



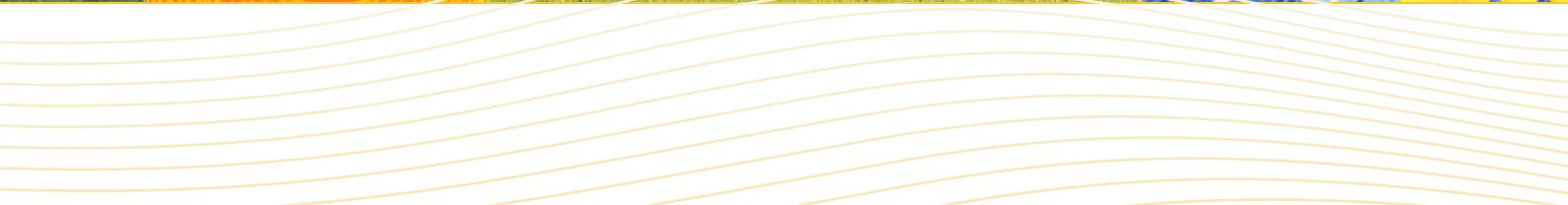
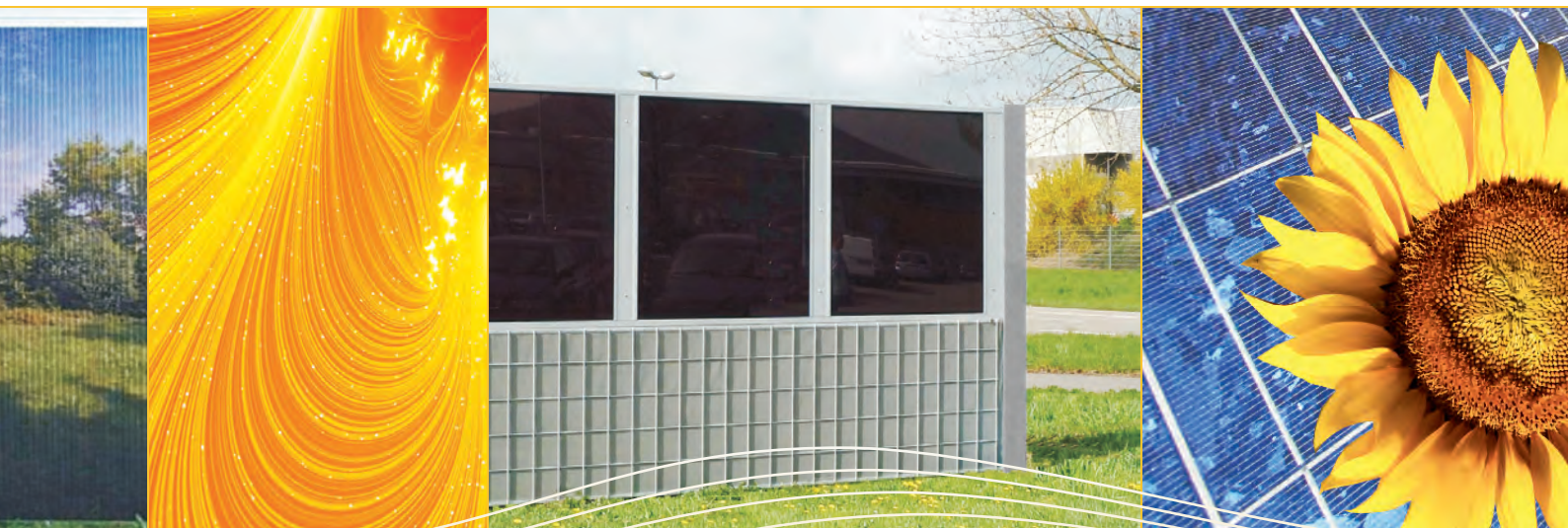
KOHLHAUER® NOISE BARRIERS – QUALITY OF LIFE

KOHLHAUER VOLTA® - THE SUSTAINABLE SOLUTION

Austria · Bosnia & Herzegovina · Bulgaria · China · Czech Republic · France · Germany · Greece · Hong Kong · Italy · Korea · Latvia · Netherlands · Poland · Romania · Serbia · Spain · Sweden · Switzerland · Turkey · United Kingdom

PHOTOVOLTAICS

Noise protection with integrated Photovoltaics
Future-proof
Multifaceted combinable



KOHLHAUER **VOLTA**[®] – UTMOST FUNCTIONALITY FOR SUSTAINABLE NOISE PROTECTION

KOHLHAUER **VOLTA**[®] offers a whole new world of perspectives in noise protection. Unmatched sound insulation and absorption combined with solar power generation provides a significant contribution to environment protection. Whether at roadsides or railway tracks, transparent or opaque design, east-west or north-south-layout – Kohlhauer **VOLTA**[®] offers the perfect product for any application.

APPLICATION

KOHLHAUER **VOLTA**[®] noise protection elements perfectly combine an appealing finish with the most easy assembly and technical expertise. Kohlhauer **VOLTA**[®] integrates solar technology in the proven Kohlhauer noise protection elements. The perfect alignment of noise protection, solar modules and electric elements. The perfect alignment of noise protection, solar modules and electric output enables defining standardised elements for almost any type of application.

Benefits

- Increased environmental protection contribution without additional costs
- Decentralised sustainable power generation
- Positive impact on the image and acceptance of noise barriers by residents
- Suited for autonomous operation
- Double use reduces the consumption of additional cultivated land and land use conflicts and
- Cost synergies between noise protection photovoltaics enable significant economic savings

Product features

- High standardisation level for all elements
- Optimised electrical output up to the energy provider's network connection (distance of 15 m)
- Solar modules can be replaced easily in case of a defect
- High sound insulation and absorption available, depending on the basic element
- Guaranteed yield even in diffuse light conditions thanks to thin-film solar modules
- Integrated cable conducts with flexible cover

EXAMPLE CALCULATION KOHLHAUER **VOLTA**[®] OPAK

The plant near Darmstadt referred to by way of example is a noise barrier with a length of 250 m. Both end sections feature a masonry design over a length of 5 m for a seamless transition into the natural landscape. The main wall section is planned to be constructed with plantable elements with a pillar spacing of 4 m each. Alternatively, the yield enabled through the use of solar modules in combination with plantable elements and whether such alternative design would cover the eventually related additional costs, must be assessed. The road runs from east to west. In order to avoid / reduce clouding/vandalism, the solar elements must be installed at a sufficient height. The generated power can be fed into the grid at a distance of some 15 m from the wall's end.

| | Only PLANTA | PLANTA and VOLTA OPAK |
|--|---|---|
| Height of the example installation | 4,500 mm | 4,500 mm |
| Length of the wall equipped with solar elements | 240 m | 240 m |
| PLANTA elements | 240 x 3,960 x 1,000 mm 60 x 3,960 x 500 mm | 180 x 3,960 x 1,000 mm |
| VOLTA OPAK elements | – | 60 x 3,960 x 1,500 mm |
| Total plant output | – | 18 kWp |
| Annual power yield | – | 15448,52 kWh |
| Avoided CO ₂ emissions | – | 13341 kg/a |
| Total costs | 248400,- € | 299000,- € |
| Additional costs | – | 50600,- € (= 140,-€/m ²) |
| Power supply compensation over a period of 20 years | – | 90180,- ¹⁾ |
| Amortisation of the additional solar element costs | – | 15 years ²⁾ |

¹⁾ According to the power supply regulation as provided by the Renewable Energy Resources Act (EEG), effective as of January 1st 2011

²⁾ In case of a 10-years funding plan bearing an interest rate of 3%.

PRODUCT PORTFOLIO

KOHLHAUER VOLTA® OPAK

For applications that require high sound insulation and absorption.

- Standardised noise protection 3,960 x 1,500 mm
- Offers all benefits of the innovative **PLANTA** concept
- Integrated growth barrier to avoid clouding the solar moduls
- Efficient use in regions with +/- 50° in southern direction

Technical module specifications:

- Thin film module ASI 103 by Schott Solar AG
- Rated output of 103 Wp
- Standard field of 6.2 optimised for a power inverter

KOHLHAUER VOLTA® THRU

For applications that require “transparency” in addition to high sound insulation.

- Standardised noise protection element of 3,960 x 1,000 mm
- Sound insulation >25 dB
- Compatible with KOHLHAUER **PLANTA**® and KOHLHAUER **SCORSA**®

Technical module specifications:

- Thin film ASI Thru by Schott Architektur
- Rated output of 220 Wp per element
- Also available with colour finish
- Transparency of 10%

KOHLHAUER VOLTA® BIFAC

For applications that require a high yield for noise barriers with north-south layout

- Standardised noise protection element format of 3,960 x 1,000 mm
- Sound insulation >25 dB
- Compatible with KOHLHAUER **PLANTA**® and KOHLHAUER **SCORSA**®

Technical module specifications:

- Bifacial crystal glass/glass modules by TNC/ErteX
- Annual yield per element of 260 kWh/a at a cell occupation of 55%
- Higher cell occupation available for higher yield requirements

KOHLHAUER VOLTA® POWER

Innovative noise protection concept for applications offering larger surfaces near roads or railway tracks.

- Individual alignment with local conditions
- Compatible with KOHLHAUER **PLANTA**®
- Highly efficient overall plant

Technical module specifications:

- Poly double-glass modules by Schott Solar AG
- Between 230 and 300 Wp, as required
- Higher pressure and drag load of 5,400 Pa
- Surface load of 550 kg/m²
- Linear performance guarantee of 30 years



KOHLHAUER VOLTA® OPAK



KOHLHAUER VOLTA® THRU



KOHLHAUER VOLTA® BIFAC



KOHLHAUER VOLTA® POWER

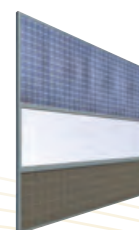
COMBINATION VARIANTS



- 1**
2 **PLANTA** elements and
1 **VOLTA OPAK** element



- 2**
2 **SCORSA** elements and
1 **VOLTA THRU** ELEMENT



- 3**
1 **PLANTA** element,
1 **SCORSA** element and
1 **VOLTA BIFAC** element



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MORE KOHLHAUER® PRODUCTS



Transparent absorbing to highly noise barrier system with transparency and glare shield.



The plantable noise barrier - eco-friendly, sustainable and highly functional.



The reasonable and proven all-round Grid-Insulation-System (GIS) with many design-variations.

