



PLUS
ENERGIE
SCHULE
STUTTGART
2018
R. SCHILD


SAINT-GOBAIN

CREATE GREAT LIVING PLACES AND IMPROVE DAILY LIFE

Gestaltungsfreiheit
Freedom of design



Raumklima
Room climate



Nachhaltigkeit
Sustainability



Sicherheit | *Safety*



Ruhe | *Quiet*



Zeitgewinn | *Gain in time*



TO CREATE GREAT LIVING PLACES AND IMPROVE DAILY LIFE

COMFORT



**A basic need for humans
for private and professional life**

SUSTAINABILITY



**Responsibility for the next
generations**



OBJECTIV PLUSENERGY - PARTNERS



Gefördert durch:



aufgrund eines Beschlusses
des Deutschen Bundestages



STUTTGART 

Forschungsprojekt Plusenergieschule/

Research Project Plus-Energy School

Ländeshauptstadt Stuttgart / *State Capital of Stuttgart*

Amt für Umweltschutz / *Office of Environmental Protection*

Dr. Jürgen Görres

Bauherrenvertretung / Building Owner Representatives:

Schulverwaltungsamt / *School Administration Office*

Amt für Umweltschutz / *Office of Environmental Protection*

Hochbauamt / *Building Department*



Gesamtbetreuung des Projektes /

Overall supervision of the project:

Michel Wenger

Technische Beratung / Technical consulting:

Isover: Daria Breitenbicher, Güven Kudas, Wilhelm Gröner,

Timo Alles, Christian Conrady, Nico Rockrohr

Rigips: Dirk Bange, Thorsten Heiss

Saint-Gobain Glass: Michael Mallmann, Wolfgang Böttcher

Weber: Jürgen Meyer, Klaus-Peter Mack, Joachim Thielen,

Albert Barth, Peter Napholz, Günter Fischer

Multi-Komfort / Multi-Comfort: Robert Schild

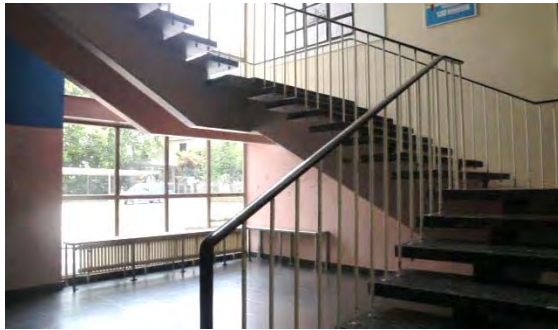
**DIE SCHULE IST FÜR RUND 450 SCHÜLER IM ALTER VON 6 BIS 16 JAHREN
THE SCHOOL IS DESIGNED FOR ABOUT 450 PUPILS BETWEEN SIX AND SIXTEEN YEARS OF AGE.**

**Hauptgebäude /
Main building (1954)**



**Erweiterungsgebäude /
Expansion building (2004)**

BESTAND EXISTING BUILDINGS



Nordfassade
North facade



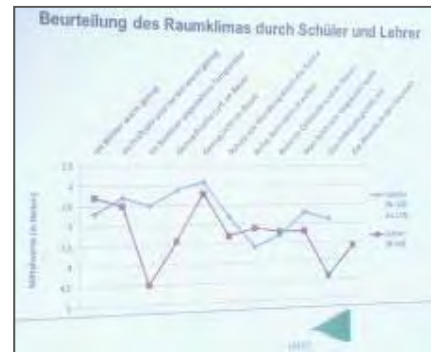
Klassenzimmer
Class rooms

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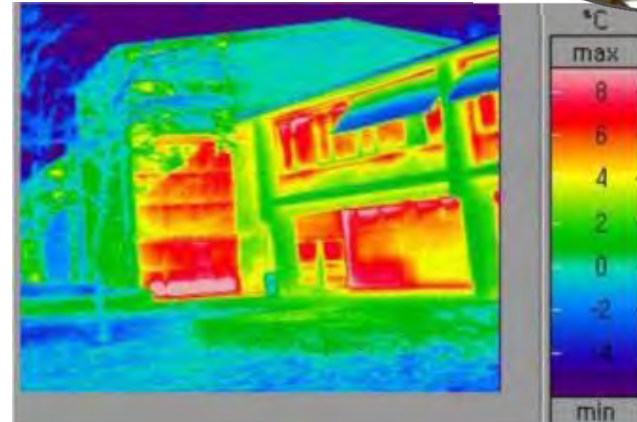
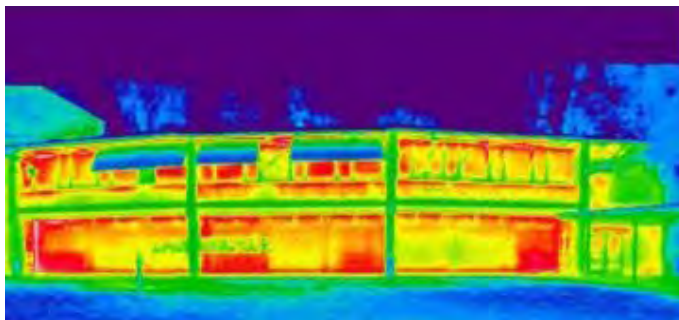
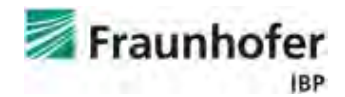
SAINT-GOBAIN

PREPARATION AND PARTICIPATION

Dr. Annette Roser
IREES GmbH - Institut für
Ressourceneffizienz und
Energierstrategien



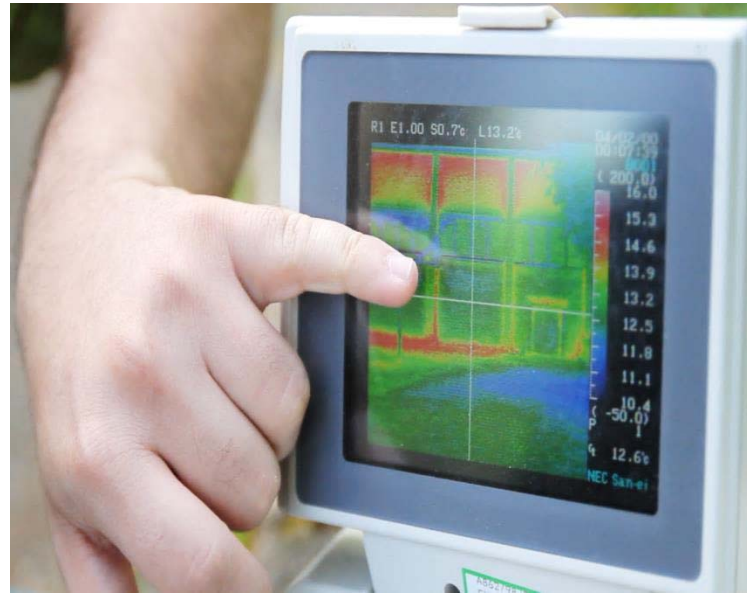
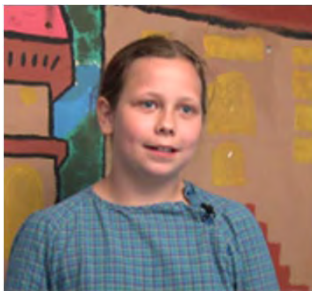
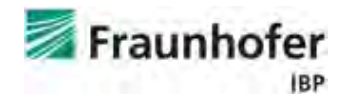
THERMOGRAPHIC ANALYSES



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ASSESSMENT AND ANALYSIS



DIE THERMISCHE HÜLLE THE THERMAL ENVELOPE



WÄRMEDÄMMUNG THERMAL INSULATION



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VOR- UND NACH DER SANIERUNG BEFORE AND AFTER RENOVATION



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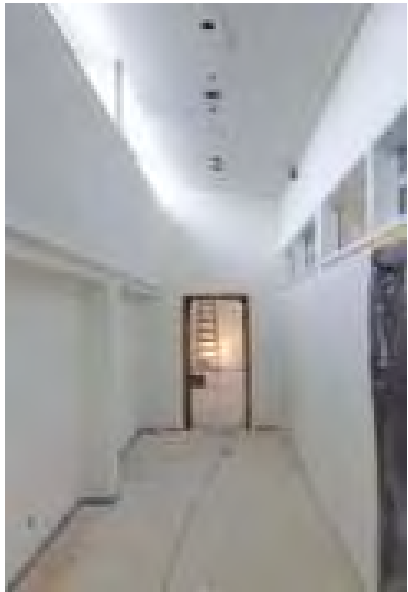
THE THERMAL ENVELOPE

<i>Component</i>	<i>U value</i>		<i>Measure</i>
	<i>before</i>	<i>after</i>	
<i>Outer wall, gable side</i>	<i>1,70</i>	<i>0,17</i>	<i>Additional 9 cm vacuum sandwich element, Weber</i>
<i>Outer wall (except for the ground floor, south)</i>	<i>1,70</i>	<i>0,10</i>	<i>Additional 30 cm thermal insulation, Isover and Weber</i>
<i>Outer wall, ground floor, south</i>	<i>1,70</i>	<i>0,15</i>	<i>Additional 20 cm mineral wool insulation, Isover</i>
<i>Parapet, upper floor, south</i>	<i>3,00</i>	<i>0,15</i>	<i>Additional 20 cm mineral wool insulation, Isover</i>
<i>Window classrooms</i>	<i>2,70</i>	<i>0,80</i>	<i>Three-paned Diamant glass with passive house frame, glass from Saint-Gobain</i>
<i>Window staircases</i>	<i>5,20</i>	<i>0,80</i>	<i>Three-paned Diamant glass with passive house frame, glass from Saint-Gobain</i>
<i>Roof</i>	<i>1,60</i>	<i>0,10/0,15</i>	<i>Additional 30 cm EPS insulation / 9 cm vacuum insulation + EPS insulation, Isover</i>
<i>Floor / ceiling against ambient air</i>	<i>0,80</i>	<i>0,25</i>	<i>Additional 12 cm mineral wool insulation, Isover</i>
<i>Ceiling of the unheated cellar</i>	<i>1,80</i>	<i>0,20</i>	<i>Additional 14 cm mineral wool insulation, Isover</i>
<i>Floor against substrate</i>	<i>3,10</i>	<i>0,47</i>	<i>Additional 3 cm vacuum insulation, Isover</i>

NACH DER SANIERUNG AFTER RENOVATION



BELICHTUNG SAINT-GOBAIN DREISCHEIBEN-DIAMANT-GLAS NATURAL LIGHT SAINT-GOBAIN THREE-PANEL DIAMANT GLASS



Südfassade / South façade:

- SGG CLIMATOP MAX Ug 0,5; LT 73; g 59;
- 6 - 12 Kr - 4 - 12 Kr – 6

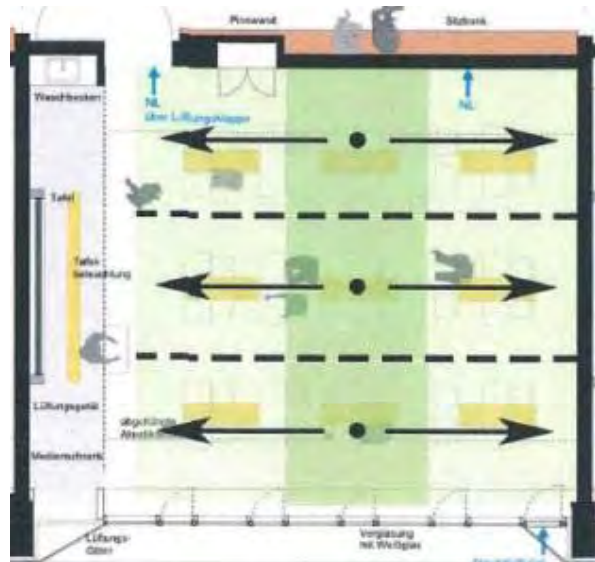
Nordfassade / North façade:

- SGG CLIMATOP MAX Ug 0,5; LT 73; g 59;
- 6 - 12 Kr - 4 - 12 Kr - VSG 33.1

BELEUCHTUNG ARTIFICIAL LIGHT

Sensorik für Lichtmanagement / Sensors for light management

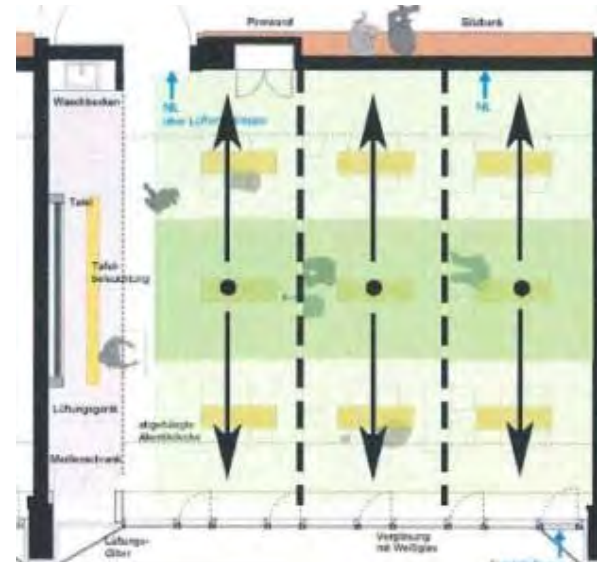
Lichtfühler zur tageslichtabhängigen Kunstlichtsteuerung
Light sensors to control artificial light, depending on daylight



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Sensorik für Lichtmanagement / Sensors for light management

Präsenzmelder zur präsenzabhängigen Steuerung
Presence detectors for operation depending on presence



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BELEUCHTUNG ARTIFICIAL LIGHT



CO2
● ● ● ● ●

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BELEUCHTUNG ARTIFICIAL LIGHT



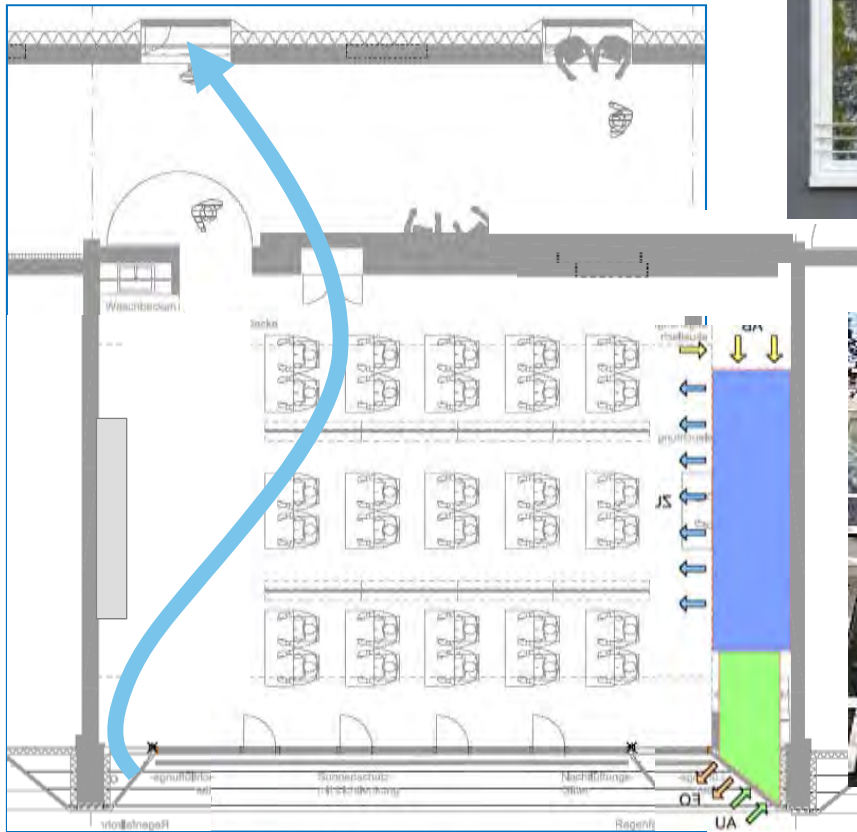
BELÜFTUNG UND KÜHLUNG VENTILATION AND COOLING



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BELÜFTUNG UND KÜHLUNG VENTILATION AND COOLING



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ENERGIEVERSORGUNG DER PLUSENERGIESCHULE ENERGY SUPPLY OF PLUS-ENERGY SCHOOL



PV-Module zur Stromerzeugung /
PV modules to generate power

Stromüberschuss in das öffentliche
Netz / *Overflow of power into the
public network*

Tageslichtnutzung und Sonnenschutzsysteme für
natürliche Belichtung / *Use of daylight and sun
protection systems for natural light exposure*



Fassadendämmung zur Energie-
effizienz / *Façade insulation for
energy efficiency*



Geothermie / *geothermal energy*
Keine fossilen Energieträger /
No fossil-based sources of energy




SAINT-GOBAIN

GEOHERMIE FÜR HEIZUNG GEOHERMIC FOR HEATING



PHOTOVOLTAIK 1.800 m² UND ERBRINGT EINE LEISTUNG VON 220 kW_p.
PHOTOVOLTAIC 1,800 m² AND GENERATES AN OUTPUT OF 220 kW_p



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SAINT-GOBAIN

AFTER RENOVATION



- Insulation: roof 20 cm, outer wall 10-30 cm,
- Floor / Roof Vacuum Insulation Panels (VIP), EPS
- Heat generation: Heat pump with 54 geothermal probes with 90 m depth
- Heat transfer: low-temperature surface heating system temperatures of 45 °C / 35 °C (TVL / TRL)
- Power generation: Photovoltaic with 220 kWp (1.800m²)
- Hybrid ventilation: ventilation system with 90% heat recovery
- Efficient lighting system: Daylight-dependent control and presence detector
- No refrigeration for cooling purposes (exception: server room)

ERSTES BETRIEBSJAHR DER PLUSENERGIESCHULE STUTTGART VOM 1. OKTOBER 2016 BIS 30. SEPTEMBER 2017



PV-Produktion: **203.308 kWh**
 Verbrauch: **160.815 kWh**
 Überschuss: **42.493 kWh**



FEIERLICHE ERÖFFNUNG AM 14. JULI 2017 OPENING CEREMONY 14TH OF JULY 2017



ANTON BRUCKNER MUSIKHOCHSCHULE LINZ PASSIVHAUS



29 / Multi-Komfort GER/AUT RSC

The logo for Saint-Gobain, featuring a stylized red and blue wave-like graphic above the text "SAINT-GOBAIN" in a bold, sans-serif font.

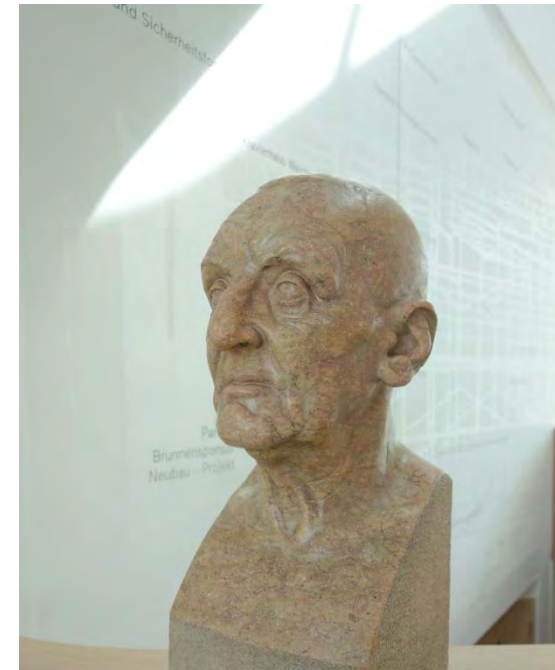
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30 / Multi-Komfort GER/AUT RSC



ANTON BRUCKNER MUSIKHOCHSCHULE LINZ PASSIVHAUS



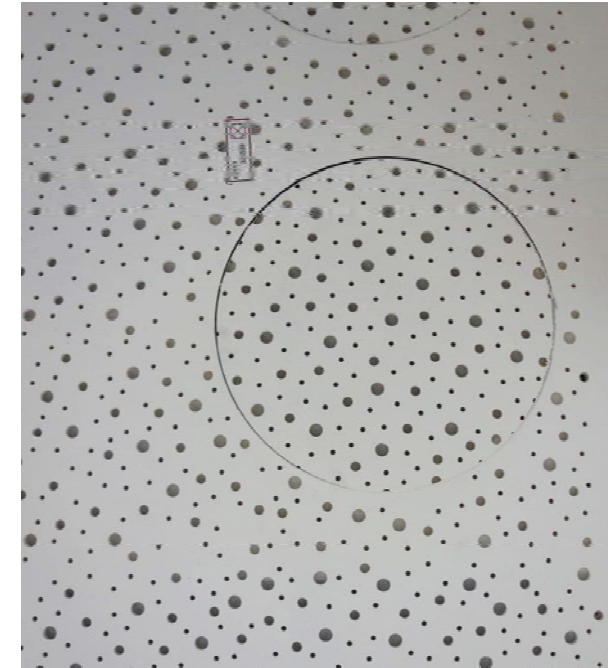
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32 / Multi-Komfort GER/AUT RSC



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33 / Multi-Komfort GER/AUT RSC


SAINT-GOBAIN

ANTON BRUCKNER MUSIKHOCHSCHULE LINZ PASSIVHAUS



