



ITA TUNNELLING
AWARDS 2019



The Follo Line Project – Tunnel TBM

Norway

Presented by :

Mrs. Anne Kathrine Kalager

Project Manager Tunnel TBM subproject, Bane NOR

Mr. Fernando Vara

Project Manager Acciona Ghella Joint Venture



ITA TUNNELLING
AWARDS 2019





ITA TUNNELLING
AWARDS 2019



The Follo Line Project – Tunnel TBM

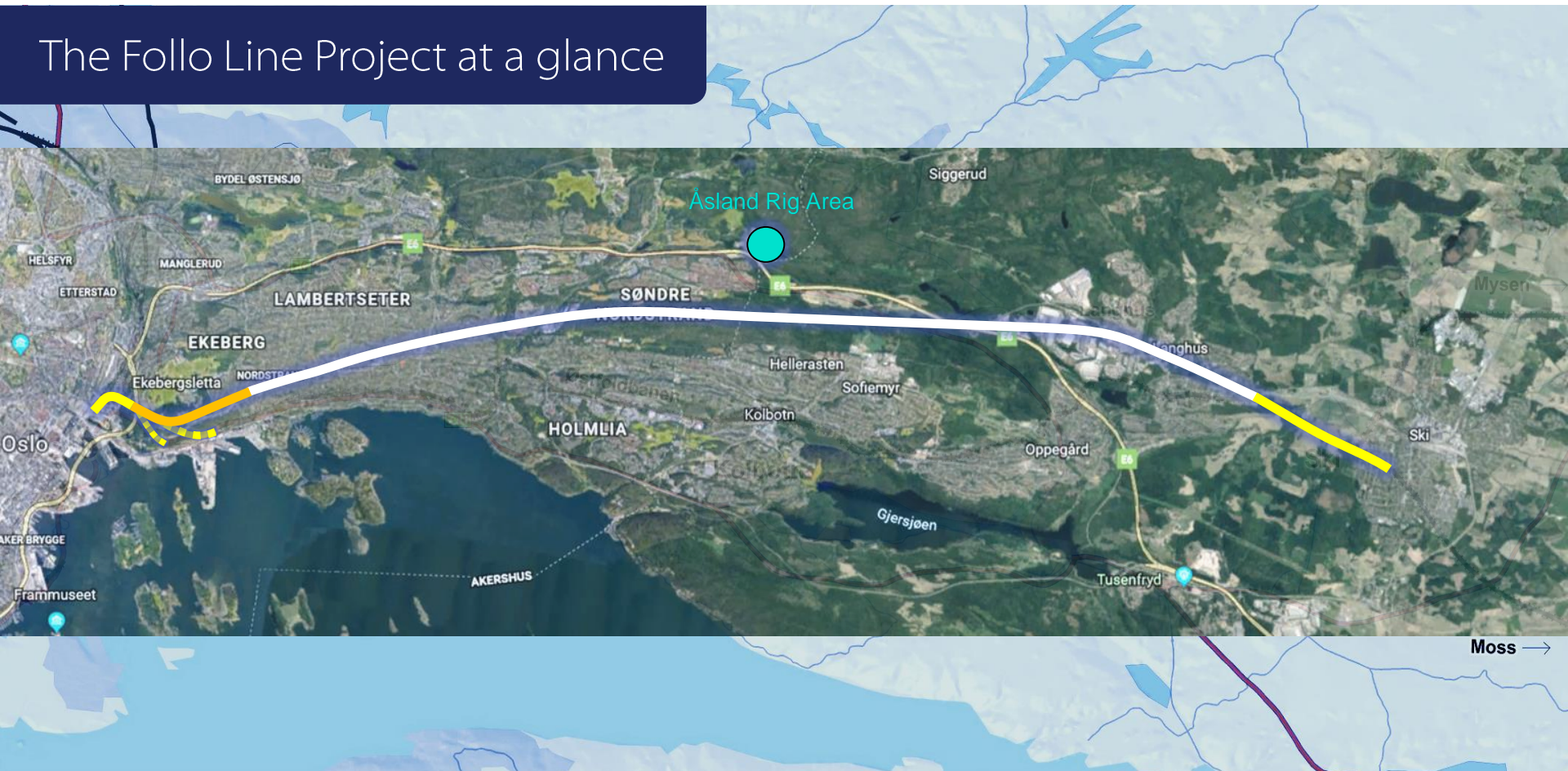
Norway



**ITA TUNNELLING
AWARDS 2019**



The Follo Line Project at a glance

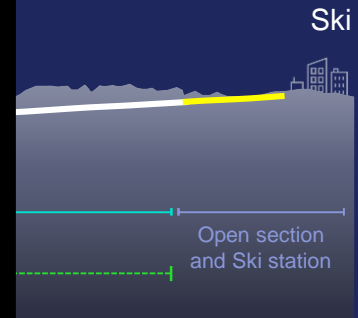
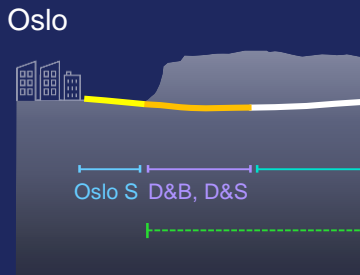
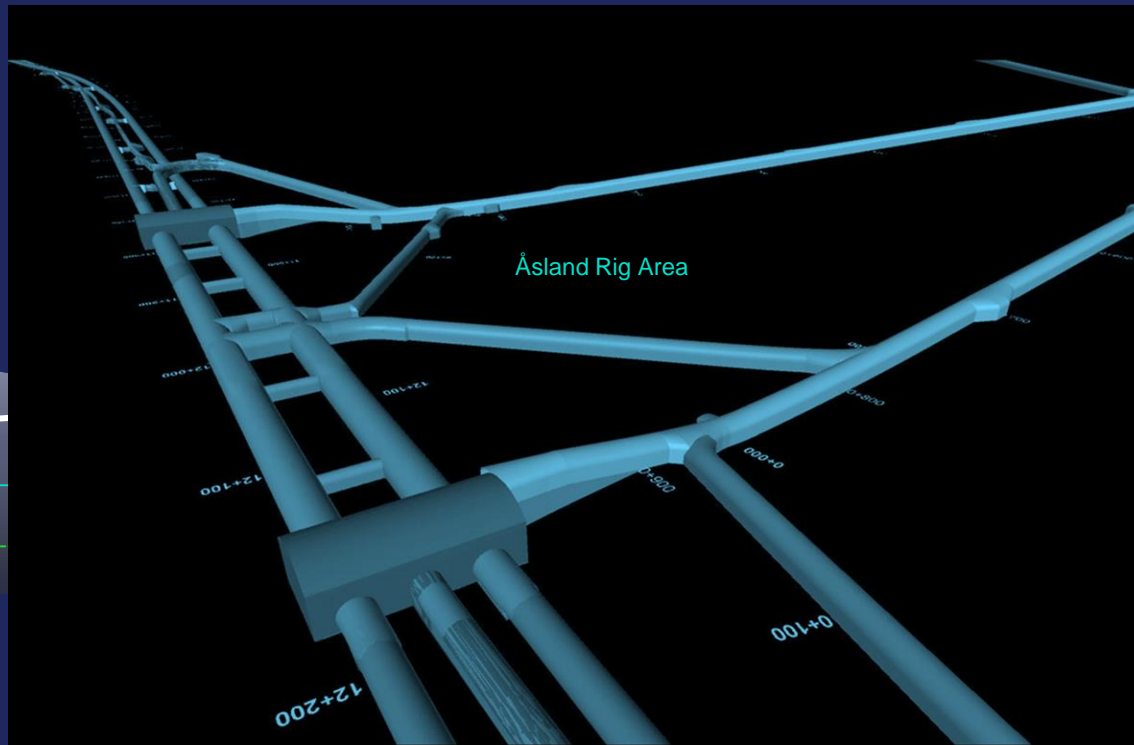




**ITA TUNNELLING
AWARDS 2019**



The Follo Line Project at a glance



- Open section
- Tunnel D&B, D&S
- Tunnel TBM



ITATUNNELLING
AWARDS 2019



Management of construction and cost saving solutions





ITA TUNNELLING
AWARDS 2019



Management of construction and cost saving solutions

- Optimized rig area
- Extremely hard rock conditions
- Increased main bearing
- Complex logistic assembly
- Improved pregrouting





ITA TUNNELLING
AWARDS 2019



Implementation of sustainable solutions





ITA TUNNELLING
AWARDS 2019



Implementation of sustainable solutions

- CO₂ reductions
- Reuse of material
- Water treatment
- Noise reduction





ITA TUNNELLING
AWARDS 2019



Design and construction innovations



Wearing Estimation [RK1 RK8 RK7 RK6 RK5 RK4 RK3 RK2]

Queen Ellisiv

LAST REPORT
Date 18/11/2016 11:04 AM
Ring 194
Shift Maintenance V

ESTIMATION
Ring



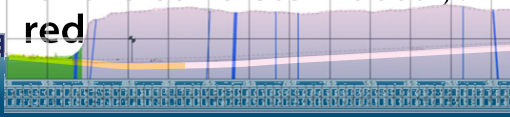
**ITA TUNNELLING
AWARDS 2019**



Design and construction innovations

- Cutter Management System, in-house developed software
- Geological mapping, verification of potential water leakages
- Important achievement for the concrete industry:

red



Oslo S D&B,
D&S





**ITA TUNNELLING
AWARDS 2019**



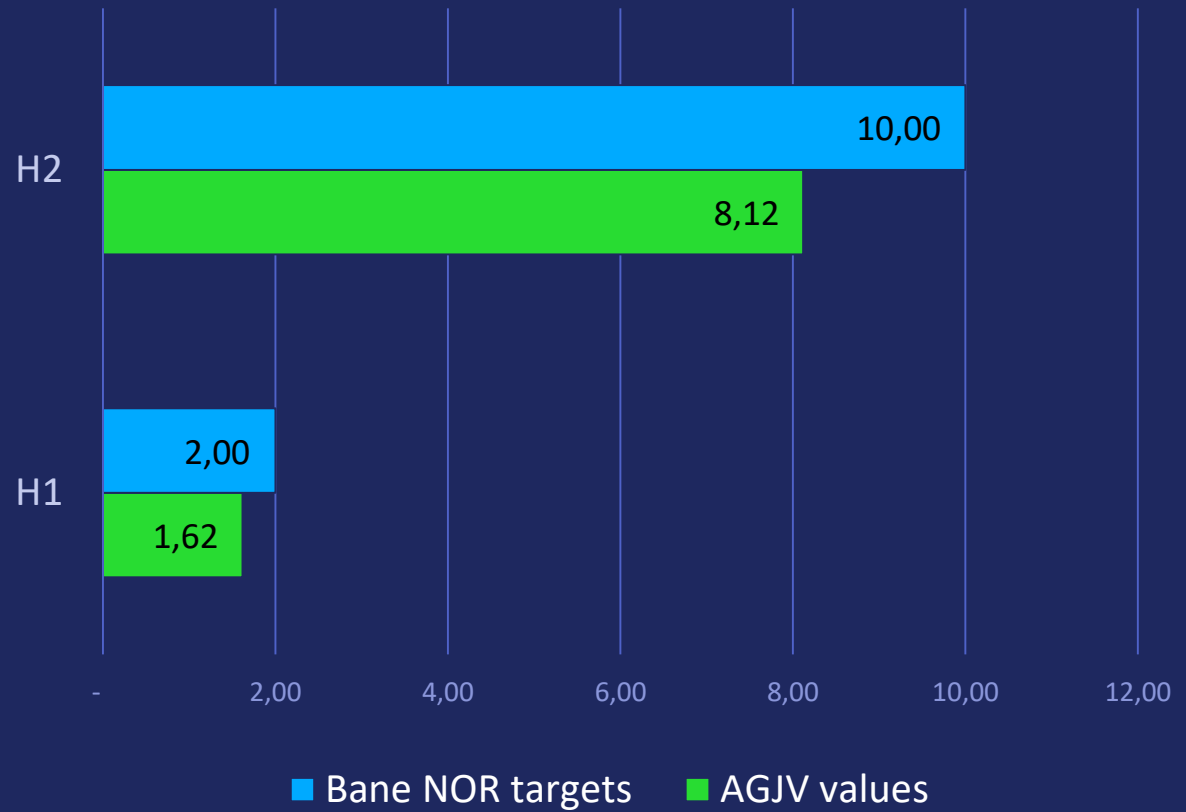
Safety performance





Safety performance

- Regular crisis training with emergency services
- Specific safety programs
 - BBS4U - Behaviour Based Safety for You
 - Project Leader
 - Safety Time Out
- Scientific program: Measure of air quality during excavation
- H1 and H2 values below targets for The Follo Line TBM Project





ITA TUNNELLING
AWARDS 2019



Community management – neighbors





ITA TUNNELLING
AWARDS 2019



Community management – neighbors





Community management – neighbors

- Alternative accommodation
- Neighbor satisfaction
- Electronic map with TBM progress
- Visitor center





ITA TUNNELLING
AWARDS 2019



Close cooperation and client satisfaction, resolving challenges





ITA TUNNELLING
AWARDS 2019



Close cooperation and client satisfaction, resolving challenges

- Innovative cooperation
- Ahead of schedule
- Minimum footprint
- Commercial issues resolved
- Multicultural co-working
- Stakeholders

Aas-Jakobsen
Acciona Ingenieria
AF
Amberg Engineering
AsplanViak
COWI
Hæhre
Herrenknecht
Lombardi
MTC
Multiconsult
Municipalities of Oslo,
Oppegård and Ski
Norwegian Ministry of
Transport and Communication
Norwegian Railway Directorate
PEAB

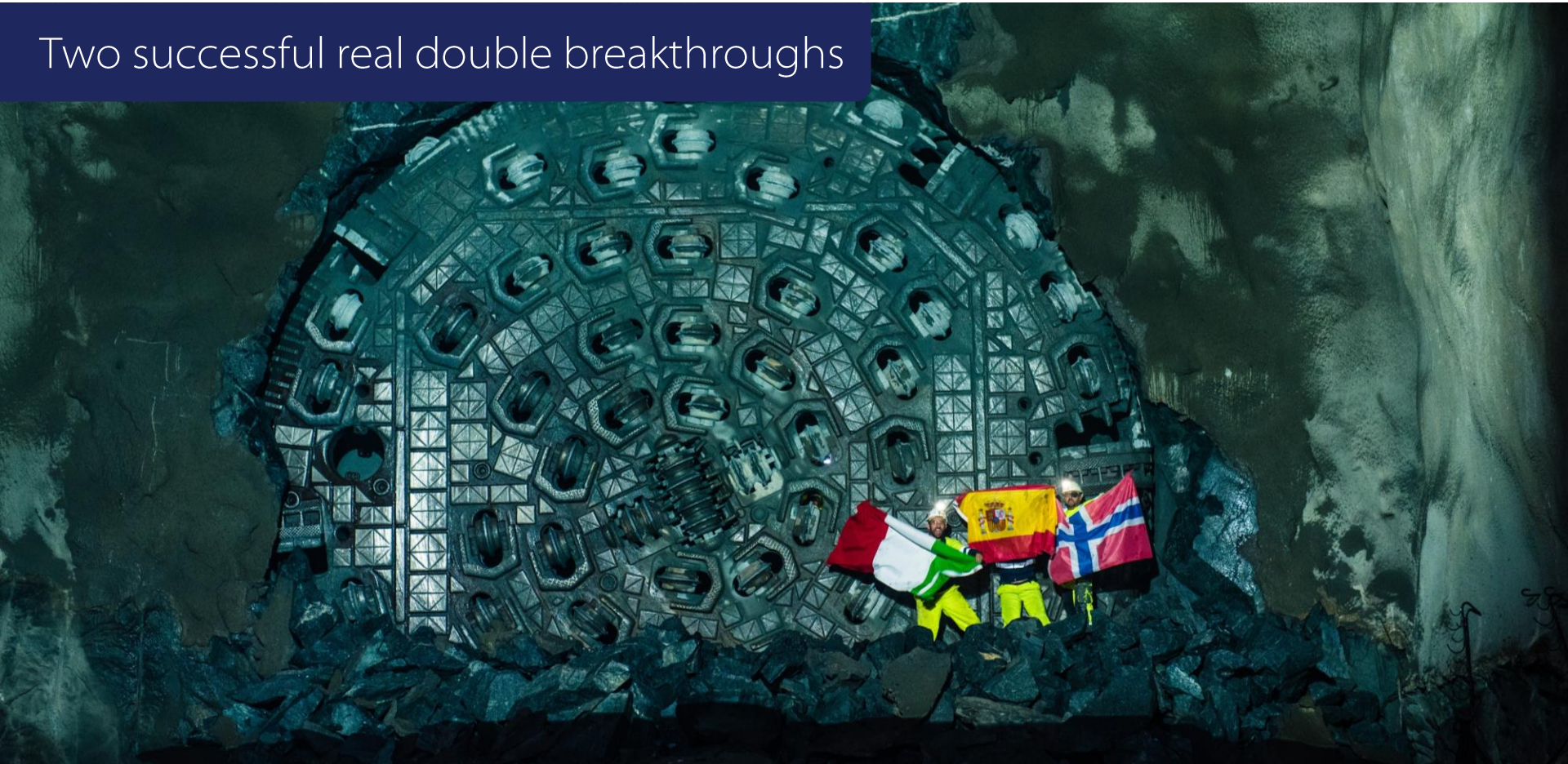




ITA TUNNELLING
AWARDS 2019



Two successful real double breakthroughs



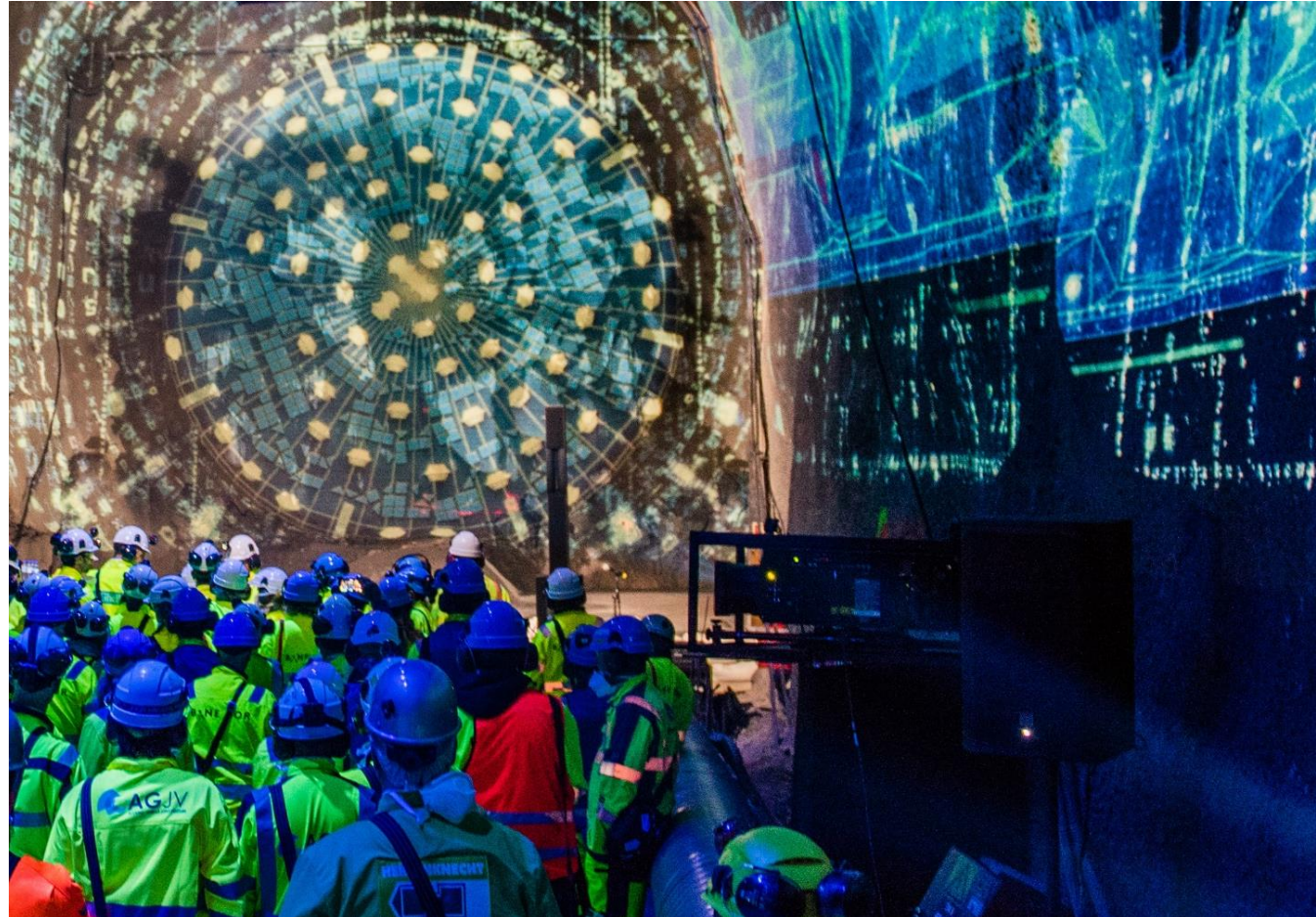


ITA TUNNELLING
AWARDS 2019



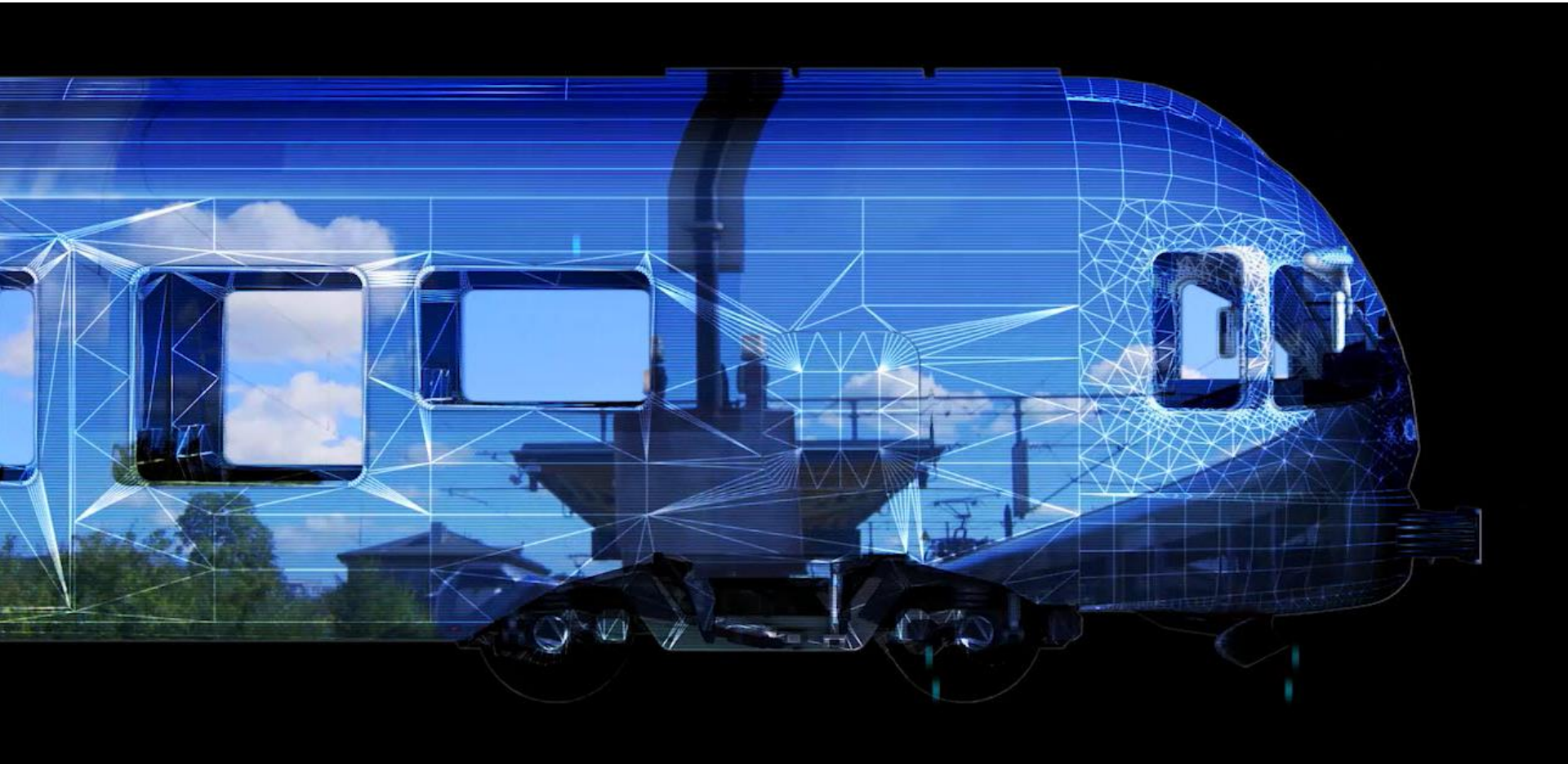
Two successful real double breakthroughs

- Each TBM has excavated 9 km of tunnel
- Ahead of schedule:
 - 11. September 2018
 - 26. February 2019





ITA TUNNELLING
AWARDS 2019





ITA TUNNELLING
AWARDS 2019



We create
the railway of
the future



ITA TUNNELLING
AWARDS 2019



Thank you for your attention!

The Follo Line Project – Tunnel TBM

Norway

BANE NOR



Photo: Nicolas Tourenc /Bane NOR/ AGJV