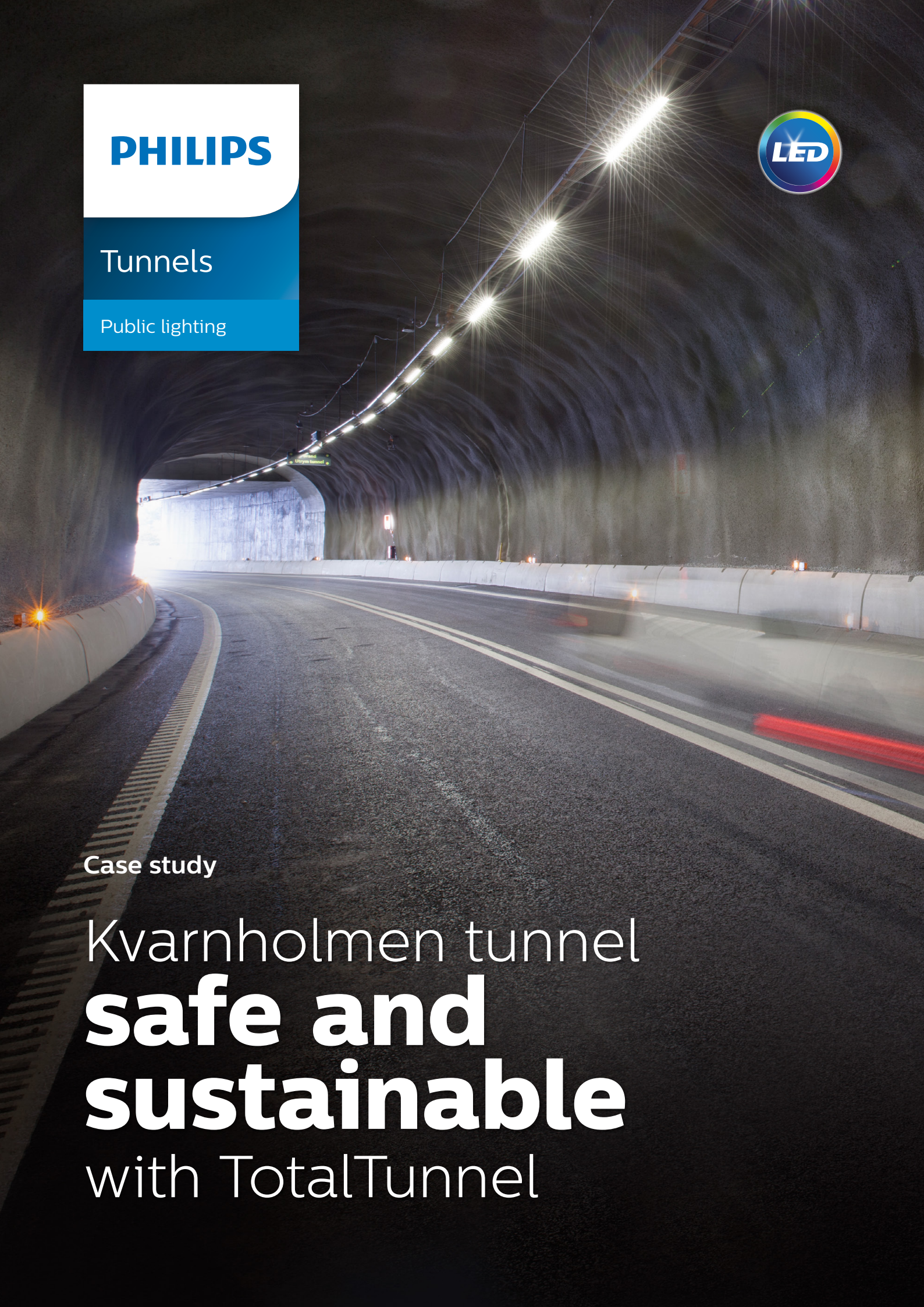

PHILIPS

Tunnels

Public lighting

Case study

Kvarnholmen tunnel **safe and sustainable** with TotalTunnel

MileWide² LED luminaires along Kvarnholmen bridge

The Kvarnholmen junction connects the peninsula of Kvarnholmen with the municipality of Nacka. Philips supplied all lighting systems with controllable LED luminaires in both the new tunnel and the access bridge.

Background

The development of Kvarnholmen, which has a unique industrial and historic cultural environment, is Nacka's largest public construction project. When fully completed, there will be 3,200 new homes, 1,000 workplaces, an elementary school for 700 students, shoreline paths, jetties and boat moorings. The old industrial buildings will be largely preserved and redeveloped into spaces for cultural activities and events.

The challenge

To connect Kvarnholmen to the center of Nacka, the Nacka municipality has constructed a tunnel through Ryssbergen and a bridge over Svindersviken. The new Kvarnholmen junction will ease and enhance the daily lives of many people and contribute to the integration of Kvarnholmen with central Nacka. "When the development of Kvarnholmen was planned, several more access and exit roads were required. A completely new connecting junction between Kvarnholmen and highway 222, Värmdö link, was built. The length of the Kvarnholmen road tunnel through Ryssbergen is 310 meters, and the bridge to Kvarnholmen is 190 meters long. The Nacka municipality's aim was to build a secure, traffic-safe environment and have sustainable energy-efficient

> “The tunnel lighting has an **advanced control system that adjusts the lighting** according to outside conditions.”
>
> **Mikael Jansson**
> Responsible for street lighting in the Nacka municipality

lighting with a very low environmental impact. We also wanted a system with low maintenance costs,” informs Mikael Jansson, responsible for street lighting in the Nacka municipality.

The right lighting – TotalTunnel approach

Philips supplied the complete lighting system for the tunnel with 115 FlowLine LED tunnel luminaires and the web-based control system TunneLogic.
The TunneLogic system includes a central computer MCU (Master Control Unit), DGGs (DALI group gateways) and photometers. In addition, Philips was also responsible for programming, commissioning and testing.
The TunneLogic system has been integrated with Nacka’s own SCADA tunnel monitoring system. Partner ÅF Lighting was responsible for the project planning.

The linear LED lighting is mounted at the center of the tunnel roof and provide a continuous line of light. Two photometers are installed approx. 40 meters outside of the tunnel entrances, one at each entrance. The photometers detect daylight levels and adjust the lighting in the tunnel entrances according to the outside conditions. It’s very important that the transition from the outside into the tunnel takes the ability of drivers’ eyes to adapt into account. By dividing the tunnel lighting into different zones, i.e. entry zone, transitional zone, and interior zone, the lighting level can be adjusted according to the outside conditions and the specific tunnel zone, enabling a smooth transition for the driver’s eyes from entrance to exit.
“The tunnel lighting is on 24 hours a day. This means it’s on for around 8,760 hours a year. As the FlowLine luminaires have a service lifetime of at least 100,000 hours, We avoid the lamp replacement costs and only need to clean the luminaires once every year,” says Mikael Jansson.

The bridge's road lighting

The Kvarnholmen bridge has two-way lanes for car and bus traffic, with a pedestrian pathway and cycle lane running alongside. The pedestrian path and cycle lane do not continue into the tunnel; these lead eastward toward Ryssbergan near the tunnel entrance. For the Kvarnholmen bridge project, Philips delivered the luminaires, designed the lighting scheme, commissioned, programmed and tested the road lighting installation. On one side of the bridge, between the roadway and the pedestrian/cycle path, MileWide^2 LED luminaires have been installed on curved cone-shaped poles. Each pole has two luminaires installed at different heights. The upper luminaires light up the road and the lower luminaires light up the pedestrian and cycle path. There's a pole distance of approx. 20 meters between each of the poles, which are 6.5 meters high. The light point height for road lighting is 6 meters, and 4 meters for the pedestrian and cycle path.
"The road lighting on the bridge, which is controlled by the Nacka municipality's street lighting control system, is switched on and off at dusk and dawn. The lighting is on for approximately 4,000 hours a year.

TunneLogic control system

MileWide² LED

FlowLine

As MileWide[2] LED also has a service lifetime of 100,000 hours, the lighting is expected to last for at least 20 years," explains Mikael Jansson.

The Benefits

Both the Kvarnholmen tunnel and Kvarnholmen bridge now have sustainable energy-efficient lighting with long operating times and extremely low maintenance costs. The LED lighting in the tunnel consumes 75% less energy than the initial plan that involved high-pressure sodium lighting. If the lighting in the tunnel is fully operated by using the TunneLogic control system, this energy saving increases to 79%. When the method of calculating luminance of the access zone L20 is applied, the total energy saving is even 82%.

"With LED lighting and the advanced lighting control system, we now have energy-efficient tunnel lighting with reduced CO_2 emissions and very low maintenance costs. It's simple to control the tunnel lighting via a computer. Each luminaire can be controlled individually. For example, we can receive information about the respective luminaire's dimming level, power consumption, hours of use and any fault indications. The lighting creates a welcoming traffic-friendly tunnel space, both during the day and at night. The bridge now also has an energy-saving, inviting, safe and traffic-friendly lighting solution with a long service lifetime," says Mikael Jansson.

82%
Energy savings

Simple control and data reporting via TunneLogic system

Low OPEX costs and fast ROI on CAPEX costs

Improved comfort and safety by 100% LED lighting


Brand
Utrym tunnel

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