

The background is a deep blue gradient with a subtle pattern of white dots. On the left side, there are several concentric circles and a large circular scale with numerical markings from 140 to 260. Some circles have arrows indicating a clockwise direction. The overall aesthetic is technical and futuristic.

FREMTIDENS TUNNELBRANSJE

FRODE NILSEN (LNS) OG ELISE MÜHLBRADT (BANE NOR)

HVEM ER VI?



BANE NOR



Nyskapende

01

Dyrere tunneler
Utvikling og innovasjon

02

Billigere tunneler
Utvikling og innovasjon

Overdimensjonert

Godt nok?

Underdimensjonert

03

Dyrere tunneler
Liten utvikling

04

Billigere tunneler
Liten utvikling

Konservativ

Hva skjer nå i det norske anleggsmarkedet?

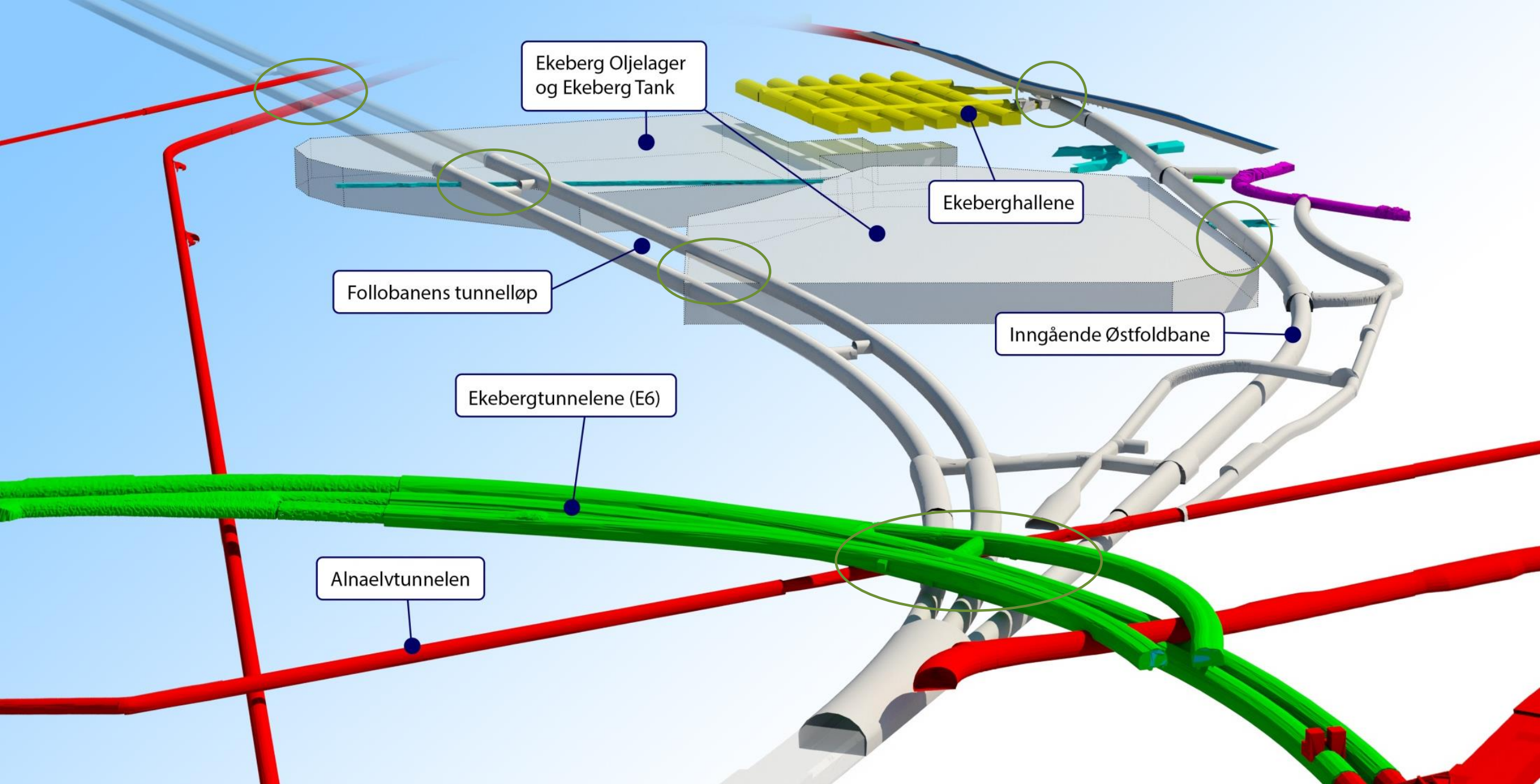


- I dagens marked øker kontraktenees størrelse betydelig
- Konkurransen minker med kontraktens størrelse
- Risiko øker eksponentiell med kontraktens størrelse
- Byggekostnadene øker
- Konfliktnivået øker

Det blir mindre vei/bane for pengene!

HVORDAN SKAPE UTVIKLING?





Eksisterende tunneler og sensitive anlegg ved nordre del av Follobanens tunneler



Drill and split methodology

HVORDAN SKAPE UTVIKLING?



HVORDAN REDUSERE KOSTNADENE?

- Lage prosjektstørrelser som er tilpasset det norske markedet
- Lage kontrakter slik at konflikter løses på lavest mulig nivå og under prosjektets gang
- Få ingeniøren i fremste linje, ikke juristen
- Motivere til innovasjon
- Øke kunnskapsnivået hos alle aktørene i bransjen, også blant politikere
- Øke forståelsen i bransjen for den «norske metoden»
- Øke kunnskapene om berget som byggematerialer

HVOR LIGGER ANSVARET?

- Politikerne
- Byggherrer
- Rådgivere
- Entreprenørene

HVA KAN UNDERGRUNNEN BRUKES TIL?





HVA KAN UNDERGRUNNEN BRUKES TIL?

- Folk ønsker å oppholde seg over bakken
- Det vi trenger FOR å leve kan flyttes til undergrunnen

BANE NOR



Finding space for the future

To use our space more efficiently, the Government is looking to launch its Underground Master Plan in 2019. Here are some subterranean ideas that are being explored.

Substations

Electrical substations, which are essential for providing electricity to estates, currently occupy small tracts of land at the ground level, even though they are connected to the underground cabling network. To save space, these can be housed underground, and can still be serviced through access points with a smaller footprint.

Bus interchange

The new Bidadari housing estate will be home to Singapore's first underground air-conditioned bus interchange below Housing Board flats. Slated for completion by 2019, it will sit below a carpark and a garden, and will likely cater to five bus services.

Road and rail networks

To enhance our living environments, future major road and rail networks, especially those that will cut through built-up areas, will be located underground. This reduces the impact of noise and dust on homes.

Deep Tunnel Sewerage System

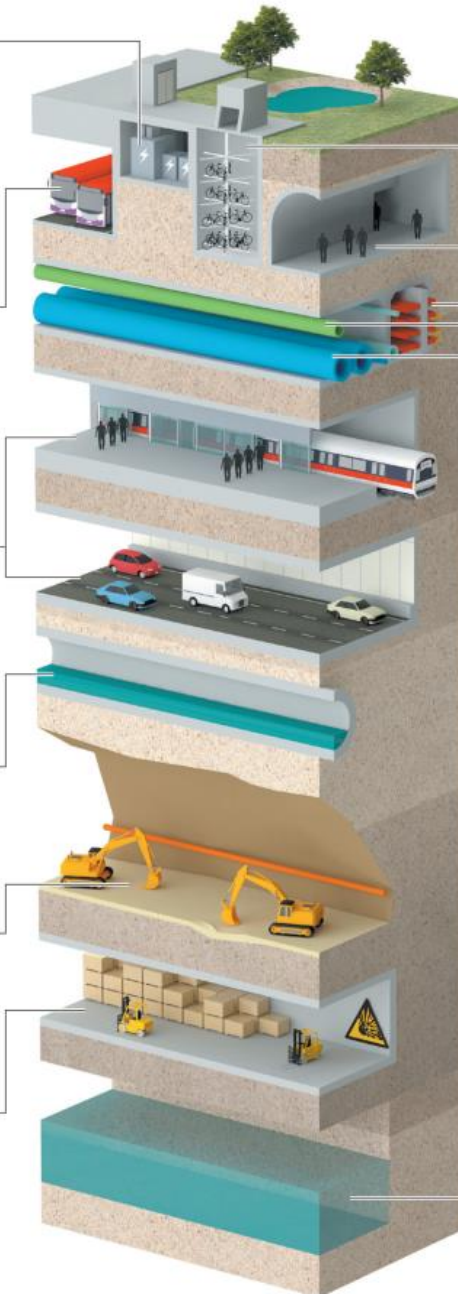
This is a network of tunnels that operates on gravity, and transports sewage and waste water across the island to two centralised water reclamation plants.

Jurong Rock Caverns

The Jurong Rock Caverns under Jurong Island is for petrochemical storage. In phase one, its five caverns are as high as nine storeys, saving approximately 60ha of land.

Ammunition facility

The underground ammunition facility built under a quarry in Mandai in 2008 stores ammunition and explosives. It frees up land about half the size of Pasir Ris town.



SecureMyBike

In Admiralty, the Land Transport Authority completed the first automated underground bicycle parking space, known as SecureMyBike. Users can leave their bikes at kiosks located above ground, which then houses them in storage cells extending up to 10m underground.

Pedestrian links

Underground pedestrian links make it easier to connect between buildings or cross busy streets. For a more extensive underground pedestrian network, the Urban Redevelopment Authority offers an incentive scheme to co-fund the construction of selected linkages in Orchard Road and the Central Business District.

Common Services Tunnel

More than just space-saving measures, underground pipes are less prone to external wear and tear. The Common Services Tunnel in Marina Bay is a creative way of housing all utilities together. This frees up land, with lesser maintenance disruptions on the roads.

Waste disposal

In housing estates, trash can be carried away to a centralised bin centre through a suction force via underground pipes, using pneumatic waste conveyance systems. Such a waste disposal network can be seen in an HDB estate in Yuhua, removing the need for refuse workers to manually collect waste from each block.

Air-conditioning pipes

Chilled water used for air-conditioning could be supplied centrally through an underground network of pipes, known as a district cooling system. This is already done in Marina Bay, and the authorities are looking to implement them in the Punggol Digital District.

Reservoirs

Water can be stored in underground reservoirs, with the national water agency PUB currently looking into an idea that can free up significant parcels of land for development. The 17 reservoirs currently occupy 3,700ha, or around 5 per cent of Singapore's total land.

NOTE: Illustration not drawn to scale

Source: URA STRAITS TIMES GRAPHICS