



A norwegian geologist way of working within tunnelprojects.

DIFFERENT PHASES. DIFFERENT ROLES.

Western coast of Norway, «Vestlandet»



Fjelberg



Halsnøy

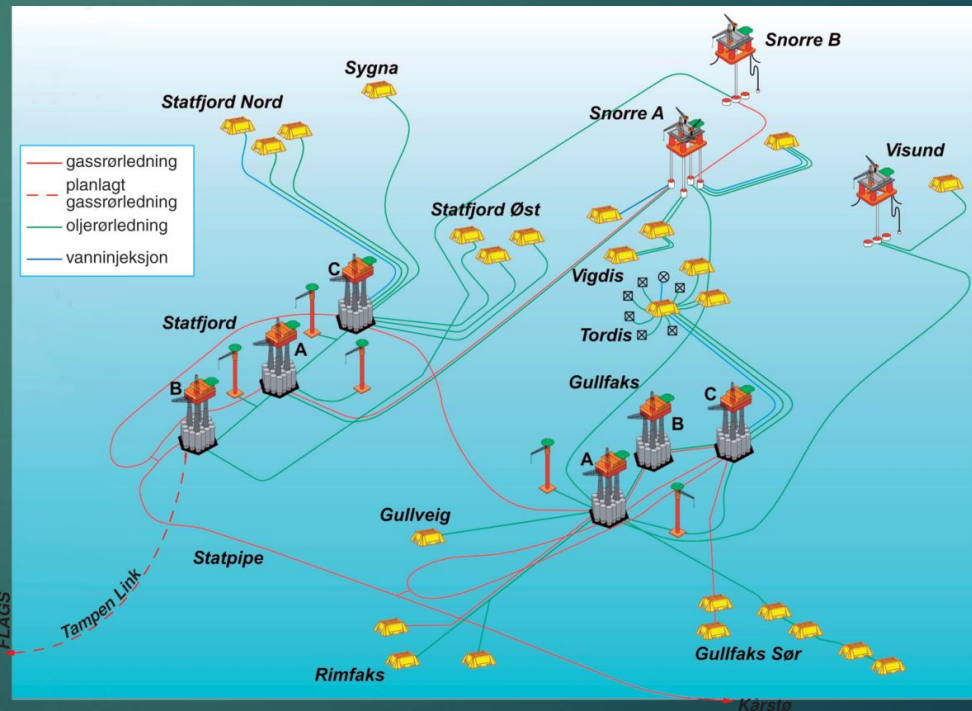


Msc. Geology from University of Bergen



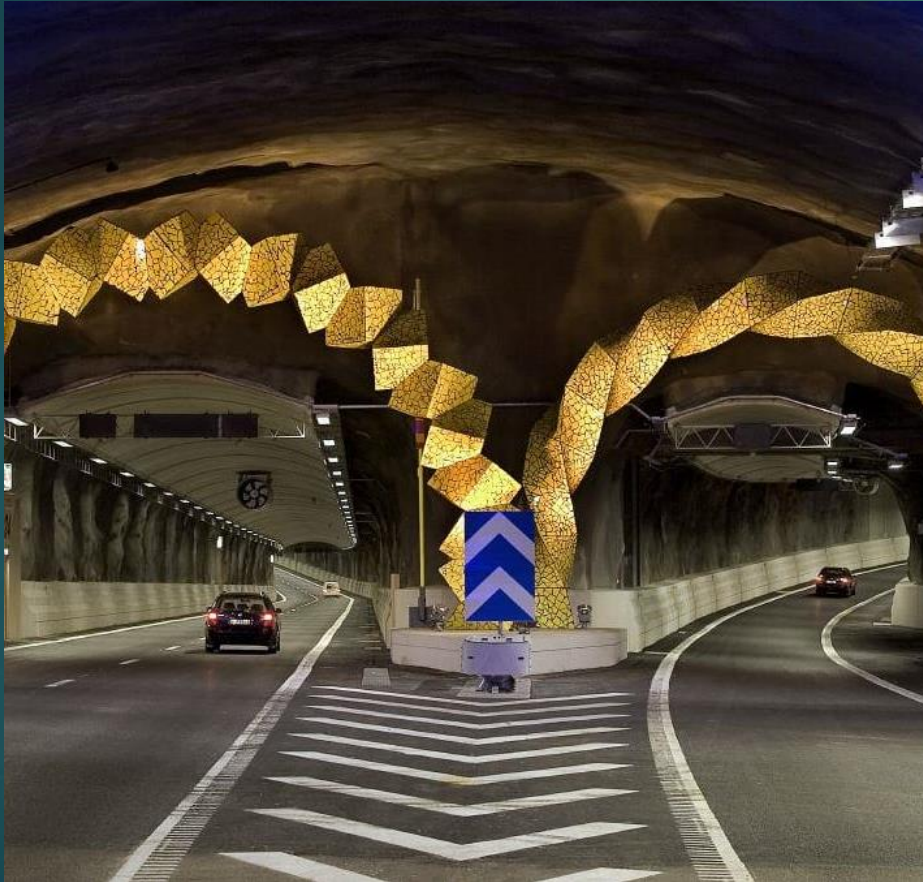
Offshore, North Sea

Drilling for oil and gas. Clients: Equinor and Norsk Hydro.





Södra Länken (Stockholm, Sweden)



► Södra länken (*The southern link*):

- Road connecting different parts in Stockholm. The link was built primarily to decrease traffic in the centre of Stockholm.
- 6 km of which 4.5 km is in tunnels.
- The tunnel is 4 lanes wide each way at its widest point (total 8 lanes).
- The construction began in 1997, inaugurated on October 24, 2004.
- The total cost was 7.9 billion SEK .

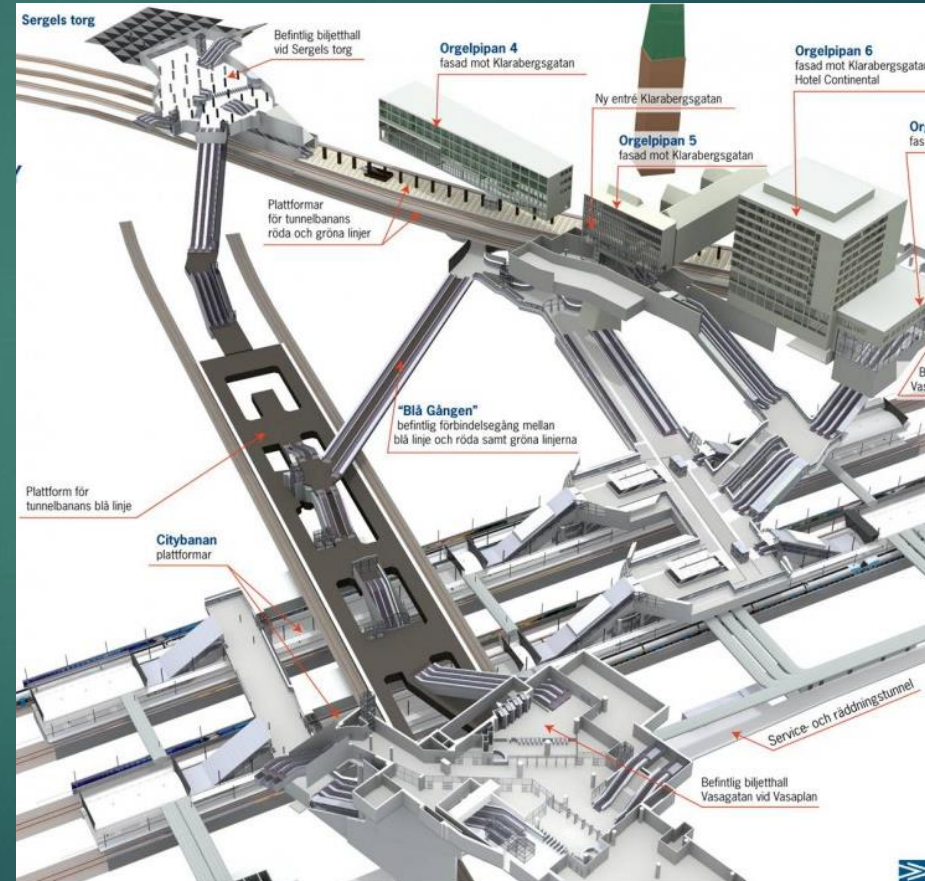
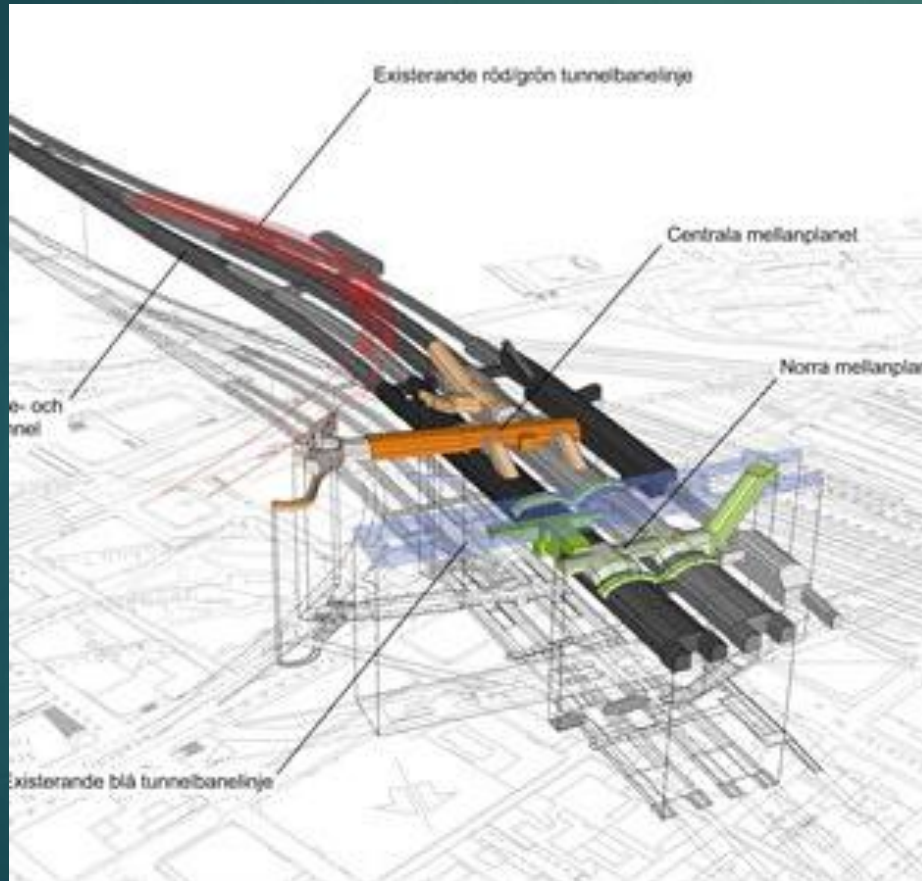
Client: Trafikverket.

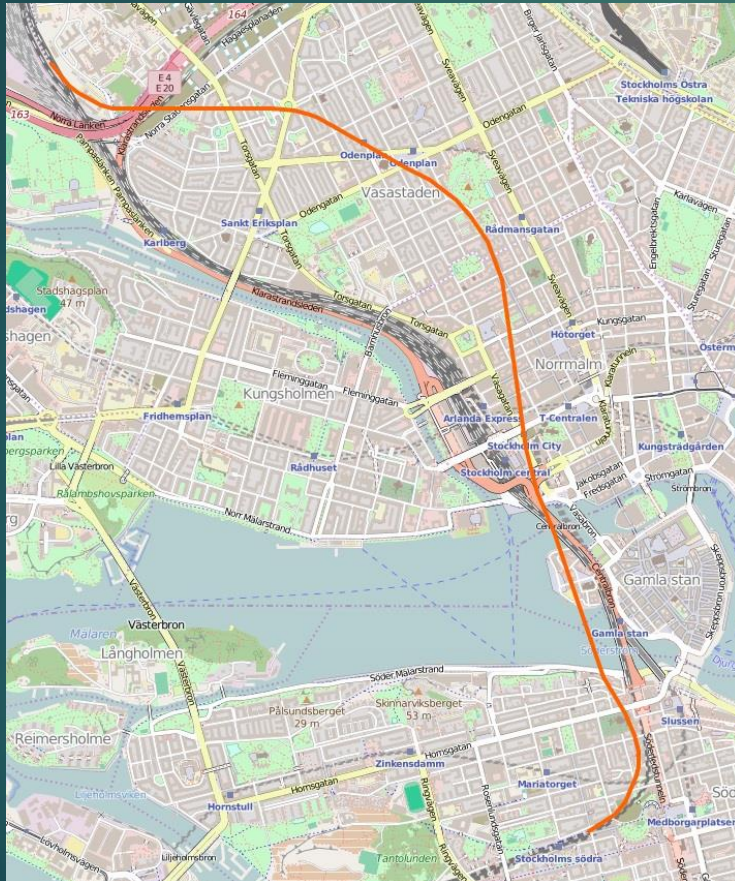
Role: Engineering geologist and hydrogeologist.

Phase: Build and following up for the warranty period.



Citybanan (Stockholm, Sweden)





Citybanan (Cityrailway):

- ▶ 6 km railway, mostly underground and also subsea, two underground stations and one bridge. Escapetunnel goes parallel with railwaytunnel.
- ▶ Cost: 17 billion SEK.
- ▶ Start: 2009. Opening: 2017.

Role:

- ▶ Ass. Design manager for GEO-disciplines. Engineering geologist and hydrogeologist. Also project manager for another tunnelsystem crossing CB.
- ▶ Phase: Design- and Build.
- ▶ Client: Banverket/Trafikverket.



Norvik hamn (Stockholm)



Facts:

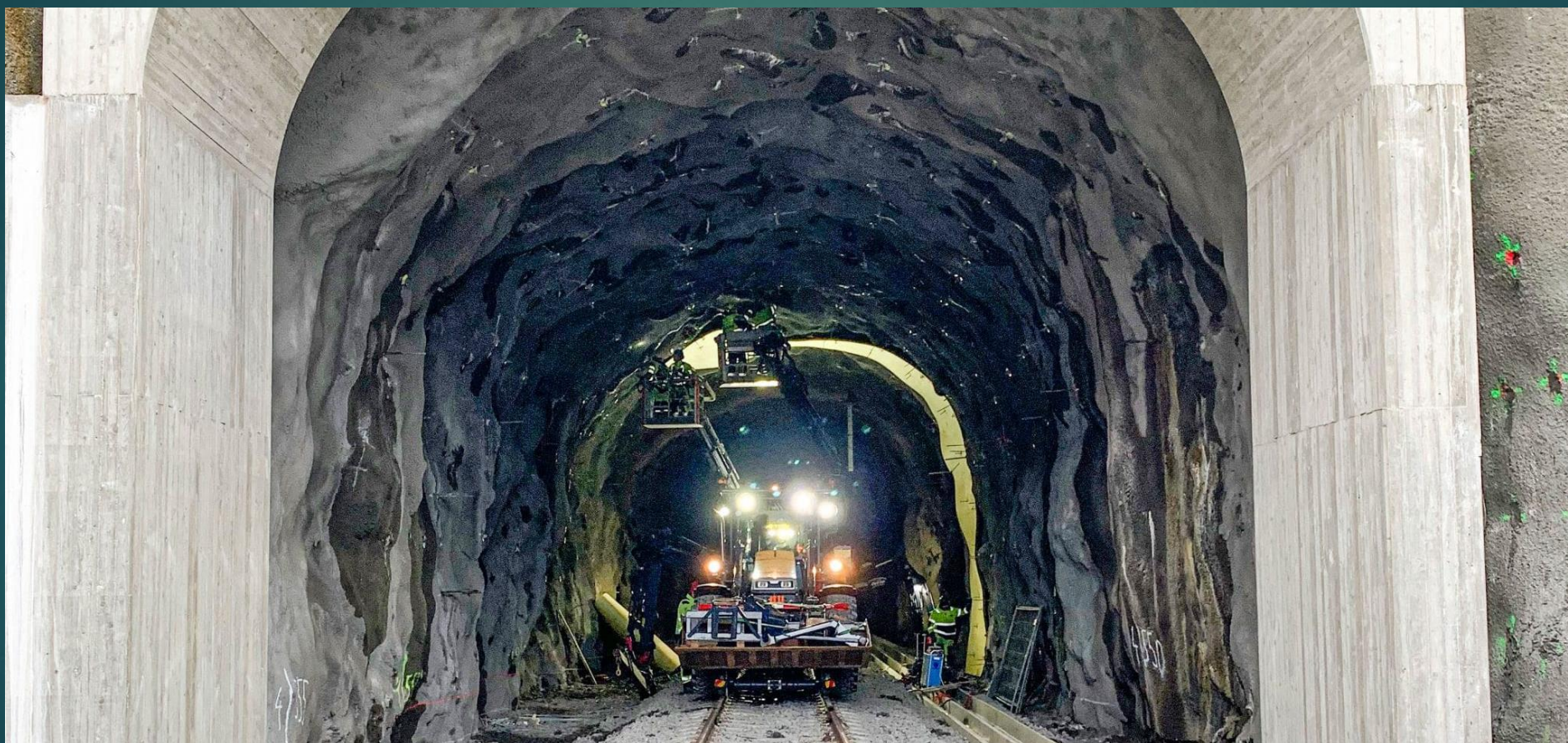
- 1 325 meter harbour with depth 16,5 meter.
- 600 000 m² .
- Tunnel and railway.
- 5 minutes to/from Stockholm.
- Start: 2016. Opening: 2020.
- Cost: 3,8 billions SEK.

Role: Discipline Leader for engineering geology and hydrogeology.

Phase: Design and build.

Client: Stockholm Hamnar.





Bybanen (Bergen)

Light railway with 3 lines and 5 construction stages.

Stage 1-3 were built between 2008 and 2017. Stage 4 open in november 2022. Next stage will open in 2035.

Total cost: 22 billions NOK. Client: Bybanen Utbygging.

Roles: Coordinator and senior geologist for stage 4. 3. parts controller for stage 5.



Construction stage 4: New underground station, Haukeland.



Construction stage4: 3 km tunnel for train with tunnel running parallel for bicycling and walking.



Construction stage 5: Bergen-Åsane.





3.Part control

In complex projects, set to geotechnical class 2 and 3, there is mandatory with independent control of design for different disciplines. It is the client paying for this 3.part control.

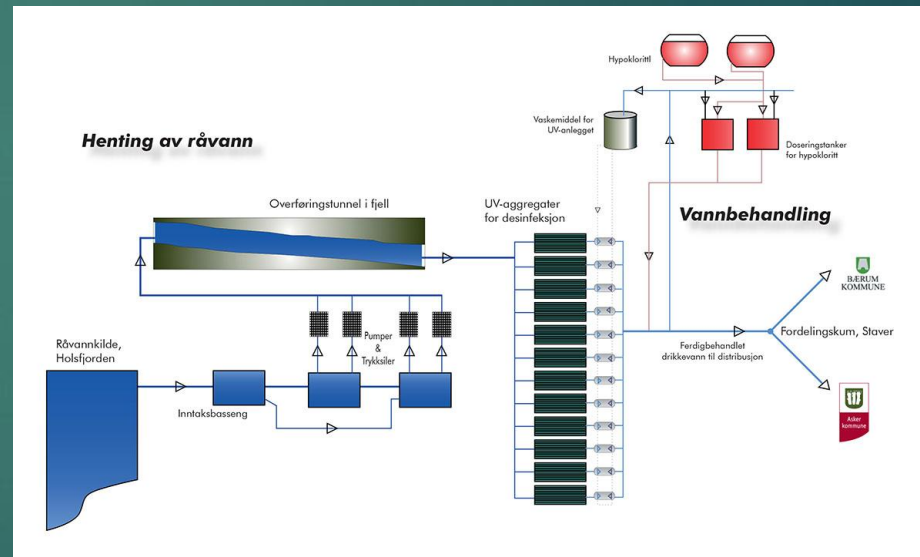
For geology the 3. part control include evaluation of:

- ▶ Geotechnical class.
- ▶ Eurocode 7.
- ▶ Handbooks and regulations.
- ▶ Need of more groundinvestigations for design phase.
- ▶ Need of investigations/measurements in building phase.

New watertreatment plant, Asker and Bærum (Eastern Norway)



- ▶ Watersupply from the fjord. Need to take care of different hygienic barriers due to recommendations from Norwegian Governments.
- ▶ Building new borehole for water, access tunnels, main tunnels connecting with bassins including halls for chemicals and UV teatments.
- ▶ Start: 2022. Finish 2026.
- ▶ Design and Build phase.
- ▶ Role: 3.part control.





Short summary of consultancy phases in norwegian projects...

Early stage, concept study, find line for new roads and railways.

Zoning plan.

Design.

Build.

Warranty.

Operation.

Maintenance.

Rehabilitation.



Short summary of different roles for consultancy geologists in norwegian projects...

Junior/senior geologist.

Discipline leader.

Coordinator for dayzone or tunnel.

Project-/design manager.

3.Part control.

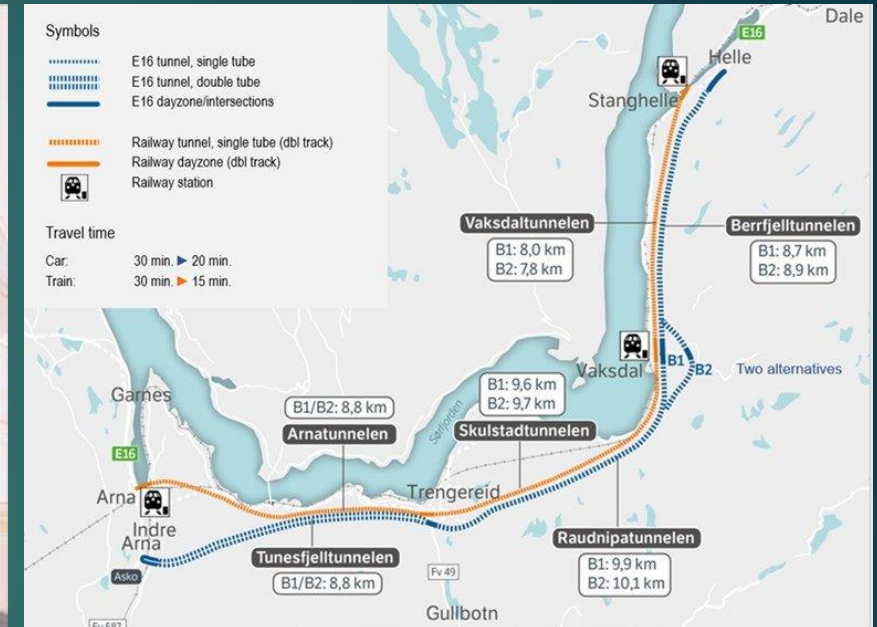
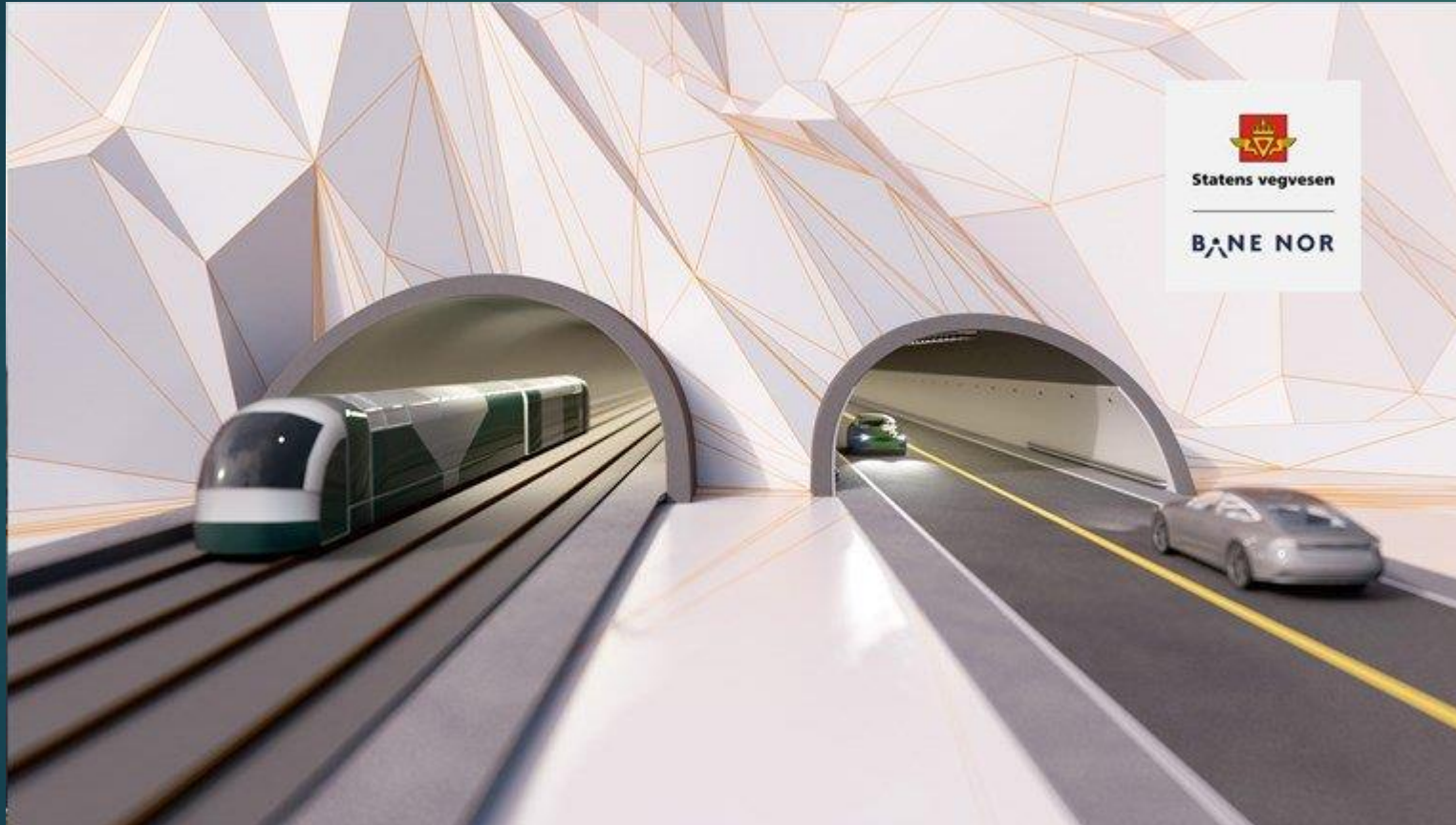
My next project coming up...



Combining road and railway safety-the biggest tunnel project in Norway ever!

E16 Vossebanen Arna – Stanghelle

Best Value Procurement (BVP). Detailed Design and processes with a variety of applications and prepare for bid for buy up contractor.



The Project has construction start in 2024 with a construction time of ten years. The project will have a reduction of greenhouse gas emissions from the construction phase in line with The Paris Agreement.

Project contains construction of total 63-kilometer tunnels. Total cost is set to 26,4 billion NOK.



Trip to Chile with NTN is headline in local norwegian newspaper...

It is very nice to be here 😊!

Thank you.

