

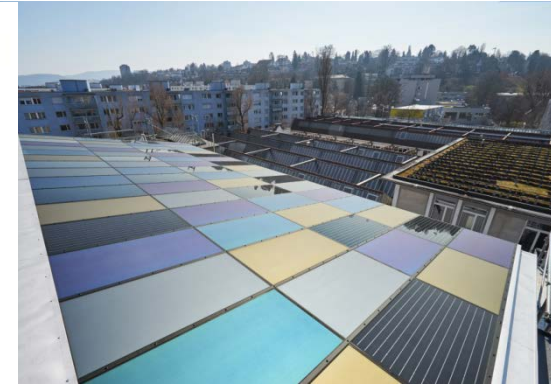
Coal silo transformation

Performance analysis of a multi-coloured building integrated PV system

Presentation at the Advanced Building Skins, 10.10.2016 Bern

Presenter: Falk Dorusch

Institute of Energy in Building



2015: Project start & first presentation

2016: First Year in operation

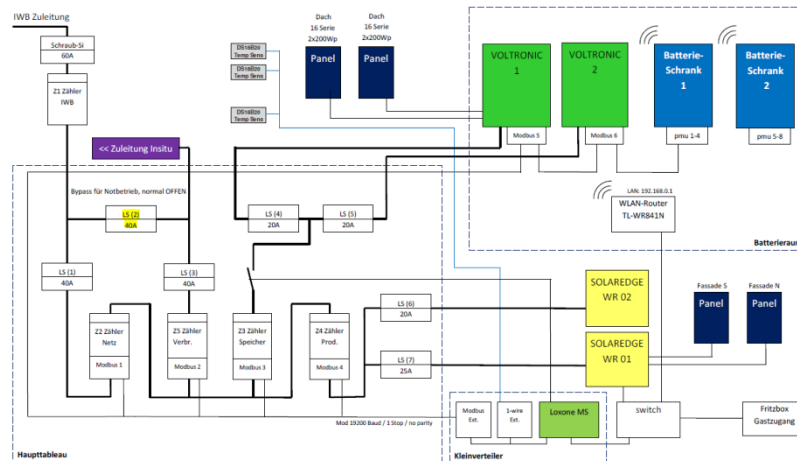
Comparisons of Prognoses and Collected data
Influence of Colour and module orientation

- PV modules on roof plant replaced
- Energy data monitoring completed and set in operate
- Battery storage installed

- Swiss Solar Award 2016
- Lighthouse-Project,
- considerable interest of national and international audience

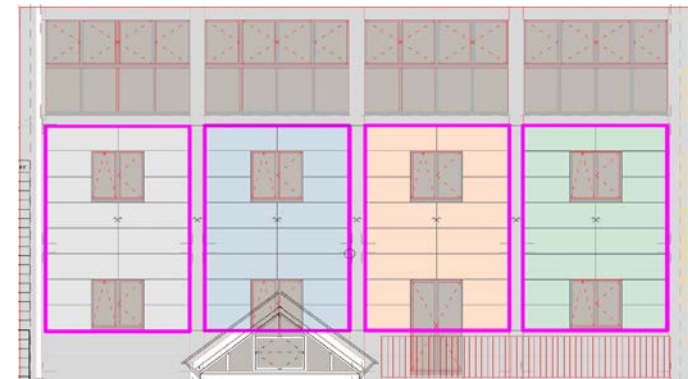
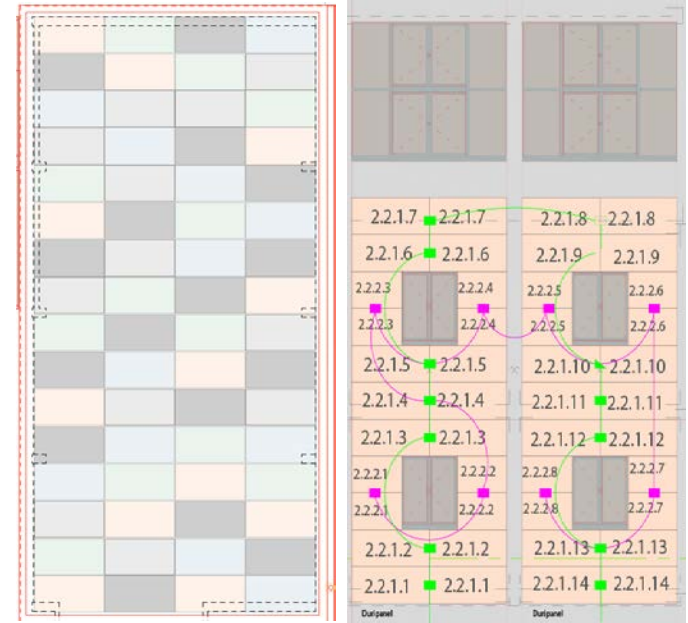


- p / E data of roof and facade plant
 - p / E data of Battery and consumer
 - T data of 10 individual modules
- 103 data points



LOXONE

dreifels



solar edge



SOLVATEC
Die Kompetenz für Solarenergie

Orientation

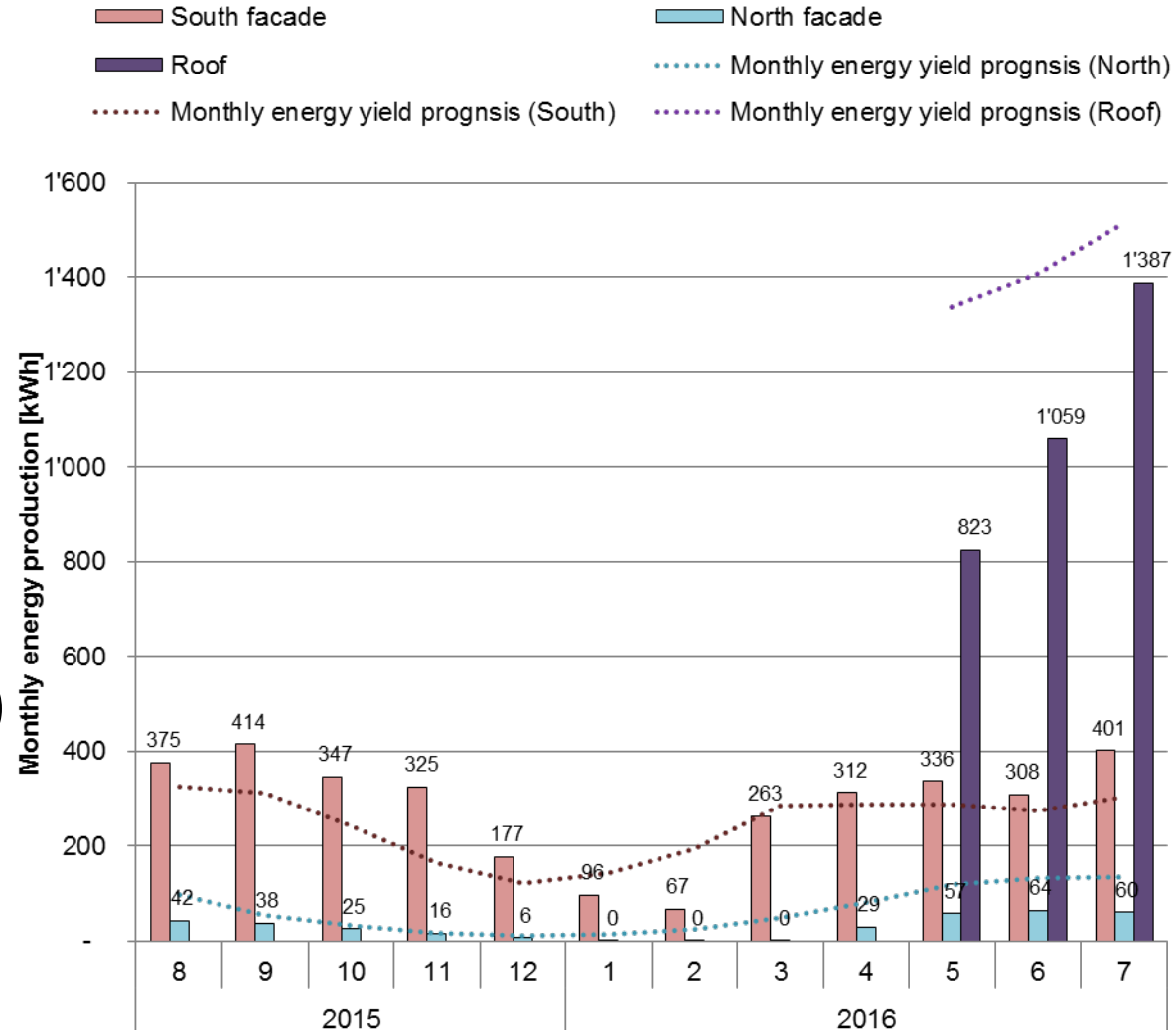
Solar yield [kWh]

North: 340 (-63%)

South: 3'270 (-5%)

Roof: 3'300* (-28%)

*3 month



Prognosis vs reality

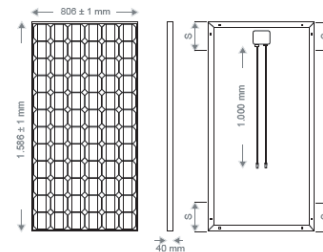
Color



Manufactures spec. (SwissINSO Kromatix Glases)

Green	-5.4%
Blue	-6.2%
Grey	-4.6%
Gold	-10.8%

DATENBLATT
ATk-cSi



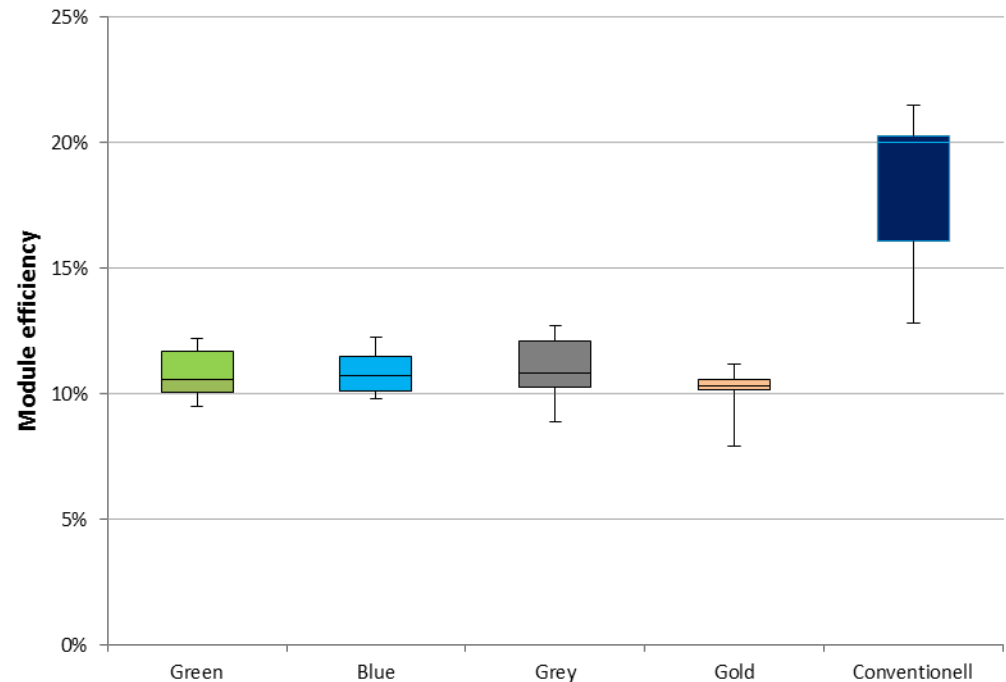
Extinction compared with non-colored modules

Color

Laboratory data: [light impulse 1000 W; $T_{\text{const}} = 20^{\circ}\text{C}$,
measuring of current (I_{mp}) and voltage (V_{mp})]; n=28

Green	10.7%
Blue	10.8%
Grey	10.6%
Gold	10.3%
Conv.	20.0%

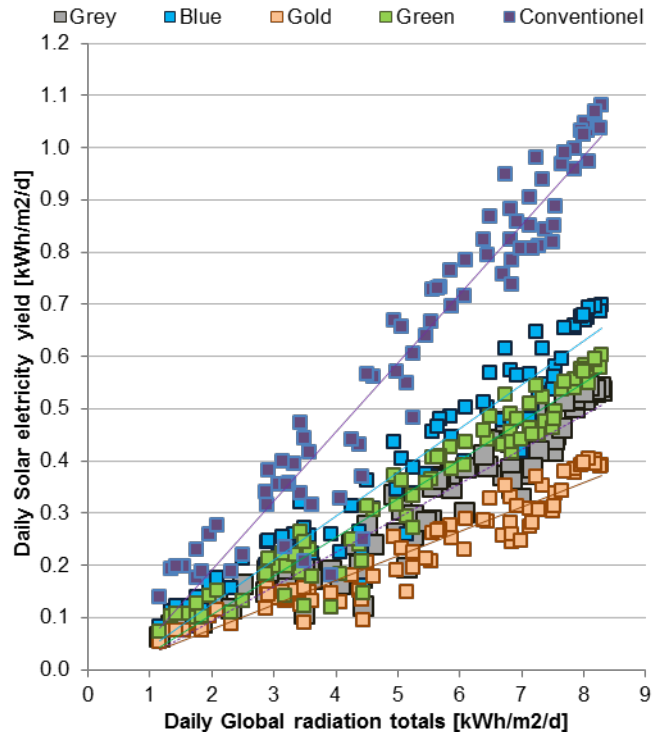
Datasheet: 27% (STC)



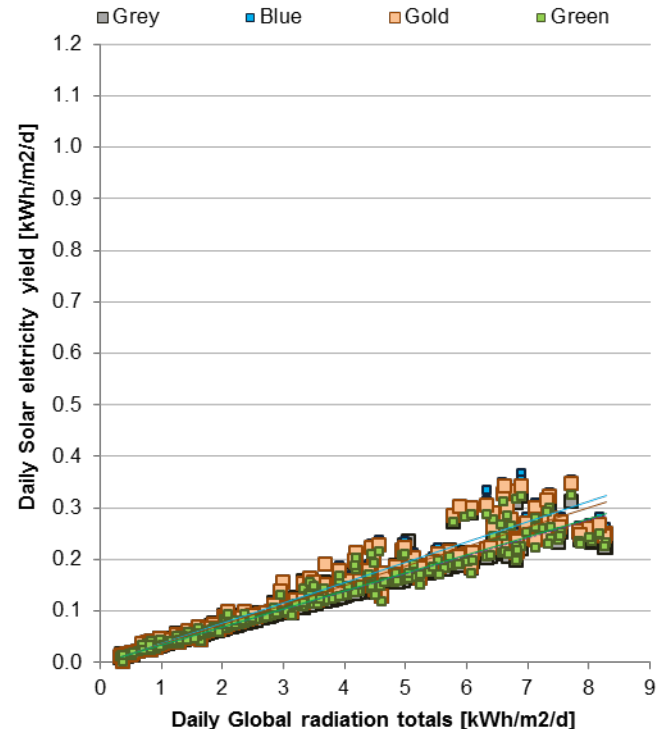
Orientation & Color

Daily Solar electrical yield vs Daily global solar radiation totals

Roof plant

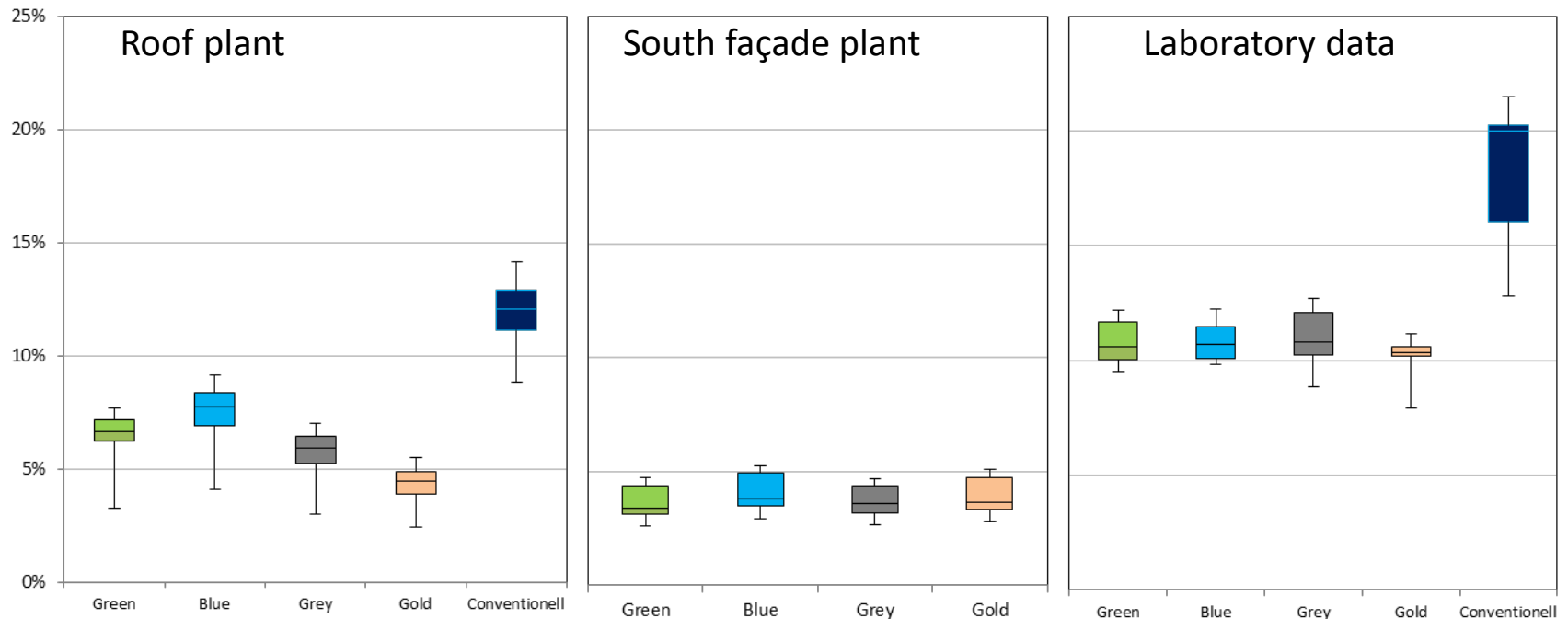


South façade plant



Orientation & Color

System efficiency & Module efficiency



- Problems with Roof PV-plant could be solved
- PV-yield of roof plant underestimated
- PV-yield of south façade plant in expectation range
- coloured modules shows lower system performance than in manufactures specification
- divergences between different module colours are low

- Temperature dependency and -coefficient
- Energy balances (building, PV, battery)
- Further performance analysis (winter time)
- Effect of system components on efficiency
- ...

