



**XXIVth WORLD
ROAD CONGRESS**
Mexico City 2011

POSTER SESSION

SUSTAINABLE APPROACH FOR ROAD TUNNEL SUMMARY OF POSTED PAPERS

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Road Tunnels Operations

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Sustainable Approach for Road Tunnels

- Although tunnels form a small part of a road network, they tend to have high energy utilisation for lighting, ventilation, and other services, as well as a significant amount of energy embedded in the structure in terms of materials and construction-related effort.
- Two papers have been presented in the C4 poster session, and they addressed issues of design, construction, operation, maintenance, and management, in a sustainable approach aiming to minimize their carbon footprints.





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PAPER C4.1

OHASHI JUNCTION “COMMUNITY, ROAD, RE-DEVELOPMENT INTEGRATED PROJECT”



Takahiro ISHIDA
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Metropolitan Expressway
Japan



SHUTOKO

Outline of Ohashi Junction Project

OBJECTIVES

- Challenge to construct an expressway junction connecting tunnels and viaduct in the densely inhabited district in Tokyo.
- Integration of the junction project and neighbourhood redevelopment considering sustainability.

CONCLUSION

- The construction of expressway and the creation of an attractive and a sustainable community can live together through environmentally friendly approaches, such as following the slide.

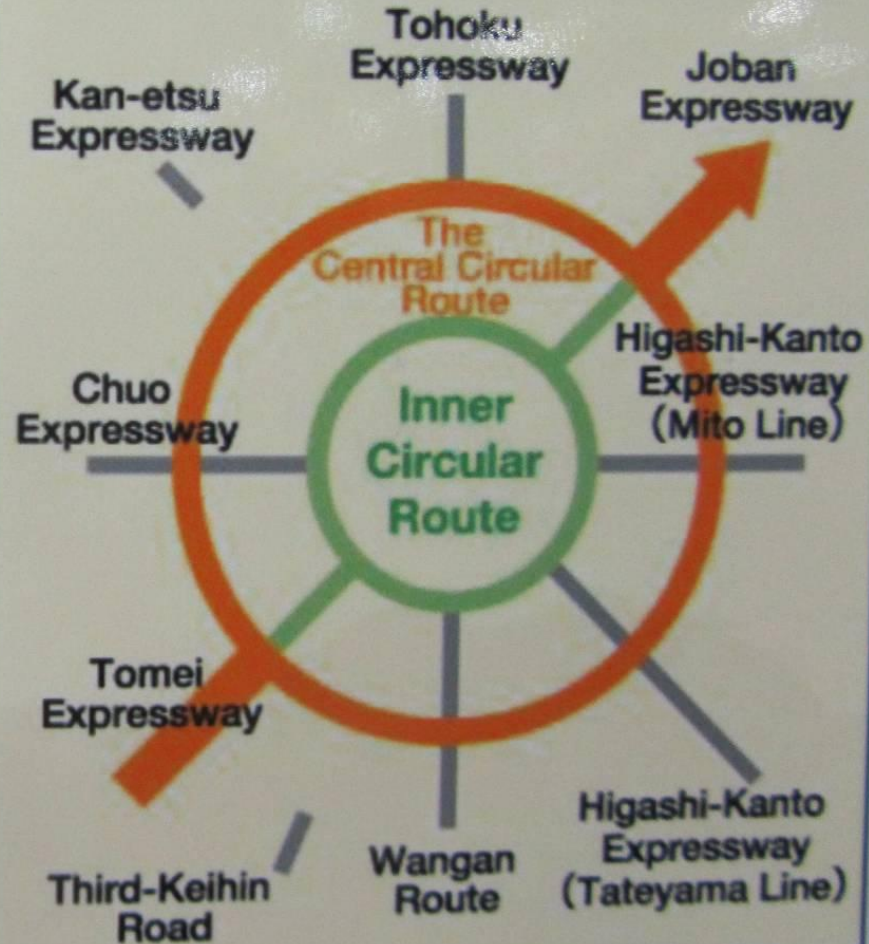


Mitigation of congestion by traffic dispersion

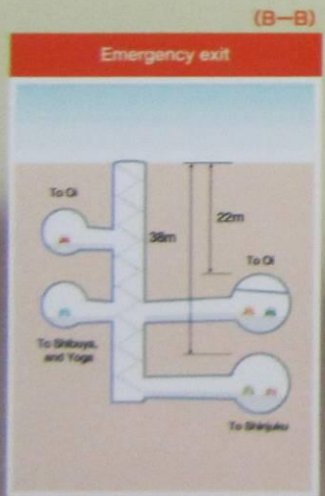
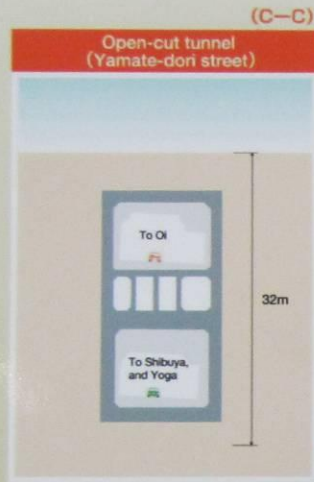
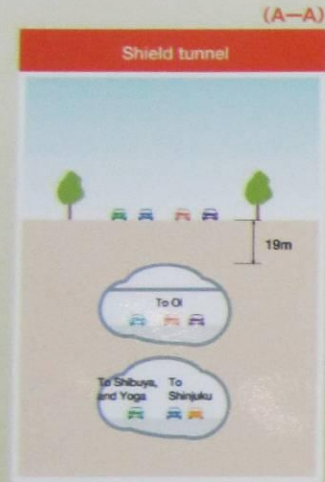
Traffic before opening the Central Circular Routes



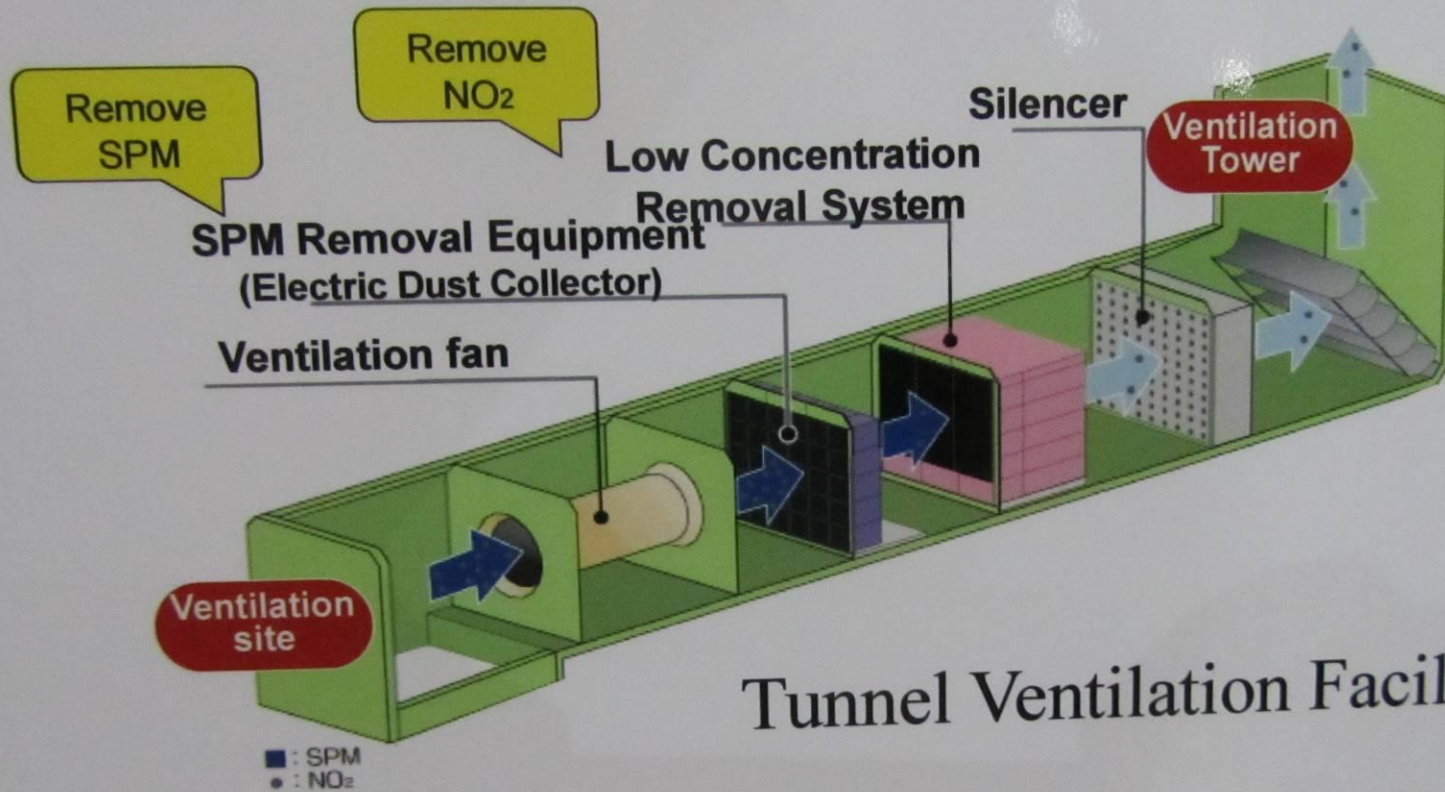
Estimated traffic after opening the Central Circular Routes



Configuration of Ohashi Junction



Usefulness and Benefits to Sustainability

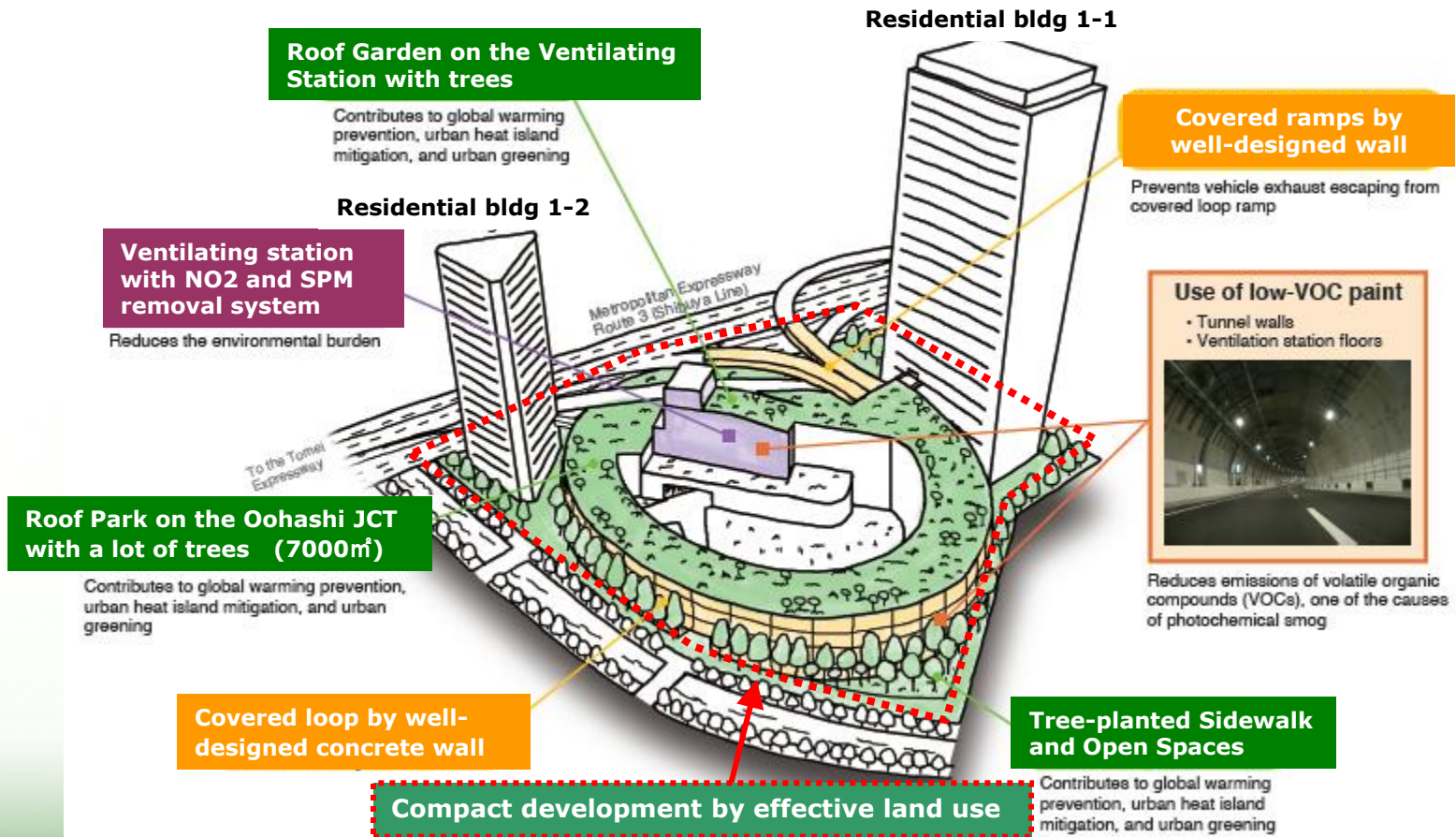


Tunnel Ventilation Facilities

Removes over 90% of NO₂, over 80% of Suspended Particulate Matter (SPM)

Ohashi “Green” Junction

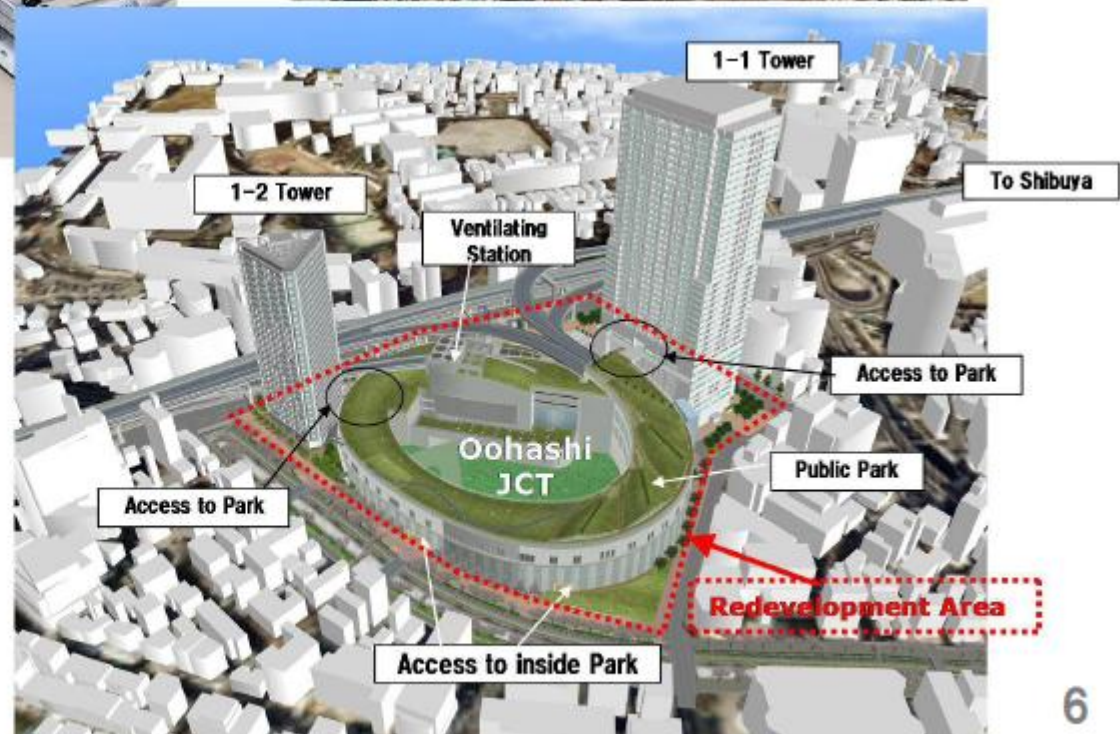
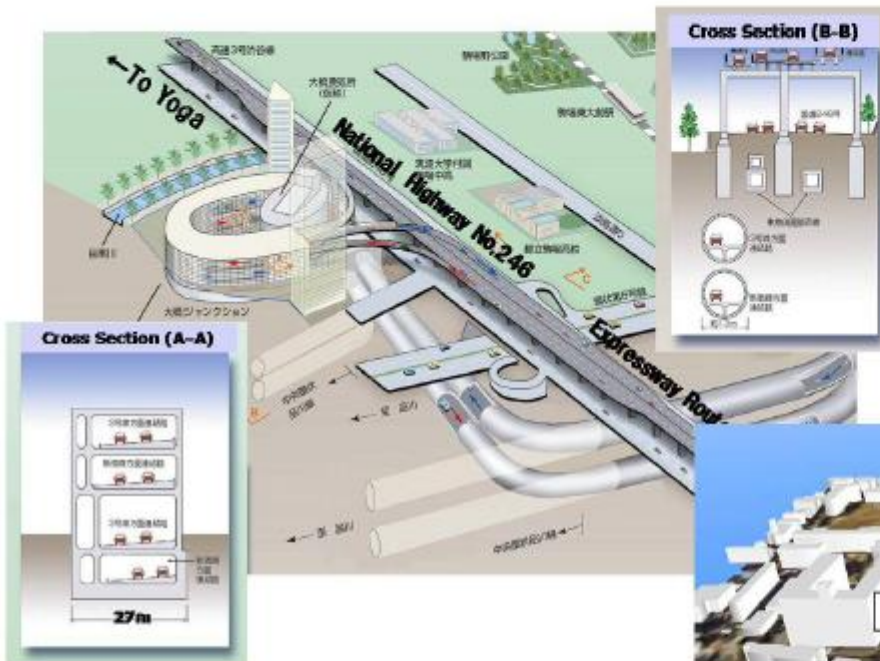
Environmentally Friendly Approaches



CO₂ reduction : 40ton/year



Central Circular Shinjuku Route - Ohashi junction in limited space -

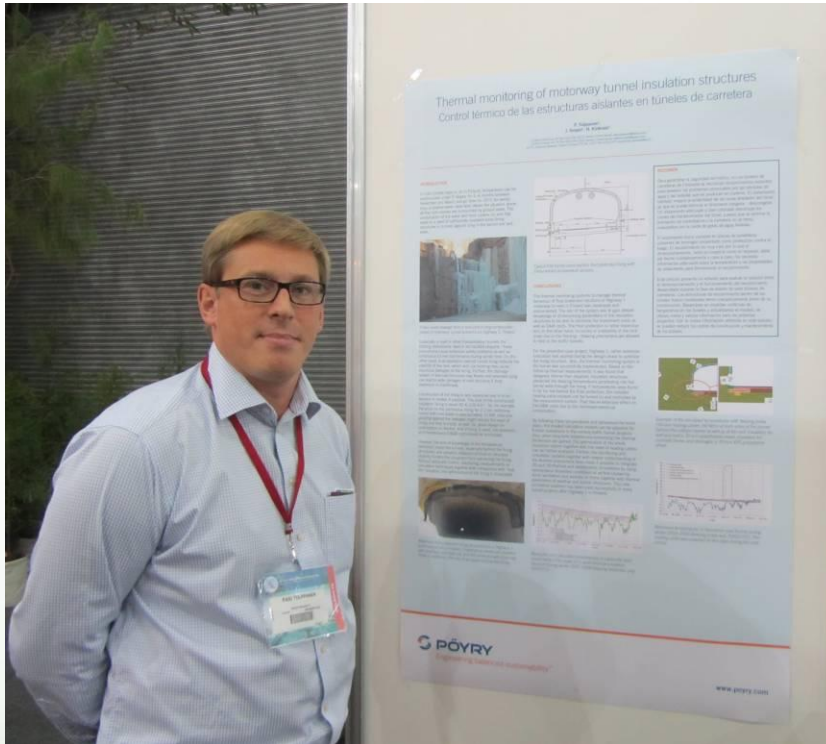




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PAPER C4.3

THERMAL MONITORING OF MOTORWAY TUNNEL INSULATION



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Thermal Monitoring of Motorway Tunnel Insulation Structures

OBJECTIVES

- Frosting phenomena occur often in Finland with temperatures under 0 °C for 4 to 6 months a year, with periods under -20 °C.
- Water & frost insulation is needed to improve traffic safety by preventing icicle formation in tunnels. However understanding of thermal behaviour and dimensioning tools are missing!
- The aim of the project is to gain deeper knowledge of design parameters of the insulation structures to be able to minimize construction, operation, and maintenance cost.



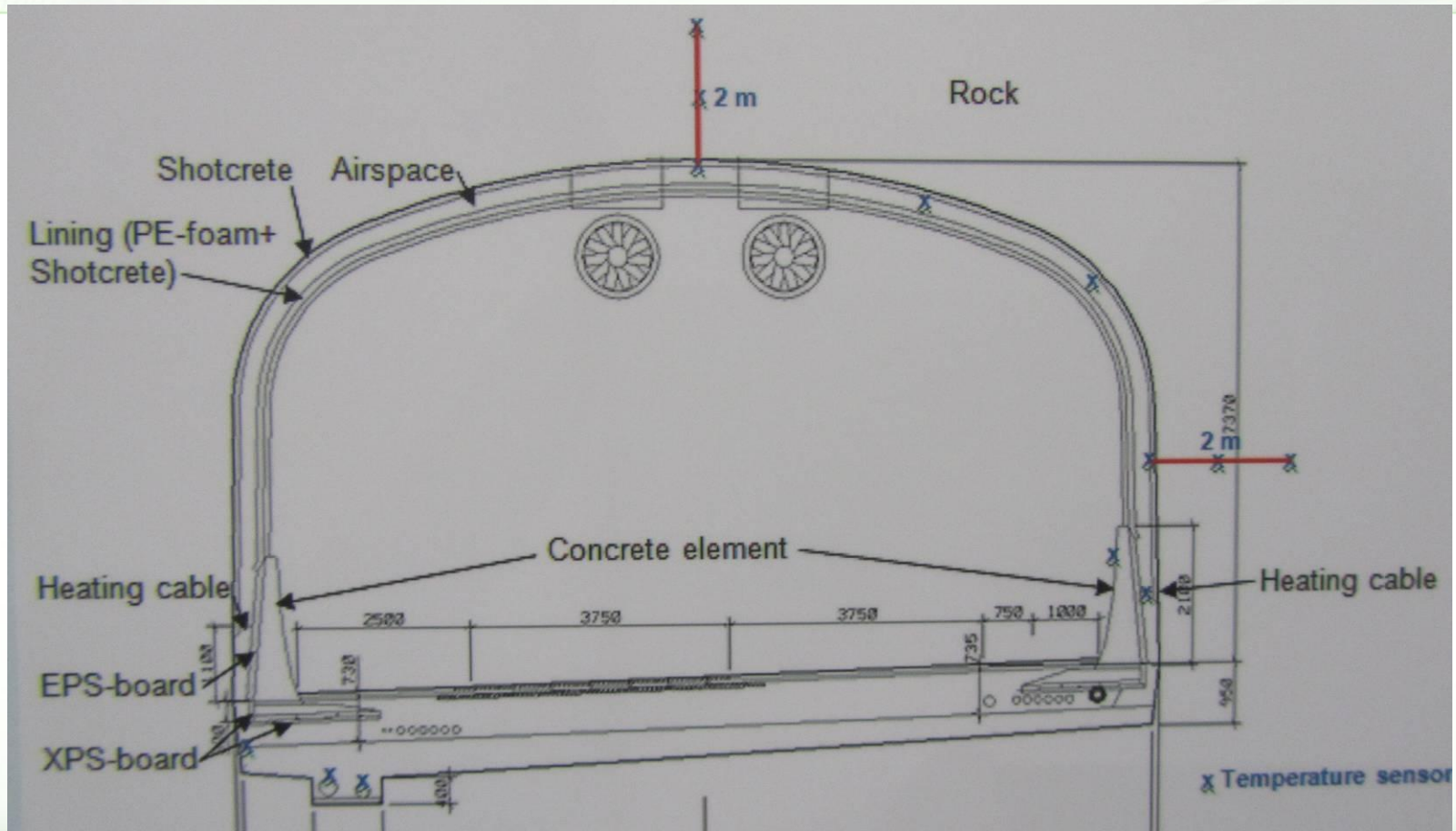
Thermal Monitoring of Motorway Tunnel Insulation Structures

Conclusion

- 8 newly constructed motorway tunnels have been instrumented for continuous follow-up to gain long-term experience concerning thermal behaviour with and without lining.
- This will help in:
 - Optimizing infrastructure design (cost effective)
 - Minimizing Energy consumption for heating
 - Minimizing Operation and Maintenance cost
 - Maximizing Traffic Safety of the Tunnel



Thermal Monitoring of Motorway Tunnel Insulation Structures



Sustainable Approach for Road Tunnels

- The first poster, addressed the issues of design, construction, operation, maintenance and management of tunnels in order to minimize their carbon footprint, while maintaining a safe and healthy operating regime.
- The second poster, discussed sustainable safety measures. It proposed new technologies aiming at reducing the risk level in very cold climate countries by preventing icicle formation by infiltration.

