PVs blend with the surrounding. The conventional dark blue and black coloured PVs don't match the façade colours in most cities. Though one or two black or dark coloured buildings can be acceptable, for a general use, such colours are not suitable (Xiang, Matusiak, et al., 2021). Moreover, covering all buildings in same tone to generate electricity would be monotonous and shall loose the uniqueness of each street.

2.2 Colour in FIPV

Ongoing research in FIPVs are yielding in production of coloured samples. Though there is limited option in terms of colours, industries exploring different techniques to produce varied colours, for instance, KromatixTM technology works with multi-layered filters to get desired colour (Jolissaint et al., 2017). Other technologies like application of anti-reflective coatings, mineral coatings, special filters etc. are also being adapted to generate more options (Xiang, Matusiak, et al., 2021).

The contrast of colour preference from architectural perspective and energy perspective makes the process challenging. Lightness of FIPV is considered the most crucial factor influencing the energy production; lower lightness level results in higher electricity generation (Røyset et al., 2020). On the contrary, from aesthetic perspective, lighter colours are commonly preferred for building facades. Experiments show that people prefer facades with primary colour in high lightness level (Xiang, Matusiak, et al., 2021).

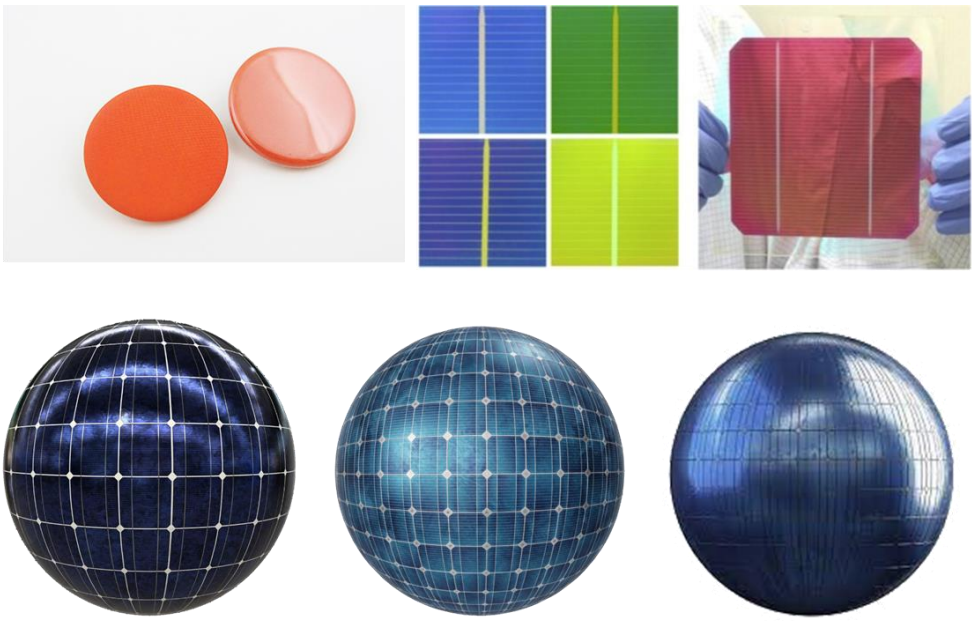


Figure 2.2 PV samples of different colours and texture (source: internet)

2.3 FIPV in Norway

Most of the projects and research on BIPVs, from the last decades, focus majorly on its application on roof (Xiang & Matusiak, 2021). The energy production is less due to limited roof area and in arctic countries like Norway, snow is an obstacle during winters. Building façades in such case can be an alternative potential to generate electricity. In façade installation, the geographical location, inclination angle due to the location and the direction determines the amount of solar energy collected. For northern part of the earth, PV modules perform better when oriented towards south, south east and south west (Atmaja, 2013). For arctic countries like Finland, Sweden, Norway, the southern façade has almost the same potential as that of roof when considered for PV production (Gholami et al., 2021).

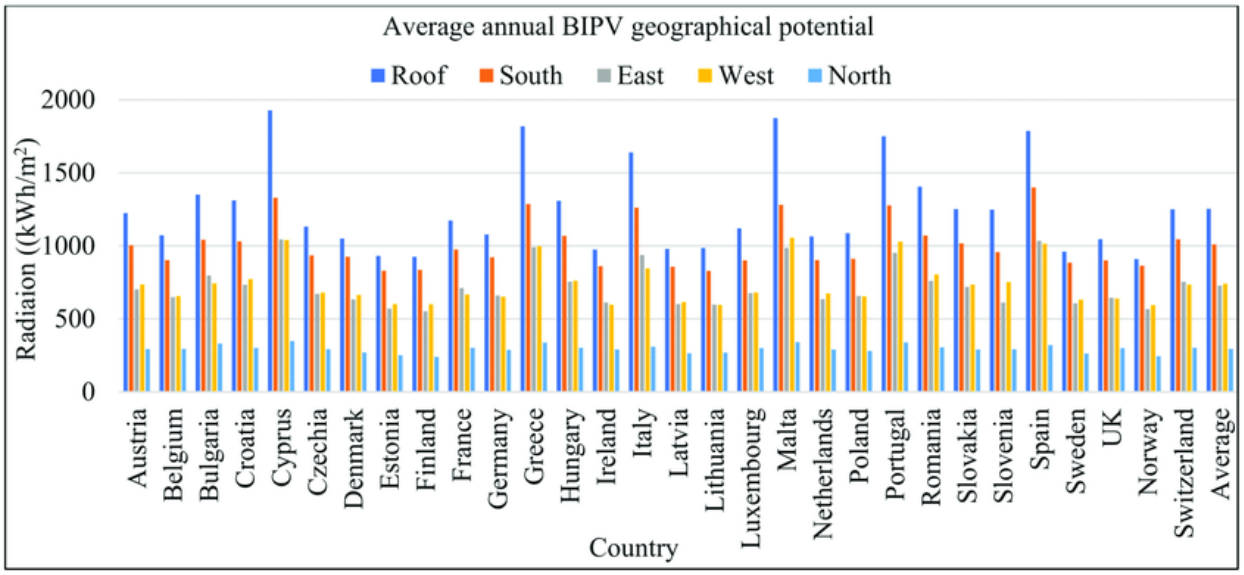


Figure 2.3 annual BIPV geographical potential (Gholami et al., 2021)

From the graph above, it can be observed that the difference between available radiation is less as the location moves towards the poles.

Trondheim has sufficient solar irradiance; as much as 99Wh/m² per day mean annual global irradiance (equal to 867 kWh/m² per year)can be expected on this region (Olseth & Skartveit, 1986; Xiang et al., 2022). The dominating low solar elevation angle during the year ensures abundance of daylight in Trondheim. Due to high latitude of 63.25°N, the highest position of sun in Trondheim is 50.0°(Xiang et al., 2022). The solar angle is between 0° to 10° for more than one third of daytime throughout the year (Matusiak & Anter, 2012; Xiang et al., 2022). This is an indication of importance of investigating façade integrated PVs in Trondheim.

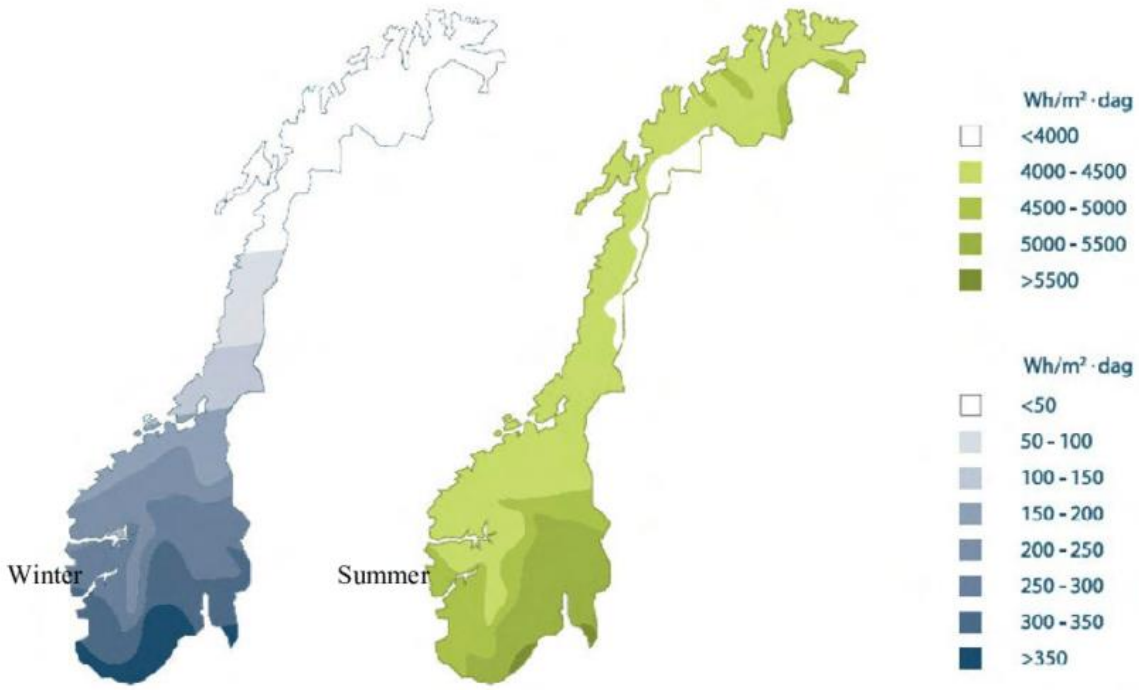


Figure 2.4 Solar Irradiation on horizontal surface of Norway in summer and winter(Tamrakar et al., 2019)

The widely discussed and accepted concept of colour harmony has developed through research and experiments, now suggests colour pairs with similarity in hue or chroma, different in lightness levels are more harmonious (Schloss & Palmer, 2011; Szabó et al., 2010; Xiang et al., 2022). The national standard in Sweden and Norway, Natural Colour System (NCS) also confirms the preference towards composition of colours with one or more colour attribute similarity (Xiang et al., 2022).

2.4 Colours of Trondheim

The city of Trondheim acts as a backdrop for this experiment, where the models are to be compared with the existing colour palette of the city. The first capital of Norway has an important role in the history of Norway. With rich urban history, Trondheim has become a dynamic city where history and modern development co exist (Xiang, Matusiak, et al., 2021). Most of the traditional buildings are located around the centrum, are easily distinguishable for their unique colour and volume. Majority of the buildings alongside Nidelva river used to be warehouses dating back to 17th century (Xiang, Matusiak, et al., 2021) when these were important for trading activities. As most of those warehouses were repeatedly burnt, the same principle was followed for reconstructing them (Grytli, 2013).

Figure 2.5: Traditional buildings around Nidelva in Trondheim has a specific colour scheme

These traditional buildings are appreciated by the city residents and forms the urban identity of the city setting up an iconic and colourful image (Xiang et al., 2022). There is a demand to respect the tradition of chromatic variation of building facades in Trondheim to preserve this valuable identity and sense of place (Angelo & Booker, 2018; Xiang et al., 2022). For a long-term aesthetic sustainability, considering the context, it is important to implement proper colour design strategies.

Using the NCS index and NCS colour system, Angelo and Booker registered the nominal colours of 200 buildings of Trondheim to develop a colour palette. The colour harmony concepts together with the colour palette of Trondheim context (Angelo and Booker, 2018) acts as the reference for the research.

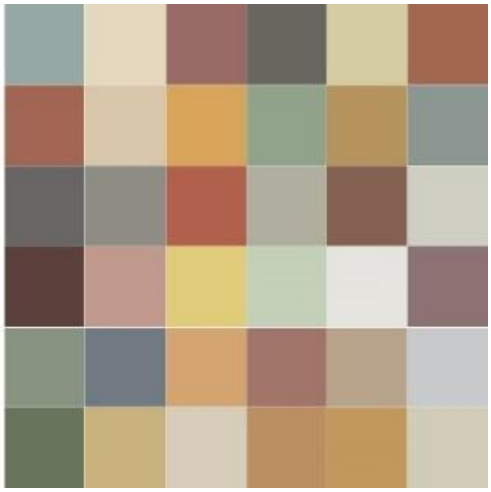


Figure 2.6 The overall colour palette of Trondheim (Angelo & Booker, 2018)

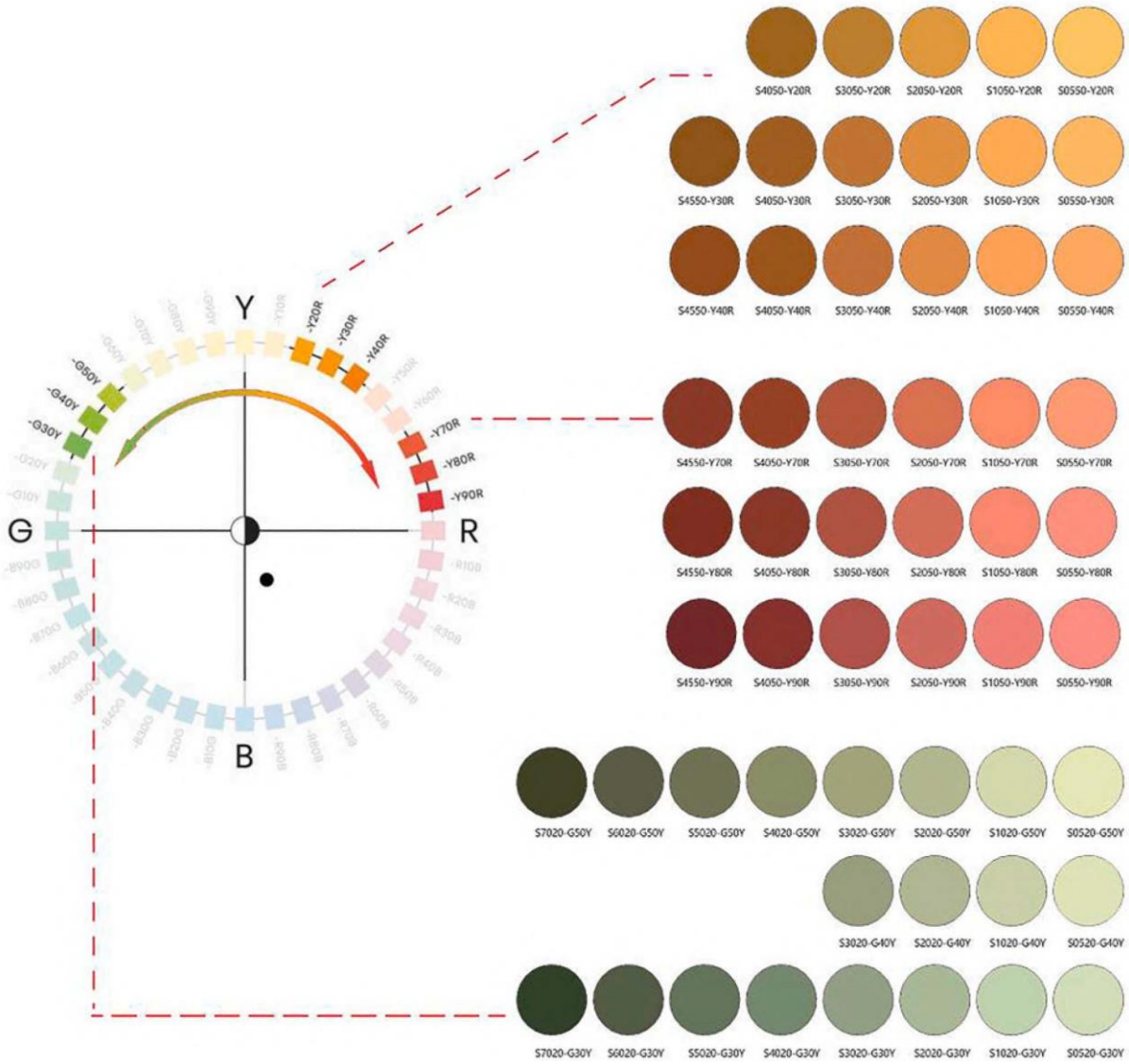


Figure 2.7 on the left: selected NCS hues for cFIPV design; on the right: detailed NCS colour palette for cFIPV design (Xiang et al., 2022)

The typical hues in such traditional buildings range from reddish hues to greenish hues; very rarely buish hues are observed and violets are not found (Xiang, Matusiak, et al., 2021). Groups of NCS colours are thus chosen taking this colour range of Trondheim into consideration.

3 Methodology

One of the aims of the research is to observe and examine the specularity of the materials produced by IFE. The efficiency of a PV panel can be calculated through simulation software, however, the reflectance or the glare cannot be perceived in such a way. Thus, the physical modelling is essential to understand how the materials behave in real life. This project has been planned and developed in cooperation with Institute of Energy Technology (IFE), which is developing new solutions for PV panels having different colours and different types of glass cover. The colours of the Trondheim palette chosen for the study could not be recreated in form of coloured PV samples by IFE at the time, therefore the glass cover and connected with it danger for solar glare was of special interest. The desired colours of future-coloured PVs were simulated with outdoor surface paints.

Initially the scope of the project was to make 6 models, 3 pairs in 3 different colours; each pair having one textured and one smooth surface. The colours of Trondheim were taken into consideration with yellow, green and red. Unfortunately, the company could not produce the required number of sample pieces in time required to make 6 models which eventually led to limiting the model number to 3 only.

3.1 Design of the model

The third largest city in Norway, Trondheim possess a rich history in urban development, a coexistence of traditional historic buildings with modern architecture. (Xiang, Matusiak, et al., 2021). Most of the traditional buildings are located in and around the city centre, with a long row of such buildings on either side of Nidelva.

Figure 3.1traditional buildings of Trondheim

The iconic buildings stand out in terms of colour and volume, pitched roof, built of wood and coloured in bright colours. Such a residential building of 4 storied is taken as the prototype for this experiment. Buildings near the old bridge, on either side of Nidelva and streets of Bakklandet were observed to determine the unique feature of the buildings in Trondheim.

Figure 3.2 typical facades of buildings near bakklandet

After observing the buildings, a façade with balconies and windows on southern side, the roof pitched equally on east and weatern side was considered for the experiment. Different window to façade ratio or height to width ratio were tried out to see which of them works best for the modelling.

The sample sizes promised by IFE was of 60mmX120mm in dimension. The façade was developed in such a way so that there is minimum waste of material and the orientation of the samples are along the same horizontal direction throught all the floors. While deciding on number of windows, care was taken so that the maximum surface area can be used for the PV panels. Thus the current façade was generated.

3.1.1 The façade type

The historical warehouses situated alongside Nidelva river face towards the waterbody, the waterway being the principle mode of communication in the then time. The entry façade is generally simple, provided with simple doors and windows, often accompanied by a balcony with a pulley system on the topmost level for easier transportation of goods. 4 such similar types of façades are designed keeping the size of the PV samples in mind and one of them is selected based on available surface area for the panels, window area etc.

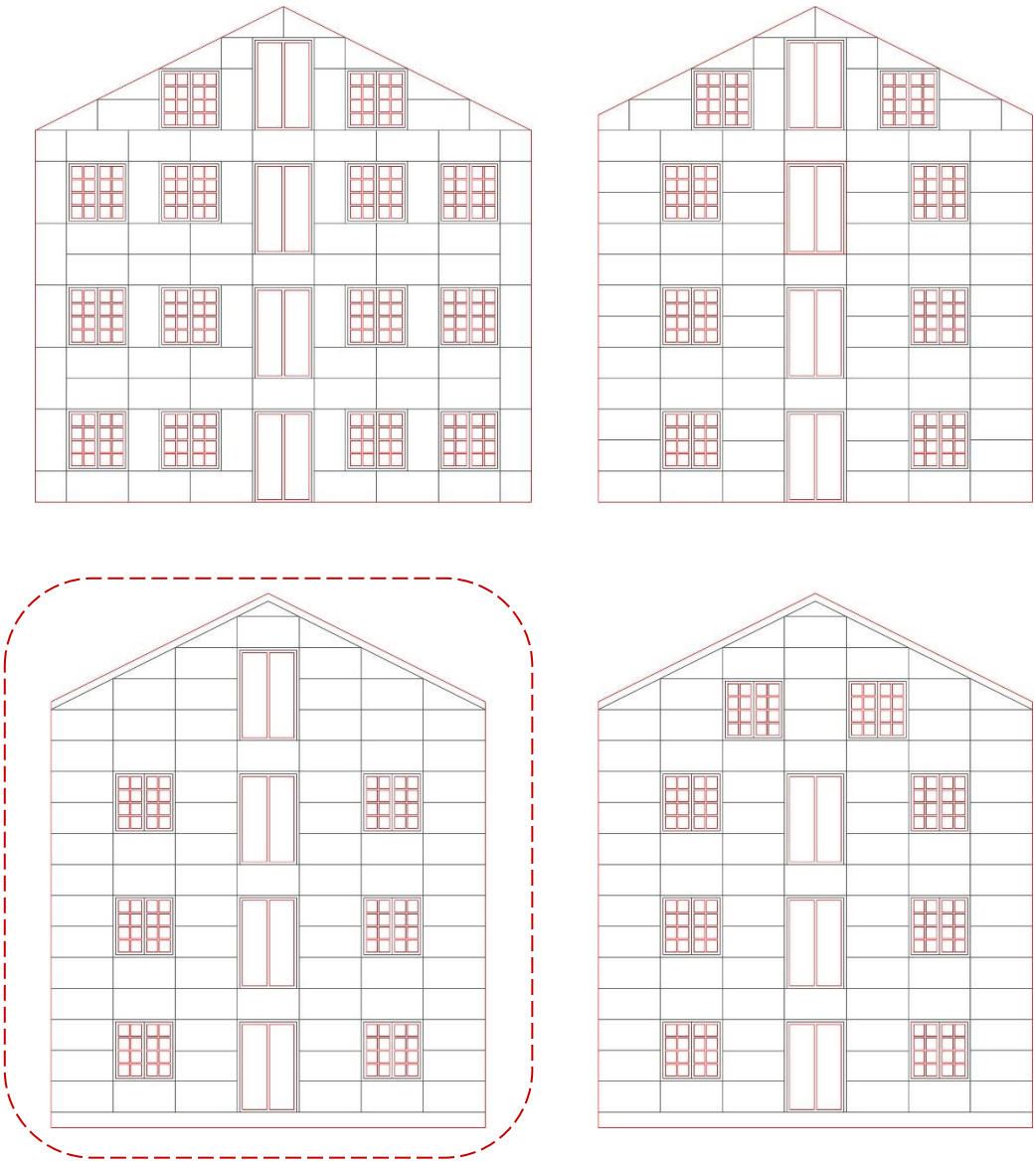


Figure 3.3 different types of facades

clockwise from top left, a. façade with 2 sets of windows on either sides of the balcony, b. façade with single set of windows on either side of balcony, c. façade with 4 balconies, one on each floor, d. façade with 3 balconies and window only on the topmost floor.

		No. of Windows	No. of Balcony	Pv area in mm	Total area in mm	Percentage of area for PV	Remarks
Type a	2 set of windows on either sides of the balcony	14	4	518400	806400	64%	The width of the model is highest but the area of façade for PV panel is lowest

Type b	1 set of windows on either side of the balcony	8	4	516600	718200	71%	The total width of the façade is less but the area for PV panel is more.
Type c	1 balcony on each floor, no window in the topmost floor	6	4	568800	743400	76%	The façade has highest PV area
Type d	1 pair of windows on each level, no balcony in the topmost floor	8	3	561600	743400	75%	The façade has 3 balconies and the window area is higher

3.1.2 The façade scale

A scale model is a physical model which is geometrically similar to an object, like building, vehicle etc.; generally smaller than the large prototype, used for design and testing. A scale model gives the impression of the actual object in a smaller area or volume for convenience. While determining the scale of the model, 2 major things were taken into consideration.

- The size of the samples provided
- Allowable size in the laser cutter

IFE promised to provide the samples in dimension of 120mm X 60mm. taking this size into consideration, the façade was designed in such a way so that there is least waste of materials. The majority of the buildings in Trondheim have wooden panels on the façade, examples of old buildings with horizontal and vertical orientation of wooden panels can easily be found. Both vertical and horizontal orientation of the panels were considered where it was observed that the vertical orientation required more cutting of samples which eventually leads to more waste. Thus the horizontal orientation was chosen. The laser cutter also has a limitation of

area, so the highest possible size with least amount of waste was tried over different scale of the models.

Height	Width	Remarks
960	960	Compact with least wastage
960	1020	Highest width, horizontal orientation leads to wastage of samples
720	720	3 panels in a floor, size is handy, less PV area
720	720	A mix of horizontal and vertical panels make it chaotic
480	480	PV area is very less

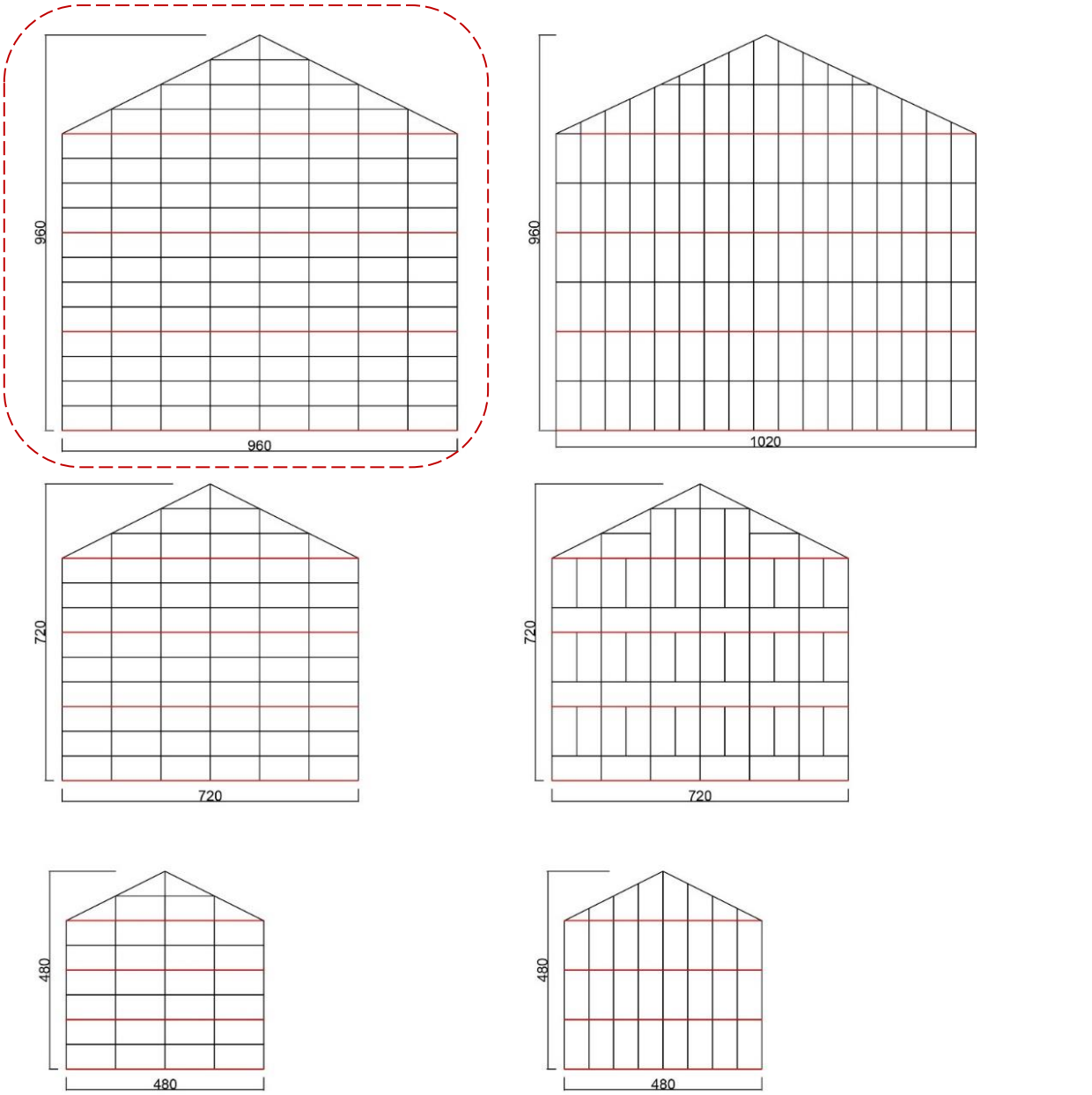


Figure 3.4 Different scaled facades with the same size of samples yield in different outcomes. The horizontal orientation is selected for the least wastage and higher surface area available.

3.1.3 Colours of the models

Trondheim has a colour scheme on its own and it is very evident in the older part of the city. The experiment was to be carried out in Bakklandet where the surrounding buildings are of the same colour scheme. Initially the three dominant colours of Red, Yellow and Green are taken into consideration, however, the project was limited to only two colours of green and yellow due to lack of samples.

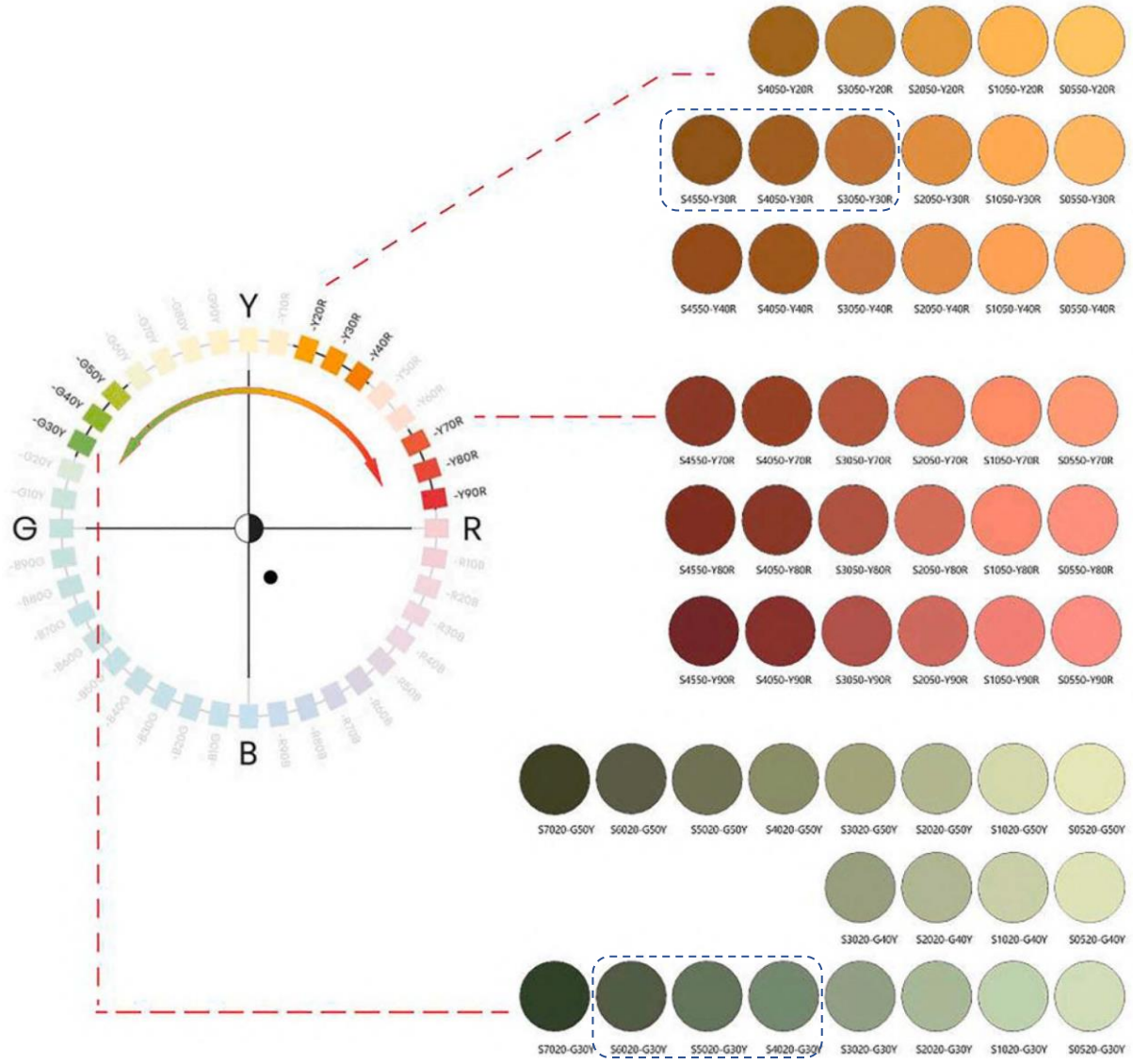


Figure 3.5 the colours chosen for the modeling of the facades.

A common architectural expression in many architectural projects with pixelization is gradual reduction of blackness level from top to bottom of the façade (Xiang, Matusiak, et al., 2021). This change in blackness level of the colours is followed in the experiment, the lighter nuances are in the top most level, making it less contrasting with the lighter sky colour. For

each of the models, 3 different colour nuances are used; the darkest one in the bottom two floors, darker in the third floor and the lightest in the topmost level.

Initially nuances selected for the yellow scheme are S4050-Y30R, S3050-Y30R, S2050-Y30R whereas nuances selected for the green scheme are S6020-G30Y, S5020-G30Y, S4020-G30Y. These exact nuances of the paints were made and collected from Trømsdal Favenhal. When the colours were tried on the model surface, the yellow scheme appeared to be brighter than what was expected, so a darker nuance S5050-Y30R with similar diference of 10 was selected as the darkest tone and the rest were adjusted accordingly.

Figure 3.6 the designed facades in the selected colour scheme.

Figure 3.7 the actual colours of the models with the samples

3.2 Selection of location

Trondheim has low average sun angle and the sun is tilted towards south. A façade exposed to south in such a location would be the most suitable for absorbing sunlight, south-east and south-west are also good. Similarly, the reflection of the sunlight from the south-oriented facade would also be highest. So, a location where the models could be oriented towards south as well as the surrounding holds the typical colours of Trondheim to compare was

sought. Care was taken so that the location is not shaded by any adjacent building or landscape. The criteria for selection of site are as follows:

- Orientation : the model needs to be placed facing towards south, so the worst possible scenario during a bright sunny day can be observed.
- Surrounding : the site needs to have enough clearance from adjacent buildings so that the models are not shaded by any part of building or landscape. The survey also requires the participants to walk around the models and observe them from different angles. Moreover, the adjacent building schemes also help the people to compare the colours of the models.
- Background : The place where the models are to placed would have a backdrop, be it a building façade or something else. The colour of the building façade was to be chosen in such a way that it does not affect the colours of the models, in other words, the colour of the backdrop needs to equally complement both the colours chosen for the models.
- Accessibility : the location required to be easily accessible and noticeable. The people taking part in the experiment can easily see the models from a distance and would not create any hindrance for the other passersby. A busy street with a continuous flow of people would be ideal for such an experiment.

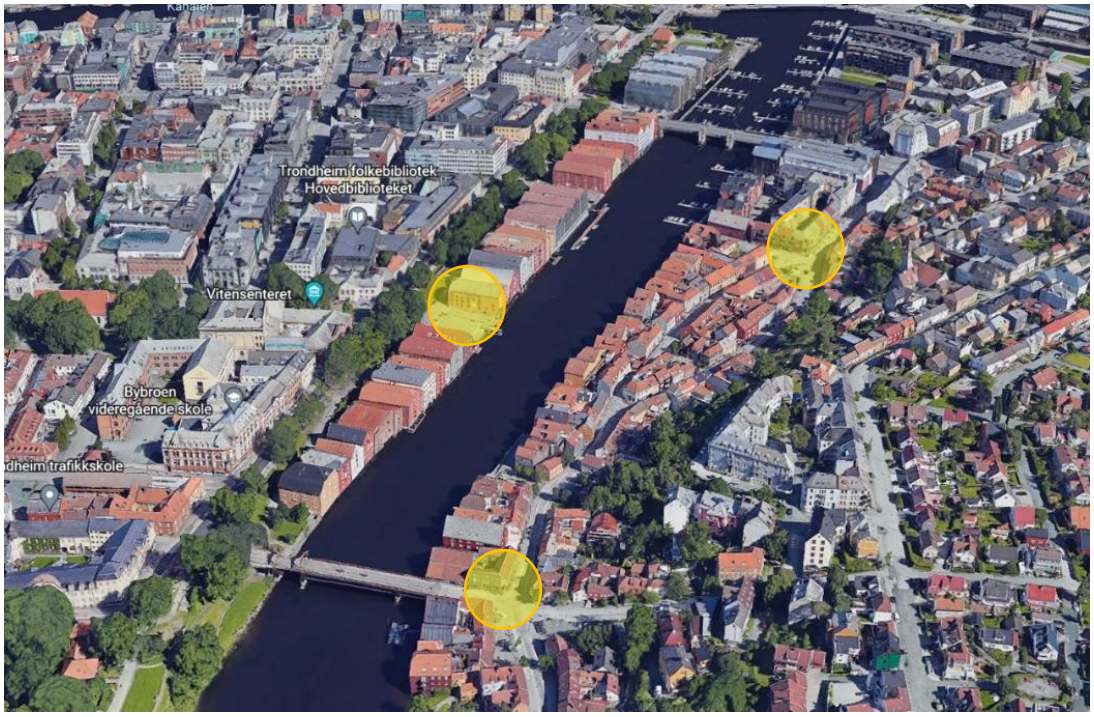


Figure 3.8 image showing probable locations for the experiment (image collected from Google maps)

The three probable locations thus chosen were – the eastern end of the old town bridge, piren near Kjopmannsgata and the intersection of Nygata & Nedre Bakklandet. All three of them are south facing with a decent amount of traffic. However, the intersection at Nygata was chosen due to its easy access to parking. The final models turned out heavier than expected and needed to be transported by a car. Thus, the location with easier access for transportation was chosen.

Figure 3.9 photo taken around the location of Nygata

3.3 Physical modelling

The samples arrived in a square form as a test batch and then requested in the shape of 120mm X 60mm rectangles. The difference in texture is less when the piece s are compared individually, however, when placed in group, the whole surface acts as one and the difference is evident. The sandblasted surface appears more whitish and less reflective whereas the smooth surface reflects more light. The figure below shows the difference in texture and reflection when captured in indoor condition.

Figure 3.10 the samples provided by IFE (left: compared individually, right: compared as a whole model surface)

The base of the models was tried out with 4mm plyboard and 3mm MDF boards. Both of the materials were tested with colour and gluing of the samples. The plyboard surface got uneven when the paint dried making gluing of samples difficult. The MDF was stiffer compared to the plyboard but it was heavier despite its lesser thickness.

Figure 3.11preliminary models with MDF and Plyboard tried to test the colours

The colours were applied 2 times for a uniform texture and when complete dried the panels were stuck with a heavy-duty glue. The glue turned out to be less transparent when applied on glass surface, glue marks could be observed if someone looks at the model from very proximity.

Figure 3.12 Doors and windows cut out of plyboard and lined with aluminum foil

The windows of the models were made out of aluminum foil to create the impression of glass. A transparent material for the glass was avoided to provide maximum accuracy of the materials. Most of the glass used for the windows are reflective, so a foil surface created the same appearance. The balconies were provided with doors of same material. The railing was designed in the simplest manner so that it does not overpower the model.

Figure 3.13 photo taken at different stages of making the models

The panels received from IFE had minor defects in terms of size and shape. Some of the sample pieces were uneven on the edge while some had broken edges. The triangular pieces required for the topmost floor had to be cut by hand into desired shape.

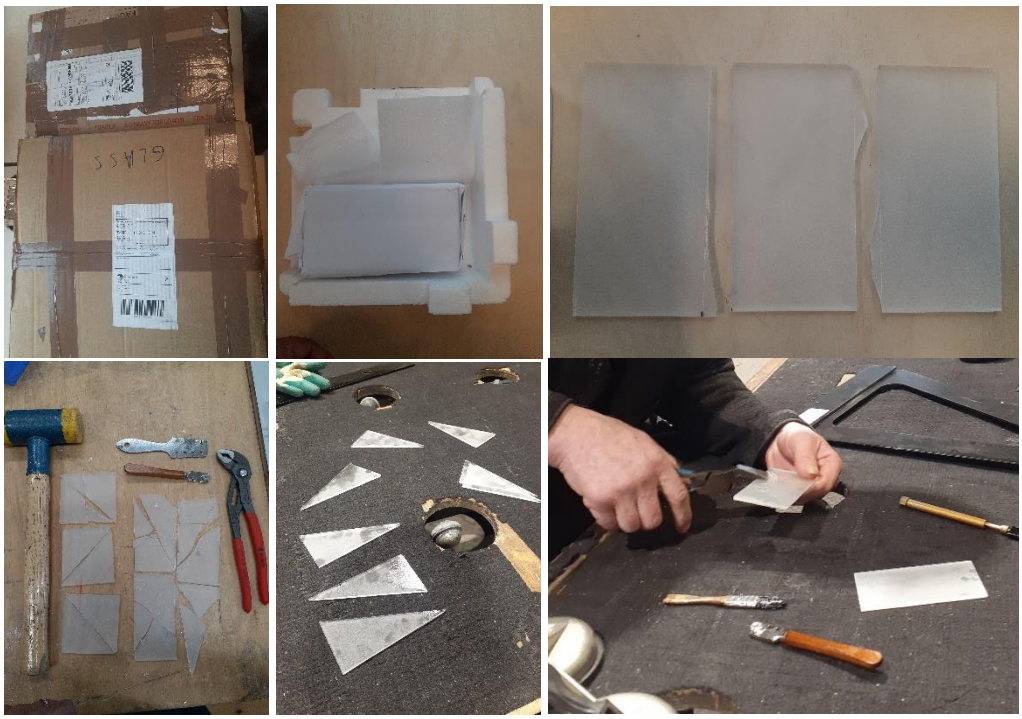


Figure 3.14 cutting of glass samples into required shape and size.

When all the panels were glued to the MDF surface, the model became heavy and was prone to bending when lifted. To limit this bending, cardboard back support was provided for each of the models.

3.4 Questionnaire survey

The final part of the experiment was to create a questionnaire to observe and analyze how people perceive the materials. A questionnaire with comparison 6 different models were first created and approved by Norwegian Centre for Research Data- NSD. When the sample quantity was reduced the questionnaire had to be adjusted accordingly. The final questionnaire includes a comparison between 3 models and participants are asked to rate the models in terms of their preference and discomfort. Additionally, they are also asked about how the colours and the materials correspond to the existing surroundings.

The questionnaire included basic information of age, gender, colour vision difficulty to observe how different age or gender group react to the same model. People of different ages were asked to take part in the survey so that the outcome becomes more acceptable and reliable.

The initial aim was to get as many as 50 participants to take part in the survey. Over the two days, 70 responses were collected. The survey form is attached as follows:

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):……

Age ☐18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional)……
☐No

Do you have any difficulties with colour vision?

☐Yes(optional)……
☐No
☐Sometimes(optional)……..

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

☐Model A
☐Model B
☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

3.5 The experiment

The models were set in front of Royal Haircut saloon, at the Nygata intersection. Tables were used so that the models are at eye level of the participants. The three models were marked as “A” (yellow with glossy finish), “B” (yellow with textured finish) and “C” (green with textured finish). Participants were allowed to observe the models from different angles and were asked to take a walk assuming the as real buildings. With a brief introduction to the project, they were asked to answer the questionnaire and share their thoughts and feedback about the models.

Figure 3.15 the models on two different weather condition (top: sunny, bottom: cloudy)

The experiment was carried for 2 days, one on a bright suuny day, with less clouds and other on a cloudy day. A digital luxmeter (BEHA digital luxmeter, model 93408) was used to measure the overall light intensity around the model on both sunny and overcast day. A luminance meter (Minolta luminance meter, model LS-100) was used to measure how illuminated the surface was for the three different models, for 3 different nuances.

Figure 3.16 photo of the devices used for the experiment

Luminance is the amount of light passing through or reflected from a surface from a solid angle. The luminance of the materials were measured for different time of the day. To keep the process systemic, same points were measured under different conditions.

Figure 3.17 Figure 10: photo showing the marked areas where the readings were taken by the luminance meter.

4 Results

4.1 Results of the survey

The questionnaire survey included basic questions of age and gender to ensure people of different age took part in the experiment. A total of 70 participants took part over 2 days of the experiment. The majority of the participants were young, 76% of the total participants range from 18-35 years; the gender ratio is almost equal and none of the participants had difficulty in colour vision.

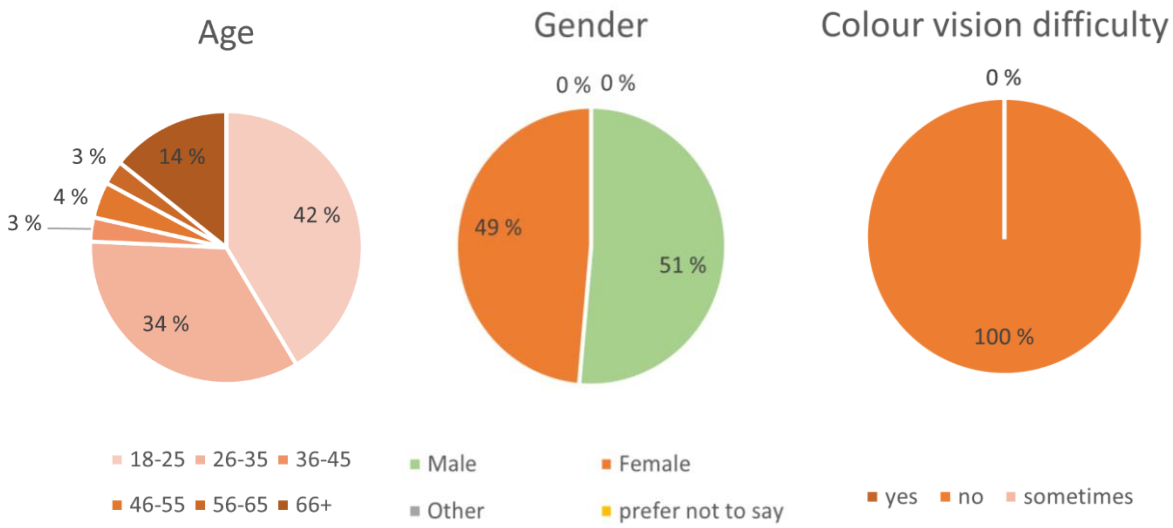


Figure 4.1 Charts showing percentage of Age group, gender and colour vision difficulty among the participants of the survey.

The participants were asked to score the models in terms of preference, 1 being the least preferred and 3 being the best. The three models were marked as A (yellow smooth surface), B (yellow textured surface) and C (green textured surface). Majority of the people, 64% preferred the Green textured one over the other 2 samples while the smooth surface was the least preferred by maximum number of people 74%.

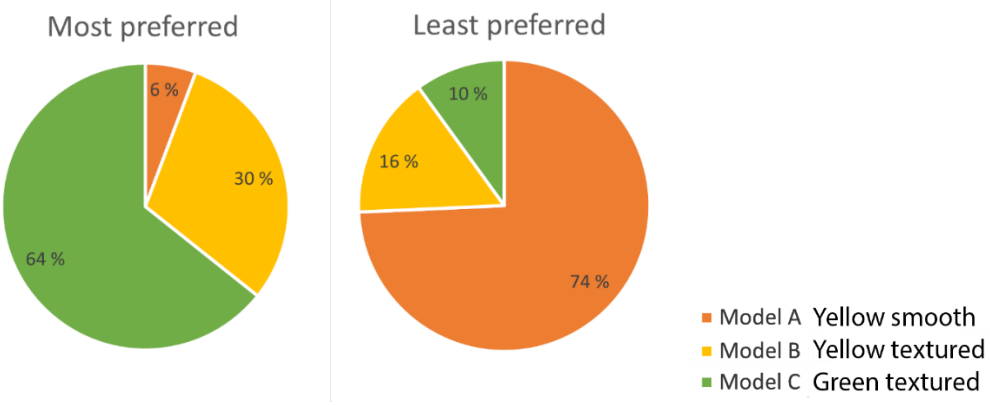


Figure 4.2 Charts showing the percentage of preference of the three models in respect of colour and glossiness.

Participants of the survey were asked to walk around the models and observe form different angles. Since specular reflection can be observed from a certain angle corresponding to the angle of the sun, this movement around the models ensured that they get the chance to see if the reflection create any discomfort in eyes.

Majority of the people choose the green textured sample over the other two and the amount of discomfort is lowest. While some of the people couldn't distinguish the textural or finish difference between the models of same colour until mentioned some others could easily isolate the two types. However, majority of the people claimed the reflection from the models were not very discomforting to their eyes. As the green coloured and sandblasted sample was preferred by majority, none of the participants claimed to have any discomfort looking towards it, even during a sunny day.

The location of the experiment allowed people to compare the models with the existing buildings, already in the colour palette of Trondheim. when asked about how the colours correspond to the existing colour scheme, people took their time to look around and make their decision keeping that in mind.

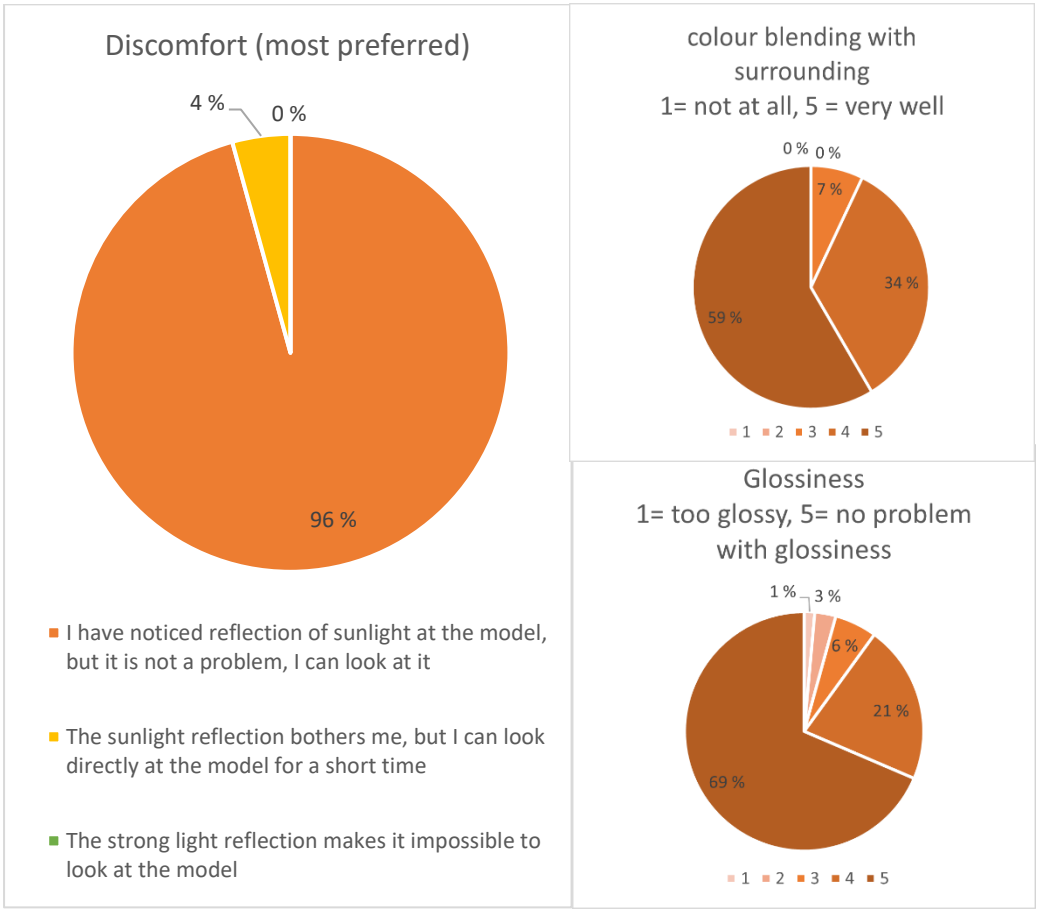


Figure 4.3 charts showing the percentage of discomfort caused by the samples most preferred

Maximum people responded that the colour blends well with the surrounding and none responded in opposition. While 69% of participants were not bothered by the glossiness of the material a few of them marked it too glossy.

The least preferred model turned out to be the one with smooth surface. 74% of the participants marked this type as the worst in their opinion. Some of the comments on the yellow model included that the colours could have been brighter. There was a mix of opinion about how much the colour blends with the surrounding, though majority were agreeing to it, 6% mentioned the colour does not go with the surrounding. In terms of texture or glossiness, the distribution is somewhat equal. However, when calculated, the higher percentages show people claimed it to be very glossy for a finish material.

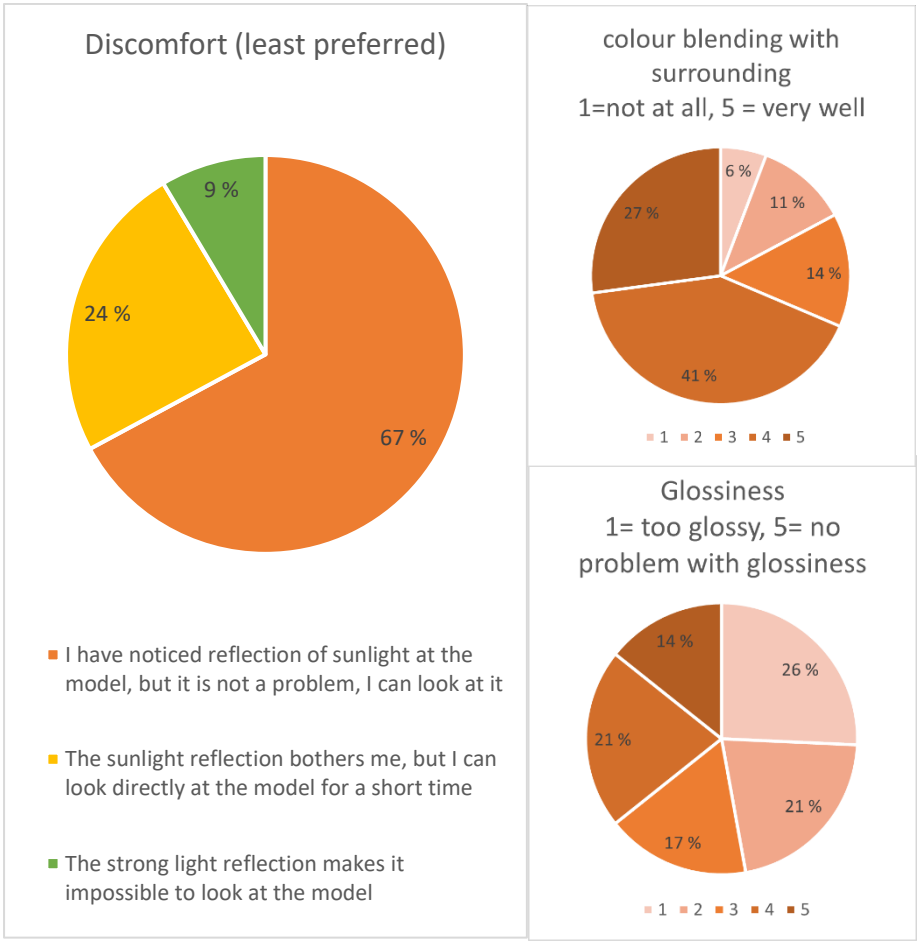


Figure 4.4 pie charts showing the percentage of discomfort caused by the sample least preferred

Since the experiment was carried out in two different weather conditions, the results were also separated to analyze if there is any impact of the sun on the perception of glare or discomfort. The sun is more visible on a bright sunny day and thus create more specular reflection on the surface, whereas on an overcast sky condition, the direct sun position often can not be determined, creating less obvious reflection on the surface.

4.1.1 Results for Sunny condition

The models appeared whiter in the sun than that of a cloudy day. Majority of the people opted for the green model whereas some of them willingly liked the one with reflection. It is evident that about 8% of the people liked the reflective smooth surfaced model over the other two.

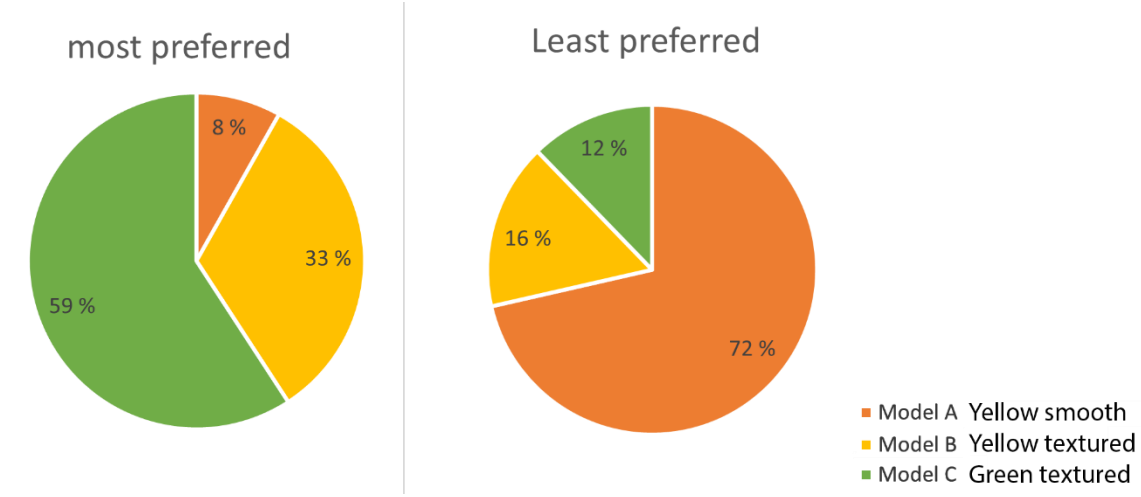


Figure 4.5Charts showing the percentage of preference on sunny day.

With the luminance meter, the luminance from the model surfaces were recorded. For each record of the data, 3 readings were taken and an average is calculated from them. On the sunny day, the readings were taken in such a way that they correspond to the angle of reflection from the sun. since the exact angle of incidence on the surface could not be precisely determined, readings were taken on 4 different angles assuming the angle of reflectance, the points are marked in the figure below.

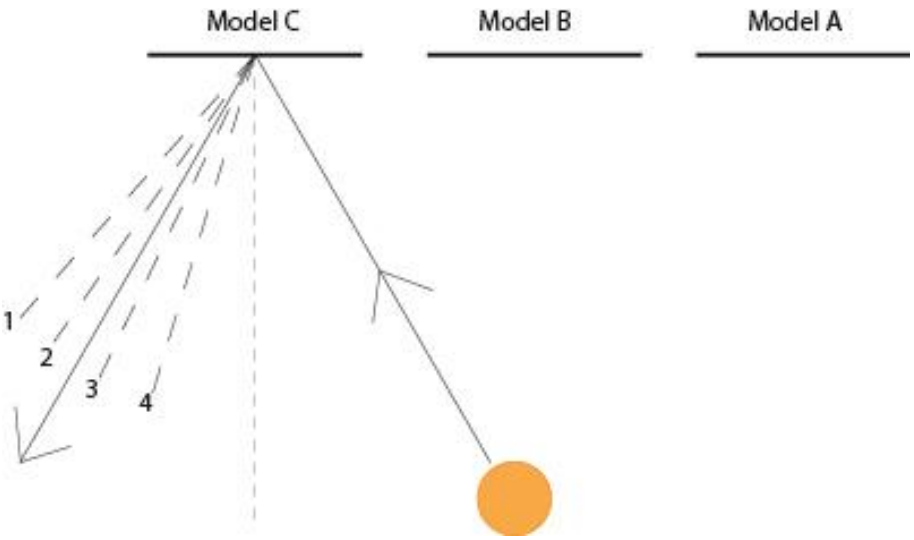


Figure 4.6 top view of the positions where the readings were taken by the luminance meter.

Model A

S3050-Y30R	9900	9975,667	10940	10876,67	10180	10233,33	9555	9553,333
	10040		10900		10160		9543	
	9987		10790		10360		9562	
S4050-Y30R	8972	8882,333	9393	9411	8826	8852,667	8090	8050
	8795		9415		8822		8010	
	8880		9425		8910		8050	
S4050-Y30R	9342	9335,667	9653	9687,667	9267	9262,333	8343	8337,667
	9330		9719		9233		8240	
	9335		9691		9287		8430	

Model B

S3050-Y30R	9918	9920,333	10940	10796,67	10330	10150	9484	9453,333
	9956		10480		10090		9359	
	9887		10970		10030		9517	
S4050-Y30R	8130	8311,667	8888	8877,667	8397	8369,333	7745	7749,333
	7995		8895		8320		7773	
	8810		8850		8391		7730	
S4050-Y30R	7391	7276,333	8232	8172,667	7866	7836	7117	7157
	7151		8116		7849		7157	
	7287		8170		7793		7197	

Model C

S4020-G30Y	9056	9090,333	10060	10029	9587	9571,333	8970	8944
	9133		10030		9590		8941	
	9082		9997		9537		8921	
S5020-G30Y,	8150	8118,667	8649	8669,667	8067	8072	7851	7858,667
	8177		8670		8039		7859	
	8029		8690		8110		7866	
S6020-G30Y	6981	6945	8295	8255	7516	7558,667	6698	6686,333
	6957		8280		7629		6695	
	6897		8190		7531		6666	

Figure 4.7 Tables showing luminance of the models on a sunny condition for each colour nuance.

The measured luminance was highest for model A and lowest for model C, from observations points 1, 2, 3 and 4, respectively. At the same time, luminance is higher in colours with lower blackness level, and is measured to be lower, where blackness level is high.

4.1.2 Results for cloudy condition

For the majority of time, Trondheim has an overcast or a cloudy sky. The experiment on a cloudy day reveals how differently the material behaves in different lighting condition. For the cloudy overcast sky condition, the sun was not visible. With diffused light, it was hard to get a reflection of light from the coloured surface behind the glass. Materials were not reflecting too much light but appeared like mirrored surface. None of the participants preferred the reflective smooth surface as the topmost.

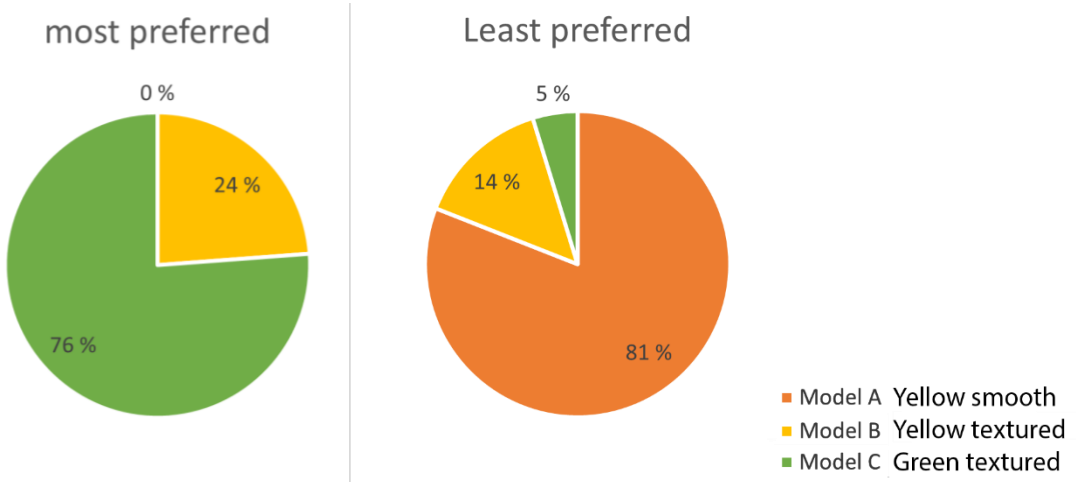


Figure 4.8 Charts showing the percentage of preference on a cloudy day.

Since it was not possible to get a direct specular reflection from the surface on an overcast day, readings were not taken at different angles like that of during sunny day, rather luminance of the models were measured at different times of the day as it appeared different in terms of daylight. The sky was darker during early morning and it got brighter as the day went by. With increase of daylight on the surface material, the luminance level also changed, these values are shown in the table below.

Model A

	8.30 am		10.30 am		12.30pm	
S3050-Y30R	1153	1166	1691	1685	6343	6316,667
	1167		1663		6297	
	1178		1701		6310	
S4050-Y30R	867	861,7667	1259	1273	5288	5272
	857		1281		5257	
	861,3		1279		5271	
S4050-Y30R	830	825	1347	1349	5373	5377
	824		1351		5377	
	821		1349		5381	

Model B

	8.30 am		10.30 am		12.30pm	
S3050-Y30R	1007	1016,667	1615	1613,667	5290	5285,333
	1019		1618		5286	
	1024		1608		5280	
S4050-Y30R	809	796,3333	1286	1284,333	4499	4488,333
	793		1270		4477	
	787		1297		4489	
S4050-Y30R	716	724,3333	1130	1125,333	4373	4344,667
	732		1124		4325	
	725		1122		4336	

Model C

	8.30 am		10.30 am		12.30pm	
S4020-G30Y	1002	1001,333	1727	1726,333	5318	5290
	1005		1730		5282	
	997		1722		5270	
S5020-G30Y,	880	874,3333	1478	1485	4781	4757
	865		1490		4749	
	878		1487		4741	
S6020-G30Y	706	710,6667	1277	1252,333	4284	4321,667
	711		1245		4281	
	715		1235		4400	

Figure 4.9 Tables showing luminance of the models on a cloudy condition for each colour nuance.

The luminance is significantly lower than in sunny conditions. The measured luminance was highest for model A and lowest for model C in same weather condition.

4.1.3 Comparison of results between sunny and cloudy condition

49 participants took part on the survey during the sunny day whereas 21 participants took part in that of a cloudy day. Though the number of persons taking part in the survey varied in two days, the results for the two days are noticeably different. While 59% of participants preferred Model C (green textured) on sunny condition, on cloudy day, the preference is 27% higher than that of the sunny day. It is interesting to note that none of the participants preferred the model A (yellow smooth) on cloudy condition.

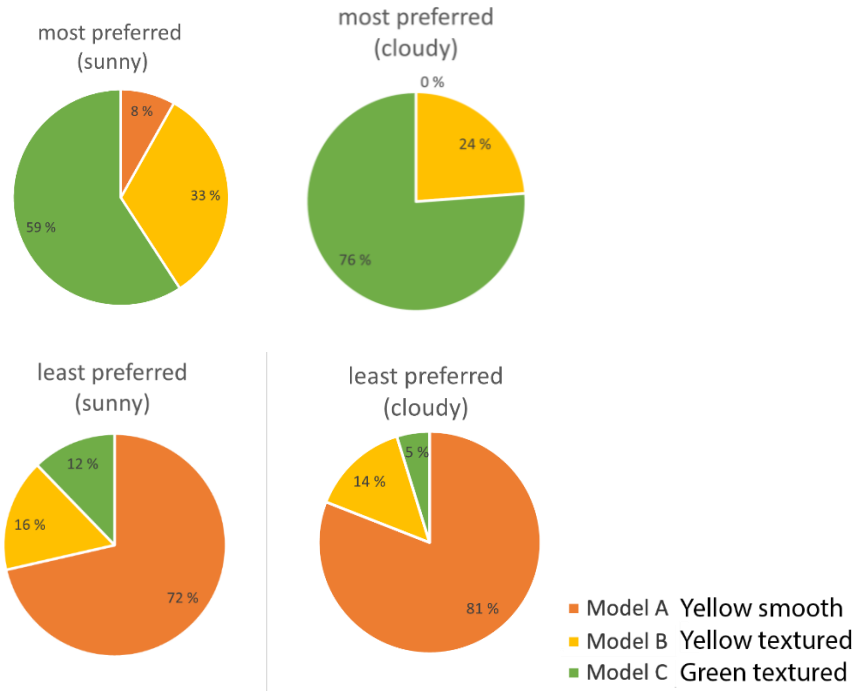


Figure 4.10 Preference comparison for different sun conditions.

Despite the difference in percentage, the overall impression is the same, in both cases, the green textured model is the most preferred one and the glossy yellow on is the least preferred.

Additionally, it is important to note that the material appears to be glossier in sunny sky condition. For the model which is least preferred in both the days, model a or the yellow one with smooth surface, 35% of the people mentioned the material to be very glossy in sunny condition whereas only 5% mentioned it the same in a cloudy day. The sunlight has impact on the perception of colour as well. Though for both the cases, model C or the green one with sandblasted surface is the most preferred, the acceptance of colour compared with the surrounding is different for the two days. On sunny day, 51% of participants agree that the colour blends very well while people agree more, up to 76% on a cloudy day.

The sky condition for sunny day was clear and thus the light intensity was high. The average illumination measured on the sunny day was 46,200 lux. For the cloudy condition, the exact position of sun was often not distinguishable. With no direct sun position, the illumination was low and measured as 11,520 lux.

The luminance of the backdrop was measured separately without the models to see what the models were compared with. The luminance level distinctly differed in the said two conditions.

Figure 4.11 photos of the backdrop where the experiment was carried out, sunny day on left, overcast day on right.

On overcast day, the daylight was varying due to moving clouds, it started to get brighter as the day went by and thus readings were taken at three different times with difference in surrounding light.

356	361,6667	525	520,3333	779	769
361		519		781	
368		517		747	

On a sunny day, on the other hand, the readings were somewhere close.

1385	1367,667	1405	1398
1349		1412	
1369		1377	

4.2 Research results

1. *What are the preferences of people in terms of colour and surface texture of the FIPVs?*

From the survey, it is clear enough that in terms of colour, the green one is more accepted than the yellow one and for texture, the sandblasted surfaces are preferred over the smooth ones. In separate weather conditions, the preferance for the green colour and textured surface (Model C) is evident from the following pie charts.

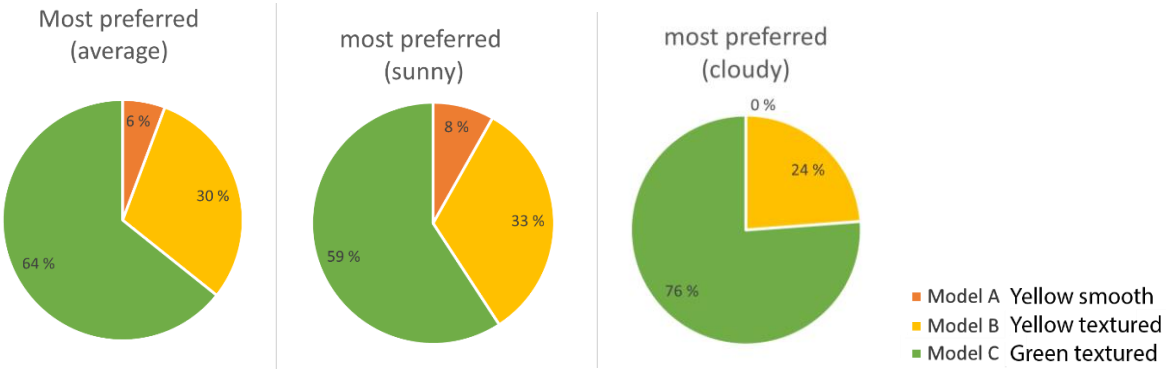


Figure 4.12 green coloured and textured surfaces are preferred

The pie charts above show that a maximum preference towards green textured samples irrespective of weather condition. On sunny condition, 59% preferred model type c and it is higher, 76% on cloudy condition.

2. *How people react to the reflectance of the materials?*

Most of the people were okay with the reflectance from the materials while a few of them termed them as very glossy in their opinion. The sandblasted surface appears less glossy and reflects less light, the smooth surface, on the contrary, appears glossier, especially on a sunny day.

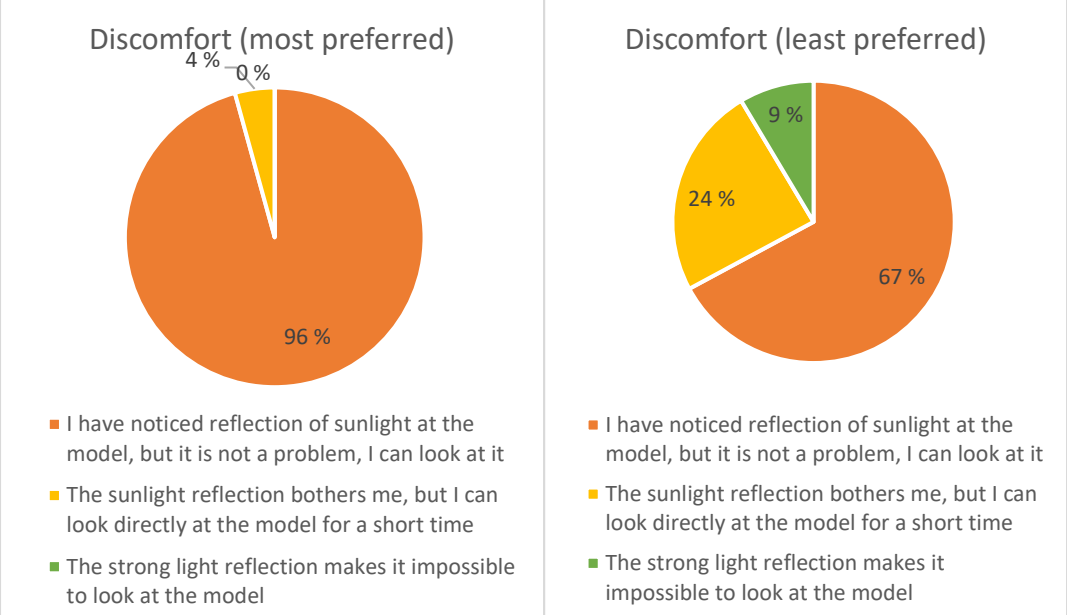


Figure 4.13 Discomfort is less in the sandblasted samples and higher in the smoother ones.

3. *What are the differences in visual impression in sunny and cloudy weather?*

Despite a similar overall impression in terms of preference (majority supporting the green sandblasted sample façade), the acceptance of gloss and colour remarkably changes in different weather condition. The sunlight has direct influence on the reflectance of the materials. Same material appears glossier on a sunny day to the majority of people. The colours also fade with higher daylight, as a result the acceptance of the colour changes in different weather condition. Thus, the same colour nuances appears more acceptable in cloudy sky than a clear sunny sky and the same material look glossier in sunny condition than that of a cloudy one. For both condition, model A or the yellow smooth one being the least preferred, it is observed that it appears that more glossier on sunny day (35%) than on a cloudy day (5%) whereas, model C or green sandblasted one being most preferred on both days, the colour seems more acceptable (76%) on cloudy day than that of a sunny day (51%).

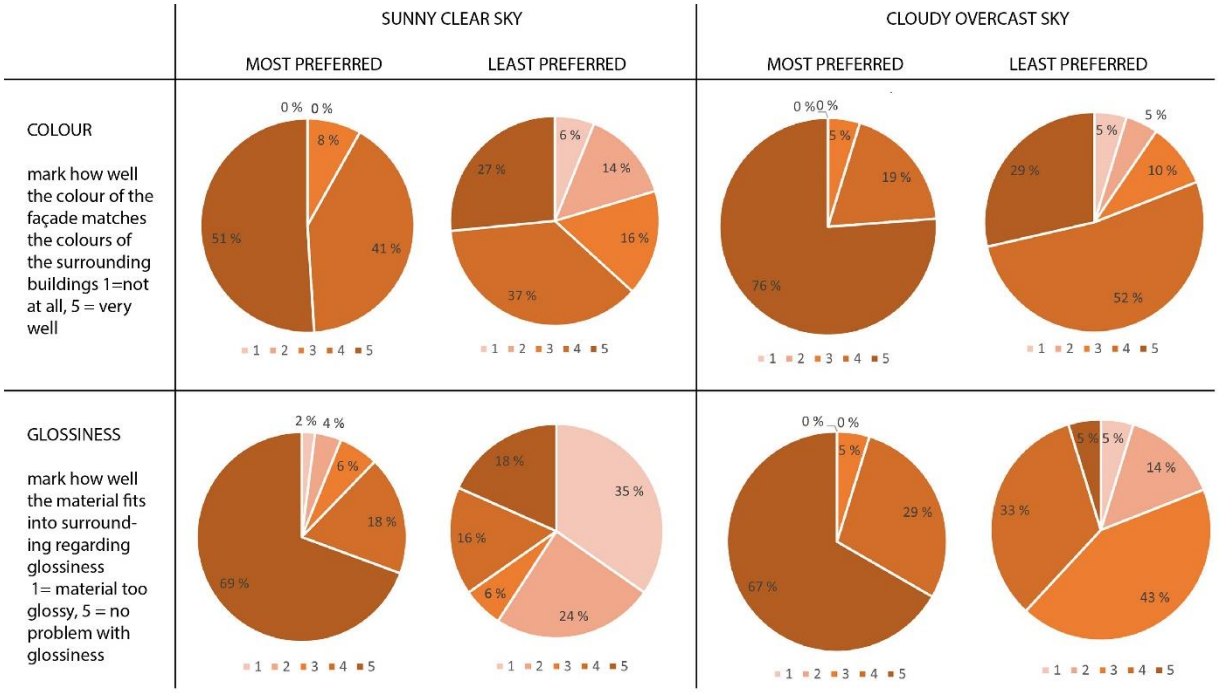


Figure 4.14 difference in visual perception between sunny and cloudy condition

4. *Impact of sandblasted treatment of glass on final colour of the PV?*

The models appear whiter in colour when the samples were placed on top of them. Initially the colours chosen for the yellow one had to be adjusted due to this phenomenon. Models A and B, despite made up of same material and colour, the luminance level is different due to sandblasting of one of the materials. Under the same weather and daylight condition, the luminance of the smooth surface is higher than that of the sandblasted surface.

Model A

S3050-Y30R	9900	9975,667	10940	10876,67
	10040		10900	
	9987		10790	
S4050-Y30R	8972	8882,333	9393	9411
	8795		9415	
	8880		9425	
S4050-Y30R	9342	9335,667	9653	9687,667
	9330		9719	
	9335		9691	

Model B

S3050-Y30R	9918	9920,333	10940	10796,67
	9956		10480	
	9887		10970	
S4050-Y30R	8130	8311,667	8888	8877,667
	7995		8895	
	8810		8850	
S4050-Y30R	7391	7276,333	8232	8172,667
	7151		8116	
	7287		8170	

Figure 4.15 table showing luminance difference due to sandblasting of the samples

5 Discussion

5.1 Limitations of the experiment

A questionnaire survey often has some limitations which cannot be overlooked. The limitations or the drawbacks from the survey are listed below:

1. The questionnaire survey was done on two weekdays, most of the people taking part in the survey were ranging from 18-35 or 66+. The middle age groups are assumed to be busy with work and thus the result lacks equal distribution of age. However, in terms of gender, it's almost equally balanced between the two opposite genders (49% female, 51% male). None of the participants recorded to have any colour vision problem so the result can be claimed as free from colour vision limitation.
2. Since the survey was done in two different days, the same participants were not available on the other day, or, there was no repetition of participants. Since the individuals are completely different, the comparison is difficult and would have been nice if the same participants could be used for different weather conditions.
3. Some of the participants were personally biased towards a specific colour due to personal preference. Such participants reduce the accuracy of the survey conducted. Similarly, some of the participants were unable to notice any difference between the two textured unless mentioned, a few of them also mentioned it appeared same in their eyes as well. On the other hand, some of the participants were in favor of reflections or reflective surfaces from personal choice. They mentioned to observe glare but were completely okay with it. A few of the participants, especially on cloudy day, mentioned they didn't have any sort of discomfort looking at the surfaces; since the questionnaire had no option of having no discomfort, this is a limitation of the survey.

The process adopted for the research had a few limitations as well. These are listed as follows:

1. The visual appearance of the colours were different in real life than what was seen on computer screen. The nuances were selected digitally and mixed with the help of computer aided mixing machine in the colour shop, yet the outcome was different than expected.

2. The thickness of the smooth samples was higher than that of the sandblasted ones. The thickness of the materials may have some impact on the perception of colour.
3. The materials received from IFE were not perfectly in the size ordered. The slight inaccuracy in cutting of glass had an impact on the overalls outlook of the model. In some cases, the edges were not as sharp and straight as the other ones.

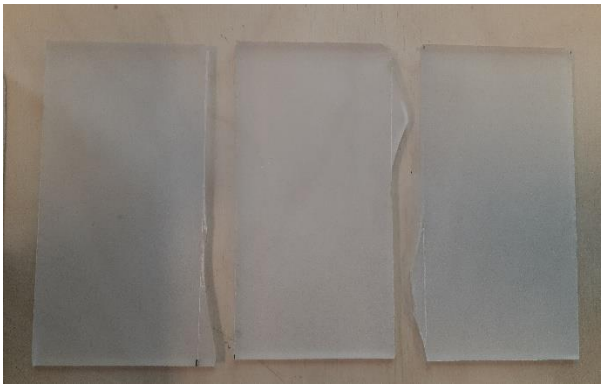


Figure 5.1inaccuracy of cutting of samples

Despite all these limitations, the research shows how the perception of colour and texture varies in real world in real atmosphere. The major achievement of the research is this finding and it would help the company to review their samples in future.

5.2 Luminance abnormality in smooth sample

The luminance level of nuances with less blackness level is higher than that of one with higher blackness level. The colour nuances were arranged in a such a way that the blackness level is higher in the bottom storey than that of the top one. For the smooth surfaced façade in Model A, the luminance level is higher for the darkest colour (S4050-Y30R) than the middle one (S4050-Y30R).

Model A

S3050-Y30R	9900	9975,667	10940	10876,67	10180	10233,33	9555	9553,333
	10040		10900		10160		9543	
	9987		10790		10360		9562	
S4050-Y30R	8972	8882,333	9393	9411	8826	8852,667	8090	8050
	8795		9415		8822		8010	
	8880		9425		8910		8050	
S4050-Y30R	9342	9335,667	9653	9687,667	9267	9262,333	8343	8337,667
	9330		9719		9233		8240	
	9335		9691		9287		8430	

Figure 5.2 higher luminance level in darker nuance

For each of the readings taken for the model A, the luminance of the darkest nuance is higher than that of the middle one. One of the reasons could be due to the angle through which the

readings were taken or due to the fact that the darkest tone had a different base; all the colours were oil based except for the darkest yellow tone (S4050-Y30R) which was a water based colour.

However, it is interesting to observe that the same process is not repeated when it comes to the sandblasted samples of Model B. with same colour nuance, same base material, same weather condition, the luminance level gradually decrease as the blackness level increase in Model B.

Model A

S3050-Y30R	9900	9975,667	10940	10876,67
	10040		10900	
	9987		10790	
S4050-Y30R	8972	8882,333	9393	9411
	8795		9415	
	8880		9425	
S4050-Y30R	9342	9335,667	9653	9687,667
	9330		9719	
	9335		9691	

Model B

S3050-Y30R	9918	9920,333	10940	10796,67
	9956		10480	
	9887		10970	
S4050-Y30R	8130	8311,667	8888	8877,667
	7995		8895	
	8810		8850	
S4050-Y30R	7391	7276,333	8232	8172,667
	7151		8116	
	7287		8170	

Figure 5.3 luminance level abnormality for smooth sample

5.3 Further scope of work

Due to time constraint and limitation of scope of work for a master's thesis, this study was limited to city of Trondheim only for two different weather conditions. The result obtained from 70 participants show the preference between the 3 models. The study can be elaborated with another model, the green nuances with a glossy surface; which was supposed to be a part of this research, but was avoided due to lack of available samples in given time. For further research, the study can be expanded with a larger sample size in other locations of Trondheim or different parts of Norway as well. The sky condition varies remarkably in different parts of Norway; with higher rainfall, the cloud coverage is higher in Bergen for example. The perception of the materials in a heavy cloudy sky condition or during rain can be examined in such a way.

6 Conclusion

Application of FIPVs in built environment has the potential to tackle challenges of climate change and shortage of fossil fuel energy; if utilized properly in urban context, it can be a promising strategy to harvest clean energy. This research tries to fill in the gap between theoretical implementation of PVs in façade with actual visual perception of the materials. With an intention to shed light on the perception of FIPVs in real life, this research was conducted with physical modeling. The scale models showed the participants how a real-life building can look like with FIPVs on façade. Based on the questionnaire survey, it is evident that the sandblasted samples are the ones which people are more drawn to, they are less glossy and had little to no discomfort on their eyes from looking at it. The texture makes the surface less glary on one side and whiter on the other, so darker nuances can be adopted for better electricity production. The colour nuances, both yellow and green, are acceptable in the opinion of most of the participants and has the characters to blend with the existing surrounding. These positive responses can be a driving force for the industry to promote PVs in Trondheim, which in turn, can yield in making Trondheim a greener and sustainable city in terms of cleaner energy production.

7 Reference

Angelo, K., & Booker, A. (2018). S>C – Proposing a formula for Harmonic Urban Colour

Composition. In *AIC Interim meeting 2018 Colour & human comfort*.

Athienitis, A., Barone, G., Buonomano, A., & Palombo, A. (2018). Assessing active and passive effects of façade Building Integrated Photovoltaics/Thermal systems: dynamic modelling and simulation. *Applied Energy*, *209*, 355-382. https://www.researchgate.net/publication/319620726_Assessing_active_and_passive_effects_of_facade_Building_Integrated_PhotovoltaicsThermal_systems_dynamic_modelling_and_simulation

Atmaja, T. (2013). Façade and Rooftop PV Installation Strategy for Building Integrated Photo Voltaic Application. *Energy Procedia*, *32*. https://www.researchgate.net/publication/257712626_Facade_and_Rooftop_PV_Installation_Strategy_for_Building_Integrated_Photo_Voltaic_Application

Bacquerel, A. E. (1839). On Electrode Effect under the influence of Solar Radiation. *Comt. Rend. Acad. Sci.*(9), 561.

United Nations / Framework Convention on Climate Change Adoption of the Paris Agreement, 21st Conference of the Parties, Paris: United Nations. AN OFFICIAL PUBLICATION. , (2015).

Farkus, K., Frontini, F., Maturi, L., Munari Probst, M. C., & Roecker, C. S., Alessandra. (2013). Designing photovoltaic systems for architectural integration. In.

Freitas, S., Guimarães, S., Catita, C., & Redweik, P. (2017). The importance of facades for the solar PV potential of a Mediterranean city using LiDAR data. *Renewable Energy*, *111*, 85-94. https://doi.org/10.1016/j.renene.2017.03.085

Fraas, L. M. (2014). *History of Solar Cell Development*.

Gholami, H., Røstvik, H., & Steemers, K. (2021). The Contribution of Building-Integrated Photovoltaics (BIPV) to the Concept of Nearly Zero-Energy Cities in Europe: Potential and Challenges Ahead. *Energies*, *14*. https://www.researchgate.net/publication/354849858_The_Contribution_of_Building-Integrated_Photovoltaics_BIPV_to_the_Concept_of_Nearly_Zero-Energy_Cities_in_Europe_Potential_and_Challenges_Ahead

Grytli, E. (2013). A Journey along the Norwegian Coast:

Warehouses and Historical Wooden

Structures In *19. Internationales Holzbau-Forum 2013*.

Jelle, B. P., Breivik, C., & Rokenes, H. D. (2012). Building Integrated Photovoltaic Products: A State-of-the-Art Review and Future Research Opportunities. *Solar Energy Materials & Solar Cells*(100), 69-96. http://dx.doi.org/10.1016/j.solmat.2011.12.016

Jolissaint, N., Hanbali, R., Hadorn, J.-C., & Schüler, A. (2017). Colored solar façades for buildings. *Energy Procedia*, *122*, 175-180.

https://www.researchgate.net/publication/319634877_Colored_solar_facades_for_buildings

Lynch, K. (1960). *The image of the city*.

Matusiak, B., & Anter, K. F. (2012). *Nordic Light and Colour*.

Munari Probst, M. C., & Roecker, C. (2011). *Architectural integration and design of solar thermal systems*.

Olseth, J. A., & Skartveit, A. (1986). *The Solar Radiation climate of Norway*.

Røyset, A., Kolås, T., & Jelle, B. (2020). Coloured Building Integrated Photovoltaics: Influence on Energy Efficiency. *Energy and Buildings*, *208*. https://www.researchgate.net/publication/337393254_Coloured_Building_Integrated_Photovoltaics_Influence_on_Energy_Efficiency

Sánchez-Pantoja, N., Vidal, R., & Pastor, M. (2018). Aesthetic impact of solar energy systems. *Renewable and Sustainable Energy Reviews*, *98*, 227-238. https://www.researchgate.net/publication/328043412_Aesthetic_impact_of_solar_energy_systems

Saretta, E., Caputo, P., & Frontini, F. (2019). A review study about energy renovation of building facades with BIPV in urban environment. *Sustainable Cities and Society*, *44*, 343-355. https://www.sciencedirect.com/science/article/pii/S2210670718310862

Schloss, K., & Palmer, S. (2011). Aesthetic response to color combinations: Preference, harmony, and similarity. *Attention, perception & psychophysics*, *73*. https://www.researchgate.net/publication/49783385_Aesthetic_response_to_color_combinations_Preference_harmony_and_similarity

Szabó, F., Bodrogi, P., & Schanda, J. (2010). Experimental Modeling of Colour Harmony. *Color Research & Application*, *35*, 34-49. https://www.researchgate.net/publication/227668859_Experimental_Modeling_of_Colour_Harmony

Tamrakar, S., Mustafa, M., & Riise, R. (2019). Feasibility study for utilization of solar energy in the arctic areas. *IOP Conference Series: Materials Science and Engineering*, *700*. https://www.researchgate.net/publication/337543181_Feasibility_study_for_utilization_of_solar_energy_in_the_arctic_areas

Xiang, C. (2022). Norwegian University of Science and Technology, NTNU].

Xiang, C., Lobaccaro, G., & Matusiak, B. (2022). *Tailored Architectural Design Method for Coloured Façade Integrated Photovoltaics: An Example from the Nordic Built Environment*. https://www.researchgate.net/publication/360243082_Tailored_Architectural_Design_Method_for_Coloured_Facade_Integrated_Photovoltaics_An_Example_from_the_Nordic_Built_Environment

Xiang, C., & Matusiak, B. (2022). Aesthetic evaluation of facade integrated coloured photovoltaics designs – an international online survey. *Journal of the International Colour Association* (28), 24-30

https://www.researchgate.net/publication/358131617_Aesthetic_evaluation_of_facade_integrated_coloured_photovoltaics_designs_-_an_international_online_survey

Xiang, C., & Matusiak, B. S. (2019a). Facade Integrated Photovoltaic, state of the art of Experimental Methodology. *IOP Conference Series: Earth and Environmental Science*, *352*. https://www.researchgate.net/publication/336931950_Facade_Integrated_Photovoltaic_state_of_the_art_of_Experimental_Methodology

Xiang, C., & Matusiak, B. S. (2019b). *Facade Integrated Photovoltaic, state of the art of Experimental Methodology*

Xiang, C., & Matusiak, B. S. (2021). *A STATE OF THE ART OF DESIGN CRITERIA FOR FAÇADE INTEGRATED PHOTOVOLTAICS*. https://www.researchgate.net/publication/356218169_A_STATE_OF_THE_ART_OF_DESIGN_CRITERIA_FOR_FACADE_INTEGRATED_PHOTOVOLTAICS

Xiang, C., Matusiak, B. S., Røyset, A., & Kolås, T. (2021). Pixelization approach for façade integrated coloured photovoltaics-with architectural proposals in city context of Trondheim, Norway. *Solar Energy*, *224*. https://www.researchgate.net/publication/353048063_Pixelization_Approach_for_Facade_Integrated_Coloured_Photovoltaics_-_with_architectural_proposals_in_city_context_of_Trondheim_Norway

Xiang, C., Moscoso, C., & Matusiak, B. (2021). *AESTHETIC EVALUATION CRITERIA FOR FAÇADE INTEGRATED PHOTOVOLTAICS IN URBAN CONTEXT* https://www.researchgate.net/publication/356218173_AESTHETIC_EVALUATION_CRITERIA_FOR_FACADE_INTEGRATED_PHOTOVOLTAICS_IN_URBAN_CONTEXT

8 Appendix

8.1 Appendix A

The idea of making six models was there from the start, the questionnaire was initially designed keeping that in mind, the older questionnaire had to be reformed due to limitation of the samples.

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):.....

Age ☐18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....

☐No

Do you have any difficulties with colour vision?

☐Yes(optional).....

☐No

☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

A photovoltaic panel (PV panel) refers to an electrochemical type of equipment that is used to facilitate the conversion of light into electricity. Façade integrated PV panels will generate electricity and thus is a sustainable option for the environment.

There are 6 models, 3 pairs in 3 different colours, each pair has one smooth and the other textured material

Which of the models do you like better? Rank them in terms of preference (6- best 1-worst)

☐Model A

☐Model B

☐Model C

☐Model D

☐Model E

☐Model F

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it

☐The sunlight reflection bothers me, but I can look directly at the model for a short time

☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it

☐The sunlight reflection bothers me, but I can look directly at the model for a short time

☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

8.2 Appendix B

(1)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Beathe

Age ☐18-25 ☐26-35 ☒36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

(2)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): MAHA

Age ☐18-25 ☑26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☐No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☐No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 ☑Model A
1 ☑Model B
3 ☑Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☑ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

it is too white

Thank you very much for your participation

(3)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Anastasia

Age ☐18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
3 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

(4)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Hanna

Age ☑18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☑ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

Not like the green colour

Thank you very much for your participation

(5)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):.....SILJE.....

Age ☑18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☑ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

Videos could be brighter

Thank you very much for your participation

(6)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):...August.....

Age ☑18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 ☐Model A
1 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Like reflection

Thank you very much for your participation

7

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Anne-Mari Stav Paulsen

Age ☐18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☒66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 ☐Model A
1 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☑ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

No reflection until mentioned

Thank you very much for your participation

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): KAE Kai

Age ☐18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☒66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☑ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Thank you very much for your participation

9

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Jens

Age ☑18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
3 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

10

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Daniel

Age ☑18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

(11)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Kjersti

Age ☐18-25 ☐ 26-35 ☐36-45 ☑46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☑The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☑ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☑ ☐ ☐ no problem with glossiness

Thank you very much for your participation

(12)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): SOFIA

Age ☑18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
3 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

(13)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): LINDA

Age ☐18-25 ☑26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
3 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation ☺

(14)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): KELVIN

Age ☐18-25 ☑26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
3 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☑ ☐ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation ☺

15

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Thomas

Age ☐18-25 ☑26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 ☐Model A
1 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

I say with reflection.

Thank you very much for your participation

16

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Oddrun Hilby

Age ☐18-25 ☐ 26-35 ☐36-45 ☐46-55 ☒56-65 ☐66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 ☐Model A
3 ☐Model B
1 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Thank you very much for your participation

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): BENJAMIN

Age ☒18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☑ ☐ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☑ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Chayenne

Age ☒18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☐No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
3 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☑The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

19

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Silvan

Age ☐18-25 ☒26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
3 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☑The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

20

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): EMILY

Age ☑18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☑ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

21

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Daniel Larsson

Age ☑18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☑The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☑ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

22

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): ELINE

Age ☐18-25 ☒26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 ☐Model A
3 ☐Model B
1 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Doesn't like green personally.

Thank you very much for your participation

(2)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): TOVE

Age ☐18-25 ☐26-35 ☐36-45 ☐46-55 ☑56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Colours could be brighter

Thank you very much for your participation

(1)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): [illegible]

Age ☐18-25 ☑26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 ☐Model A
3 ☐Model B
1 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

25

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Julia

Age ☒18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
3 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

26

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): BERNT

Age ☐18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☑66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 ☐Model A
1 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☑ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

27

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Tara Wilkie

Age ☐18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
3 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation
☺

28

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): KARL RUDISSER

Age ☐18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☒66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Thank you very much for your participation
☺

29

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): STEVE REGELE

Age ☐18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☒66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☒ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☒ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☒ ☐ no problem with glossiness

Thank you very much for your participation

30

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): MORIT

Age ☐18-25 ☒26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☑Model A
2 ☑Model B
3 ☑Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☒The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☒ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☒ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☒ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☒ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

21

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Kristina

Age ☒18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☑The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☑ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

22

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned) Architect

Name (optional): [illegible]

Age ☐18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☒66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

3 ☐Model A
2 ☐Model B
1 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score? Like reflection

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☒ ☐ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Didn't like the green, suggested black windows

Thank you very much for your participation

nr 3

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Solvej

Age ☐18-25 ☑26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☑ ☐ ☐ no problem with glossiness

Thank you very much for your participation

nr 4

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Hector

Age ☐18-25 ☑26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☑The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):.....

Age ☑18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):.....

Age ☐18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 ☐Model A
3 ☐Model B
1 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☑ ☐ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Thank you very much for your participation

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):.....Steven.....

Age ☐18-25 ☐ 26-35 ☑36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☐No
☑Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☑Model B
3 ☑Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):.....BØRGE.....

Age ☐18-25 ☐ 26-35 ☐36-45 ☑46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

3 ☐Model A
1 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Thank you very much for your participation

(29)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Eva

Age ☐18-25 ☑26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☑ ☐ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

(30)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Mattvild

Age ☒18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☒Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☒ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☒ ☐ no problem with glossiness

Thank you very much for your participation

(41)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Amaleen

Age ☒18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

3 ☐Model A
2 ☐Model B
1 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☒ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☒ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☒ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☒ ☐ no problem with glossiness

Thank you very much for your participation

(42)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): KASMUSEV

Age ☐18-25 ☐26-35 ☐36-45 ☒46-55 ☐56-65 ☐66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

3 ☐Model A
2 ☐Model B
1 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☑ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☑ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Thank you very much for your participation

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):.....

Age ☐18-25 ☒26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☒ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☒ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☒ ☐ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☒ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):.....

Age ☐18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☒66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
3 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☒ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☒ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☒ ☐ ☐ no problem with glossiness

Thank you very much for your participation

(25)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): RENATE

Age ☐18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☑66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☒Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☒ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☒ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☒ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

(26)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): LUCAS

Age ☒18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

3 ☐Model A
1 ☒Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☒ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☒ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☒ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☒ no problem with glossiness

Thank you very much for your participation

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): WALDEMAR

Age ☑18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 ☐Model A
1 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☑ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☑ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Thank you very much for your participation

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): VIGGE

Age ☑18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
3 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☑ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Thank you very much for your participation

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Parvaneh S

Age ☒18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 ☐Model A
1 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☑ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☑ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Nickolas

Age ☑18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☑Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☑ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

(No sun)

Thank you very much for your participation

(5)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):...Anuik...

Age ☐18-25 ☒26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☒ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☒ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☒ ☐ ☐ no problem with glossiness

Thank you very much for your participation
☺

(52)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):...Tanja...

Age ☐18-25 ☒26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☒The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☒ ☐ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☒ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☒ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation
☺

53

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):...Klara.....

Age ☐18-25 ☒26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

☐Model A 1
☐Model B 2
☐Model C 3

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☒ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☒ ☐ ☐ no problem with glossiness

Thank you very much for your participation

54

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):.....Jonas.....

Age ☒18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 Model A
3 Model B
2 Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☒ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☒ ☐ ☐ no problem with glossiness

Thank you very much for your participation

35

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):...Filippo.....

Age ☒18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 Model A
2 Model B
3 Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☒ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☒ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☒ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☒ ☐ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

36

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):...MOHAMMAD...

Age ☐18-25 ☑26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 Model A
3 Model B
2 Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☑ ☐ ☐ no problem with glossiness

Thank you very much for your participation

51

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Daniel

Age ☑18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☐I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☑The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☑ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

58

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Emma

Age ☐18-25 ☑ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 Model A
1 Model B
3 Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☑ ☐ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Thank you very much for your participation

59

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Sakib

Age ☐18-25 ☑26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 Model A
2 Model B
3 Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Thank you very much for your participation

60

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Tommy

Age ☐18-25 ☒26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☒Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 Model A
1 Model B
3 Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☒ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☒ ☐ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☒ ☐ ☐ no problem with glossiness

Thank you very much for your participation

61

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Emilia

Age ☐18-25 ☒26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 Model A
3 Model B
1 Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☒ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☒ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☒ no problem with glossiness

Thank you very much for your participation

62

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Stian Paulsen

Age ☐18-25 ☐26-35 ☐36-45 ☐46-55 ☐56-65 ☒66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

2 Model A
1 Model B
3 Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☒ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☒ ☐ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☒ ☐ no problem with glossiness

Thank you very much for your participation

(63)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):...April.....

Age ☑18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Thank you very much for your participation

(64)

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):...Ewity.....

Age ☐18-25 ☑ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Thank you very much for your participation

65

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):...Intedaw.....

Age ☐18-25 ☑26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☑Model B
3 ☑Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☑ ☐ ☐ no problem with glossiness

Thank you very much for your participation

66

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional):....Jenifer

Age ☐18-25 ☑26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
2 ☐Model B
3 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☑ ☐ ☐ no problem with glossiness

Thank you very much for your participation

67

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Jannike

Age ☑18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☑Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☐Model A
3 ☐Model B
2 ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☑ ☐ ☐ ☐ no problem with glossiness

Thank you very much for your participation

68

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Håkon

Age ☑18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1 ☑Model A
2 ☑Model B
3 ☑Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☑ ☐ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☑ ☐ ☐ no problem with glossiness

Thank you very much for your participation

69

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Caroline

Age ☒18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☐Male ☒Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☒No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☒No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1. ☐Model A
2. ☐Model B
3. ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☒I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☒ ☐ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☒ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☒ ☐ ☐ no problem with glossiness

Thank you very much for your participation

70

This questionnaire is designed as a part of Master's Thesis for Sustainable architecture program. The results shall be anonymous, and any information obtained in connection with the study that can be identified with you will remain confidential.

Directions: Choose only of the boxes (unless otherwise mentioned)

Name (optional): Philip

Age ☑18-25 ☐ 26-35 ☐36-45 ☐46-55 ☐56-65 ☐66+

Gender ☑Male ☐Female ☐Other ☐Prefer not to say

Do you have any visual impairment you know of?

☐Yes, (optional).....
☑No

Do you have any difficulties with colour vision?

☐Yes(optional).....
☑No
☐Sometimes(optional).....

In the scope of master thesis at NTNU/IAT, we have prepared scale models of an imaginary 4-floors building new building that is covered by coloured solar panels

Which of the models do you like better? Rank them in terms of preference (3- best 1-worst)

1. ☐Model A
3. ☐Model B
2. ☐Model C

How much visual discomfort do you feel walking along and looking at the model that you gave the **highest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

How much visual discomfort do you feel around the model that you gave the **lowest** score?

☑I have noticed reflection of sunlight at the model, but it is not a problem, I can look at it
☐The sunlight reflection bothers me, but I can look directly at the model for a short time
☐The strong light reflection makes it impossible to look at the model

Considering the model that you gave the highest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☐ ☑ no problem with glossiness

Considering the model that you gave the lowest score, what is your opinion about use of the material shown on the model in relation to the surrounding existing buildings?

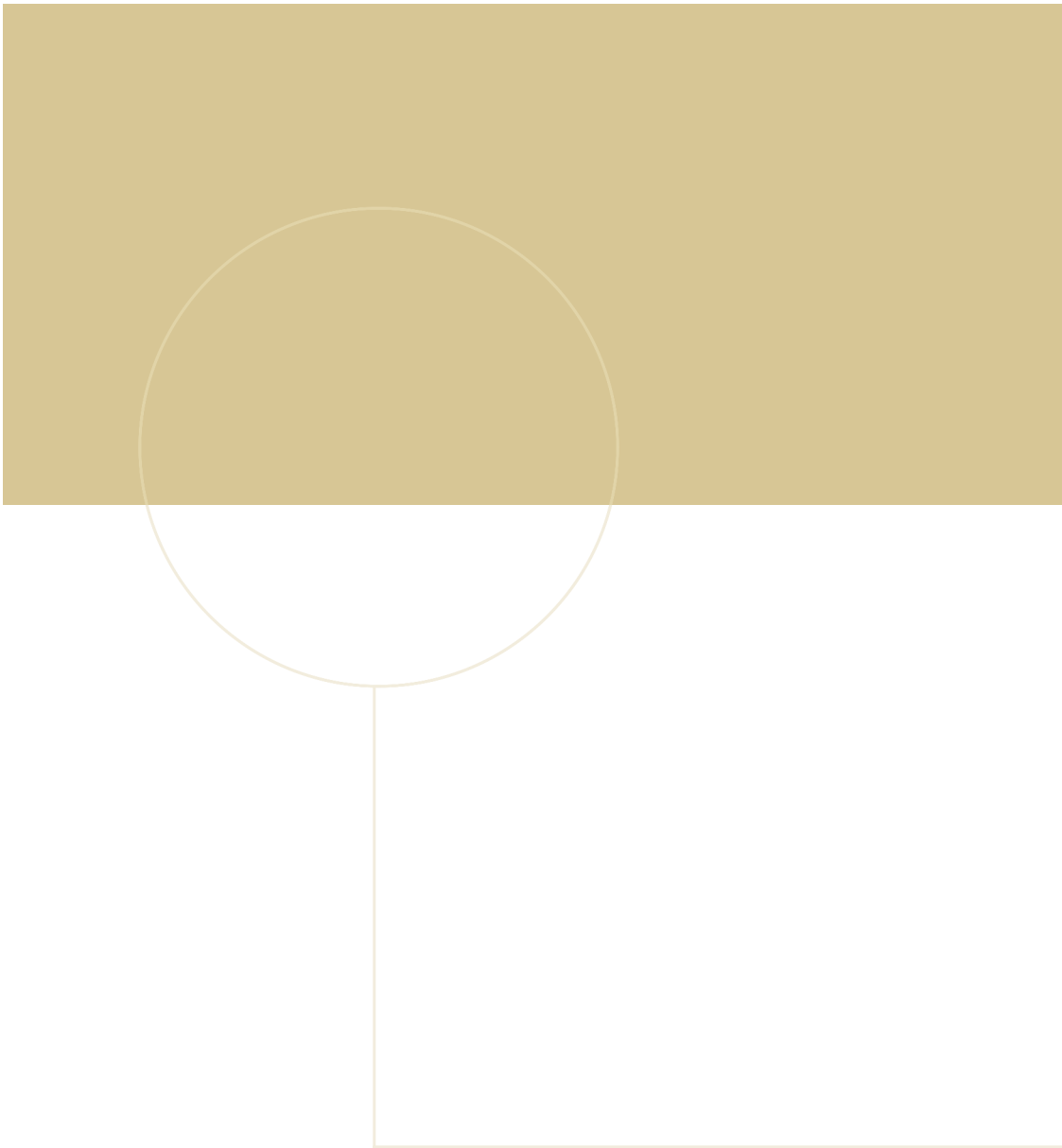
COLOUR: mark how well the colour of the façade matches the colours of the surrounding buildings

Not at all ☐ ☐ ☐ ☐ ☑ Very well

GLOSSINESS: mark how well the material fits into surrounding regarding glossiness

Material is too glossy ☐ ☐ ☐ ☑ ☐ no problem with glossiness

Thank you very much for your participation



NTNU

Norwegian University of
Science and Technology