

Continuous search for new ways to reduce operational cost.

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The First International Seminar on Road Tunnel Operations Management & Safety

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Sponsoring Organizations:
PIARC & TESC

Hosted By:
CGRDI



Facts – Energy consumption in Norwegian tunnels

2003

- 93 GWh in tunnels
 - Light
 - Ventilation
 - Pumping of water
- 72 mill NOK

2004

- More than 100 GWh
 - More equipment
 - 20-30 km new tunnels every year

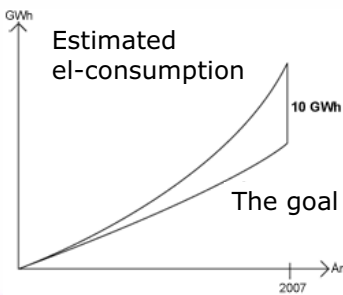
Energy prices may increase by 100 - 200 % in the next few years



Norwegian Public Roads Administration

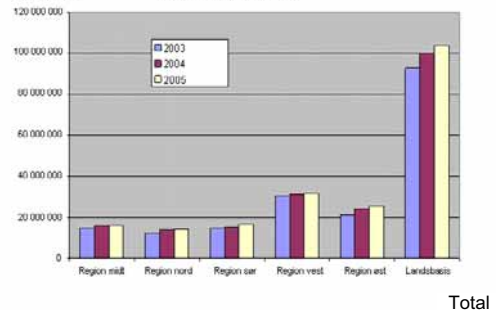
Content

A project to save energy in Norway
On roads and tunnels



Energy consumption in tunnel operation in Norway

Energy consumption (in kWh)



Use of vegetation to reduce the adaptation problem



Dark background and shielding from the sky and direct sun may reduce the need for light in the entrance zone

It also reduces the distraction for the drivers.

Pilot: Light on the walls

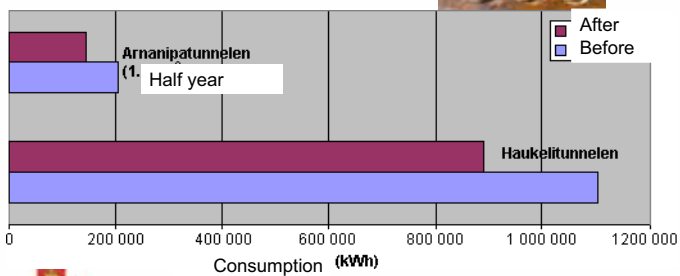


In-directly lighting of the road surface

Some lamps are directing their light on the walls

Change to new fans reduces the energy consumption

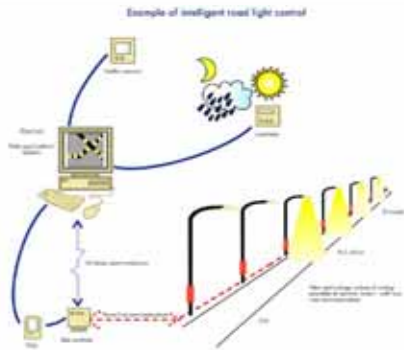
Bigger FANS – reduced friction
Better efficiency and less noise



Pilot: Traffic steering of tunnel light

- No traffic – only every 4th lamp is on
- Sensors outside and inside the tunnel turns light on when traffic arrives - reacts also on humans
- Needs use of lamps that lights up quickly (LEDs and QL lamps etc)
- Photo cells replaced by new and cheap luminance meters ?
- Useful in tunnels with low traffic or where traffic comes in waves with intervals

Pilot 3: Intelligent road and tunnel(?) light



**Thank
You
for
your
attention**

Results before and after rehabilitation

