

Concept for Railway and Transportation in Southern Norway

High Speed Line

Oslo – Hadeland – Gjøvik – Moelv

with High Speed Line Oslo – Trondheim / Ålesund

DB International GmbH

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Gjøvik, 28.10.2011

General statement

High Speed Rail is a feasible option for Norway.

The implementation of a new high capacity railway lines which allow the operation of high speed passenger trains as well as heavy freight trains will lead to an essential improvement of quality and reliability for the entire transportation sector.

The expected revenues of the new lines will cover the entire cost of operation and maintenance and a reasonable part of the capital cost for infrastructure and trains.

Objectives of a new transportation system:

- **creation of rapid and cost-effective travel and transport solutions for people and industries**
- **support the national and regional development in Norway**
- **greatly improve the reliability of passenger and freight traffic**
- **significantly reduction of environmental pollution and traffic accidents**
- **use the public funds for high economic benefits**

Way to the target

These goals are achievable with a high-quality and high-capacity rail network and competitive offerings for passenger and freight.

Concept for Railway and Transportation in Southern Norway

Basic Concept

- Double track lines
- High speed passenger trains
- Passenger and freight trains
- Many intermediate stops
- Use of existing stations
- Lines in low altitude
- New lines instead of upgrade
- Large substitution of existing tracks



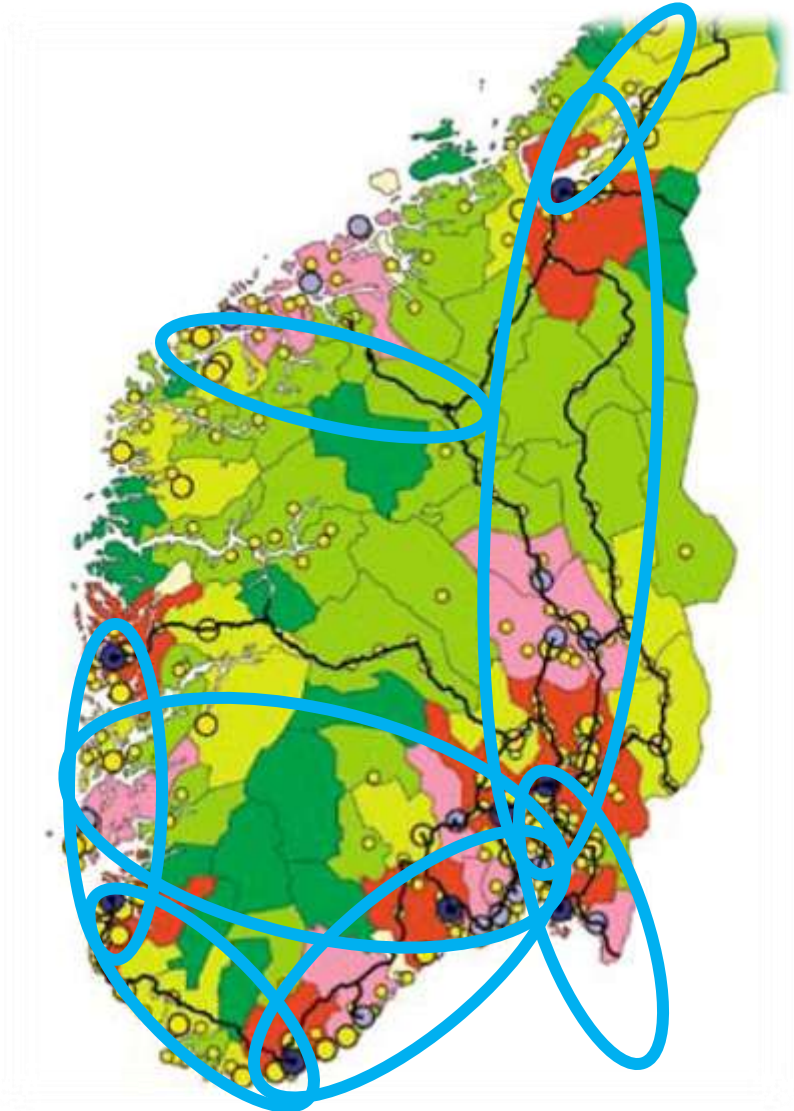
Concept for Railway and Transportation in Southern Norway

Main Corridors

- Oslo – Trondheim
- Oslo – Bergen / Haugesund / Stavanger south of Hardangervidda national park
- Bergen – Stavanger
- Oslo – Kristiansand – Stavanger via Tønsberg or Notodden
- Oslo – Halden (– Göteborg)

New Investigations

- Trondheim – Steinkjer
- Dombås – Ålesund
- Oslo – Gjøvik – Moelv
- ...



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Evaluation of the Oslo – Hadeland – Gjøvik – Moelv Corridor

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Routing

161 km new double track line

incl.

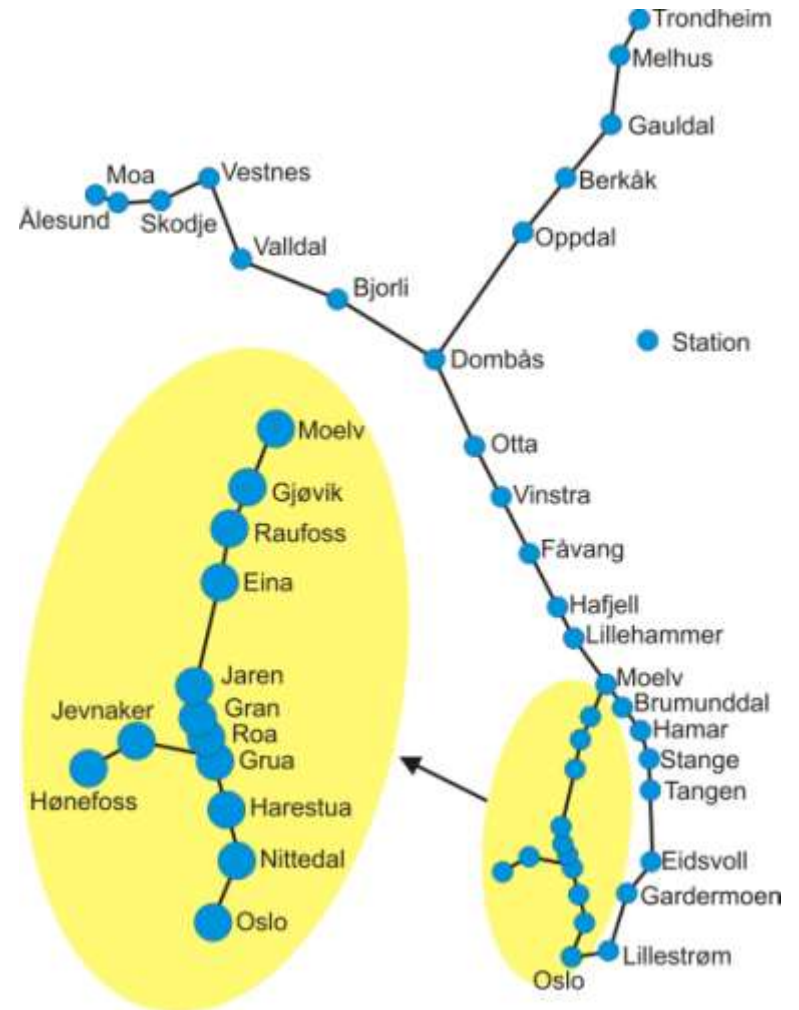
7.7 km separate tracks connecting Gjøvik,

4.4 km connection loop to Moelv

1.7 km branch line to Alnabru

18.3 km branch line to Jevnaker

10 Stations



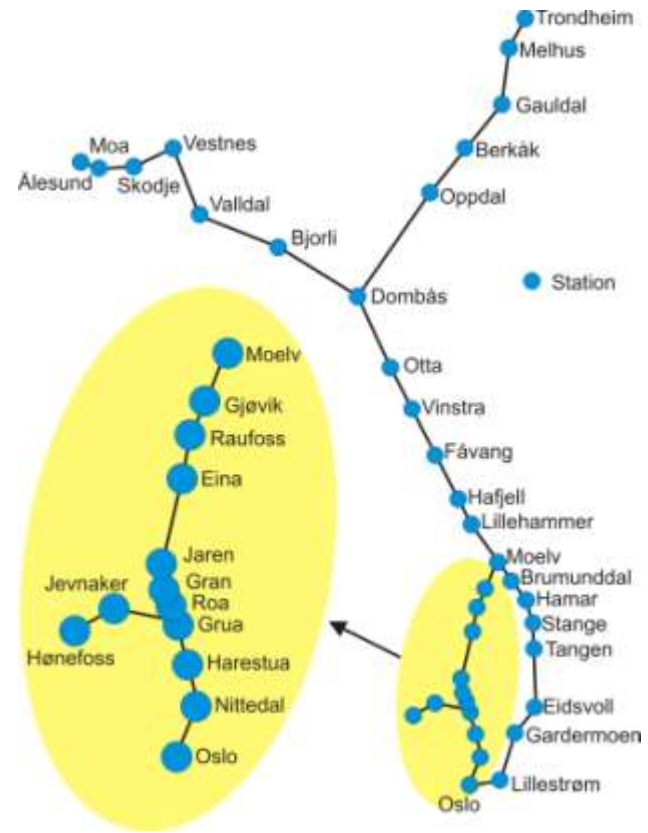
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Scenario 1



Scenario 2



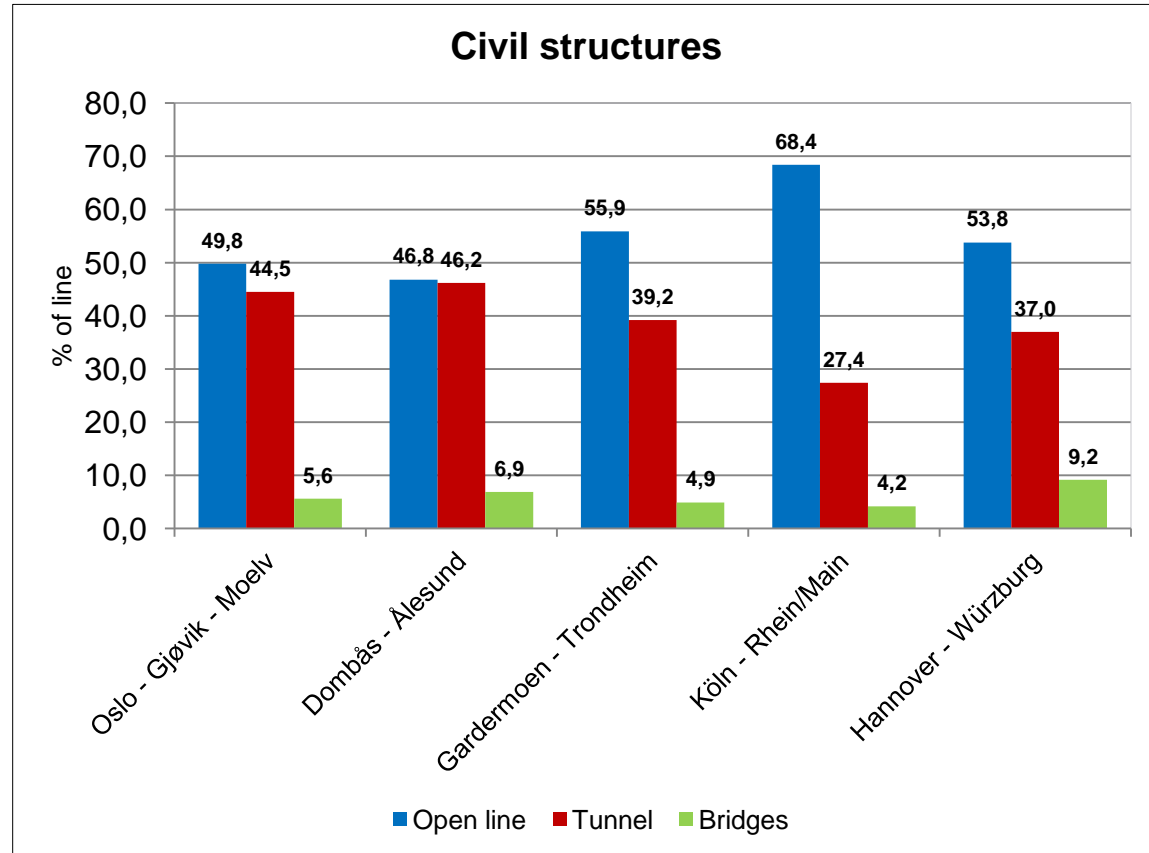
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Civil Structures

Total length: 161 km thereof

Embankments, cuts or surface level: 71 km
Tunnels: 77 km
Bridges: 8 km
(existing line 5 km)



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Costs

Total cost (Bil. NOK) for

	Scen.1	Scen.2
Infrastructure and planning	104.6	131.8
Surcharge for uncertainties	10 %	
Total	115.1	145.0
Rolling stock	12.8	17.0
Surcharge for uncertainties	10 %	
Total	14.1	18.7

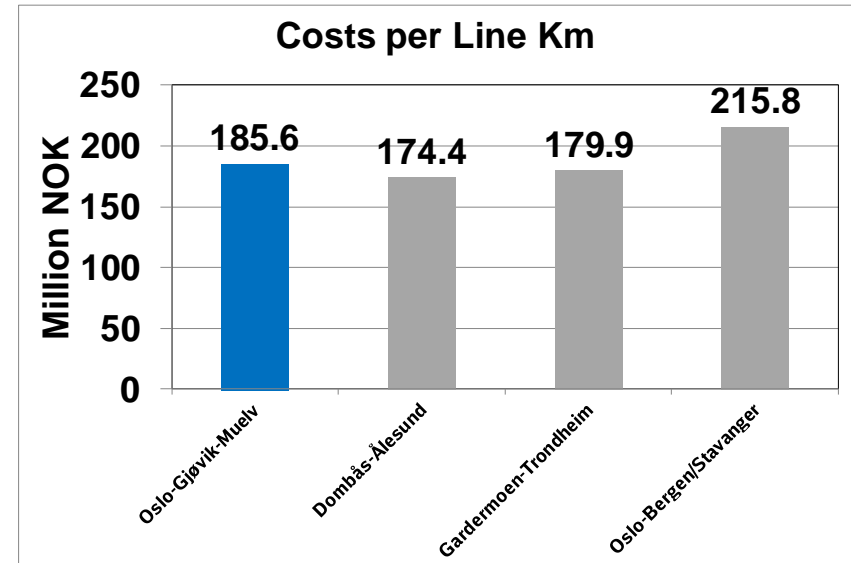
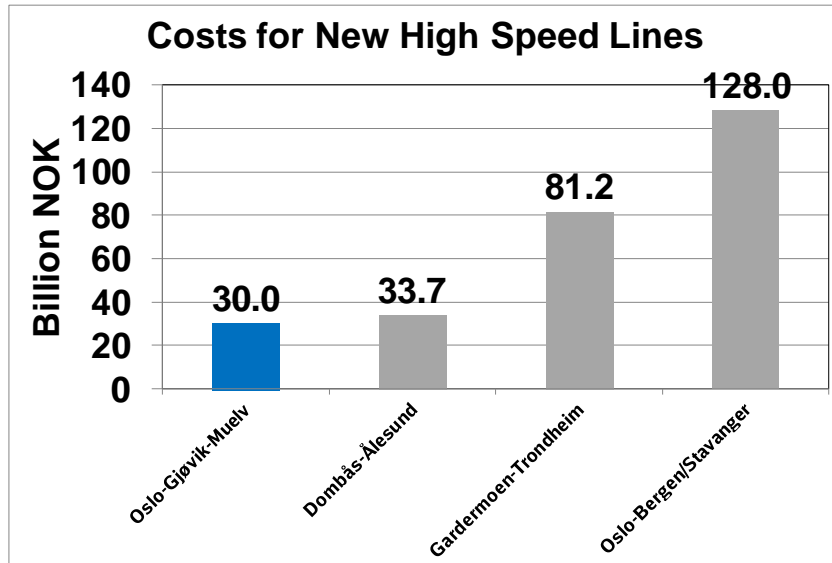


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Costs

The corresponding costs per Line-km have been calculated to 185.6 Million NOK.



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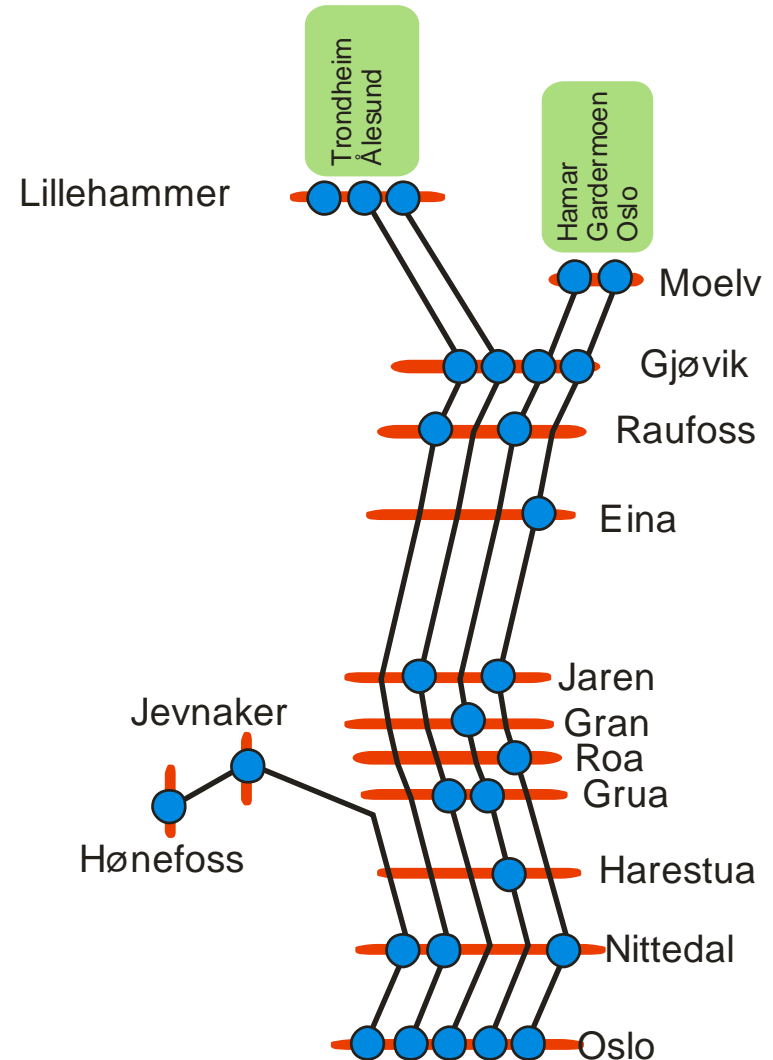
Operation Scenario 2

Stopping Pattern

Preliminary stopping patterns may change with further investigations.

Running Times and av. Fares from Oslo

	Minutes	NOK
Nittedal	9	29
Harestua	14	59
Grua	16	72
Roa	21	80
Gran	27	92
Jaren	24	98
Eina	39	139
Raufoss	33	154
Gjøvik	39	168
Lillehammer	55	232
Moelv	57	198
Jevnaker	27	94
Hønefoss	38	114



Operation Scenario 2

Trains per day and direction* from Gjøvik to

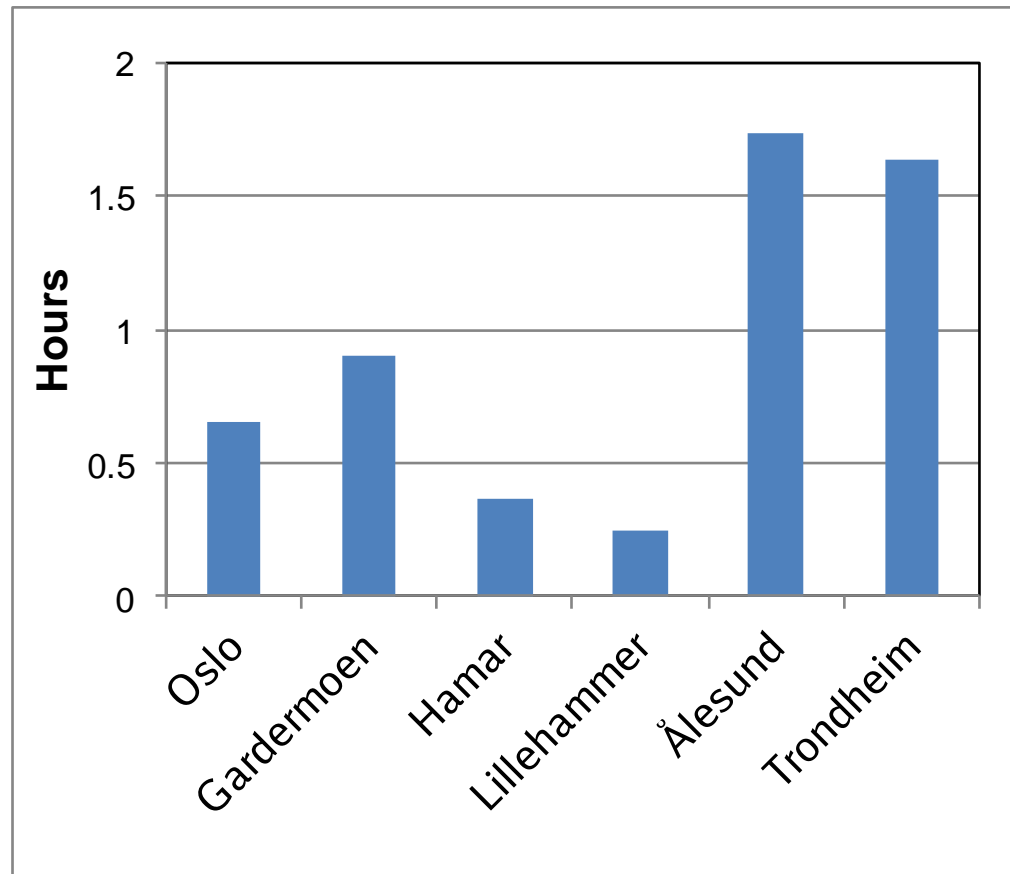
Oslo	50
Trondheim	21
Ålesund	8
Gardermoen via Moelv	21



* Preliminary stopping patterns may change with further investigations.

Operation - Train Running Times From Gjøvik

Oslo	00:39 h
Gardermoen	00:54 h
Hamar	00:22 h
Lillehammer	00:15 h
Ålesund	01:44 h
Trondheim	01:38 h
Today	
Oslo	02:00 h



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Operation and Maintenance Costs

Mil NOK per year

	Scenario 1	Scenario 2
Infrastructure	516	683
Passenger Transport	1014	1370
Freight Transport	821	781
Total	2351	2834
Number of Staff	1929	2318



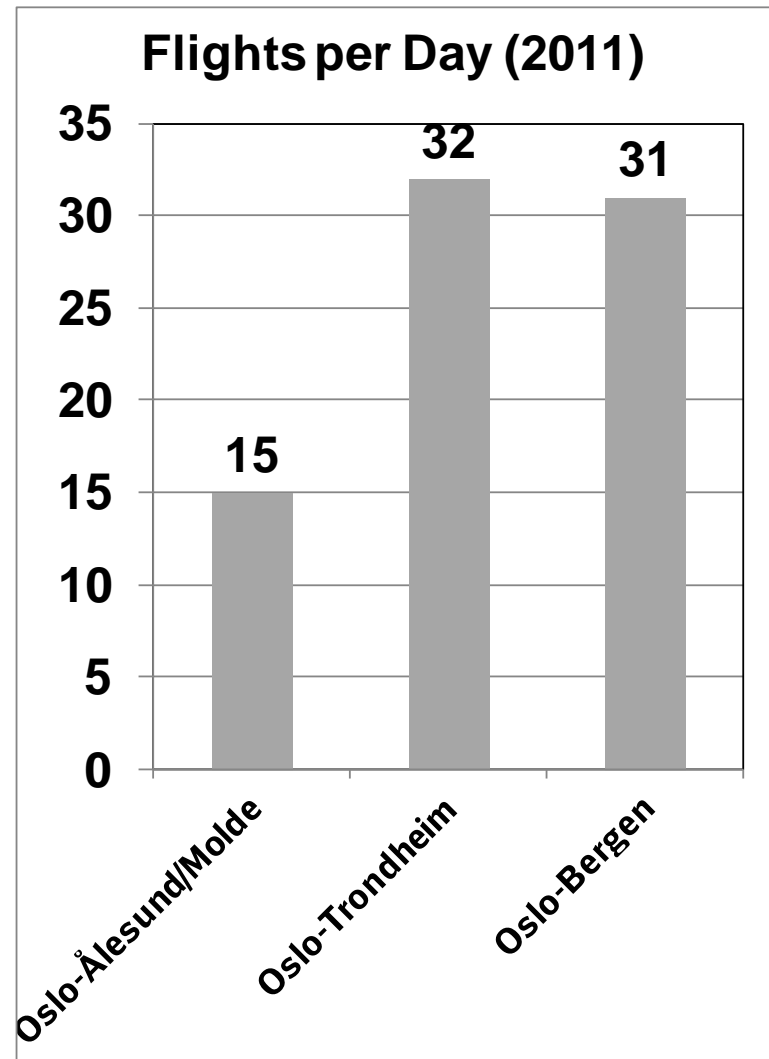
Passenger Forecast

Today's high passenger volumes in the air sector indicate

- high mobility of the Norwegian population and
- missing alternatives especially concerning rail transport

Compared with air transport rail and road show long travel times.

This gives an excellent chance for a new, fast, high frequent, and reliable railway system.



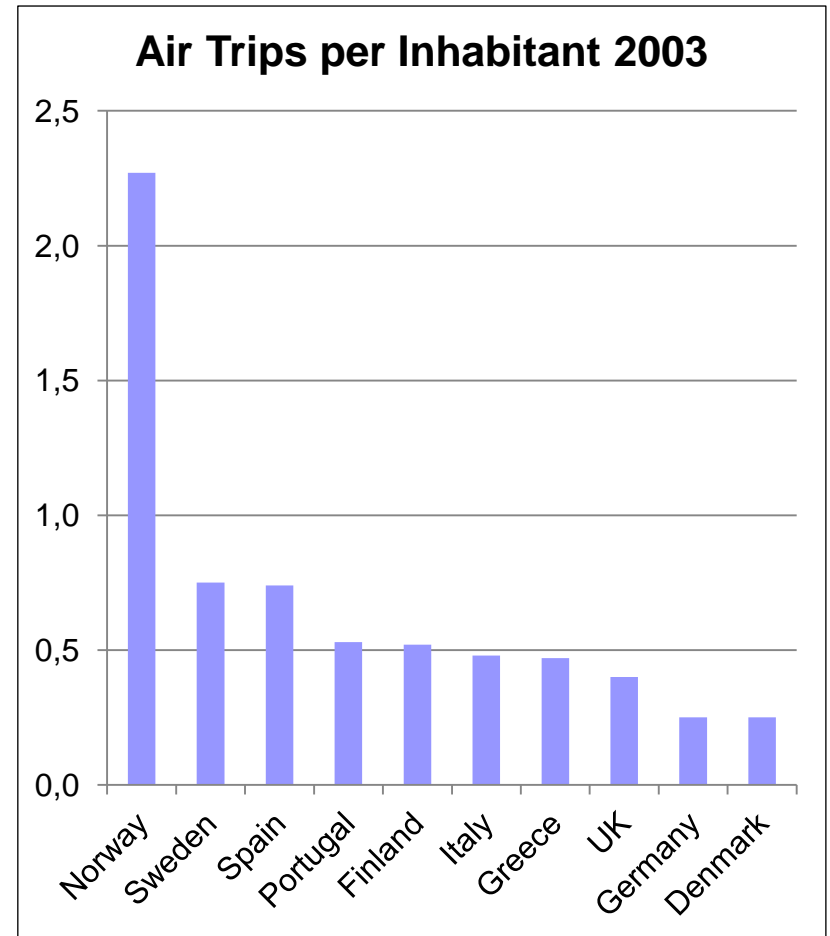
Passenger Forecast

Norway shows by far the most air trips per inhabitant.

This again indicates the unsatisfying conditions of the competing modes.

Attributes of today's transport:

- Long journey times caused by low average speed and high deviation factors
- Low service frequency
- Influence of winter conditions



Passenger Forecast

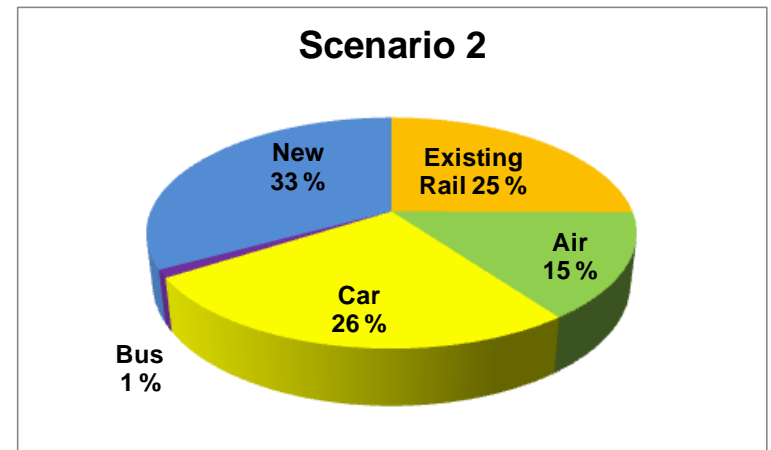
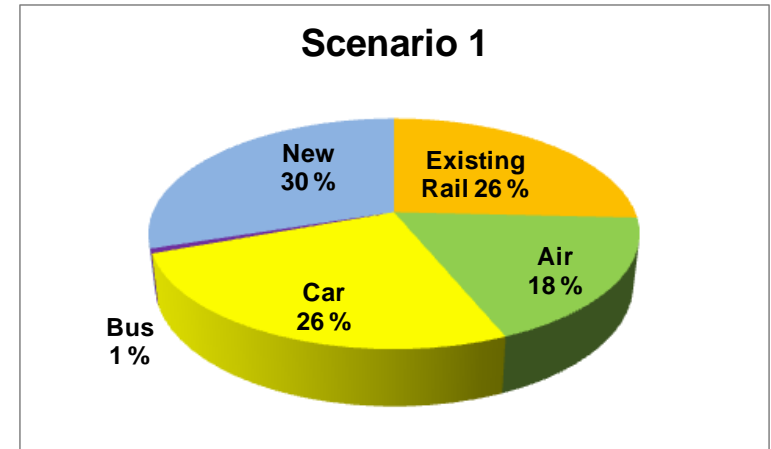
Million HSR passenger-km 2025

by mode of origin

	Scenario 1	Scenario 2
Existing Rail	1089	1267
Air	760	750
Car	1082	1316
Bus	28	55
New	1267	1663
Total	4226	5052

Growth factor 2008-2025: 1,50 % p.a.

Growth factor 2025-2055: 0.52 – 0.27 % p.a. (population growth)



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Freight Traffic

New double track lines have sufficient capacity for passenger and freight trains.

Further on they allow essentially shorter transport times and therefore a better competitiveness against road traffic.

Due to the moderate (12.5 o/oo) gradients, trains can run with almost the double load.



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Freight Traffic

Freight trains will be mostly operated during night time when passenger operation is shut down.

Freight trains during day time will be operated at 160 km/h.

These fast and light trains can be integrated in the passenger train schedule without problems.



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Freight Traffic - Forecast

Total 2025 4.32 Bil. tkm

Thereoff 2.65 Bil. tkm
diverted from road transport

Growth factor 2025-2055:
2.3 % – 2.1 % p.a.
(gross national product)



Operation Cost and Revenues

Revenues in 2025 (100 %)

Passenger transport:

With 1.50 NOK/P-km

Scenario 1 6038 Mil. NOK

Scenario 2 7253 Mil. NOK

Freight transport: 3486 Mil. NOK

With 0.81 NOK/t-km

Cost for operation and maintenance

Scenario 1 2351 Mil. NOK

Scenario 2 2834 Mil. NOK



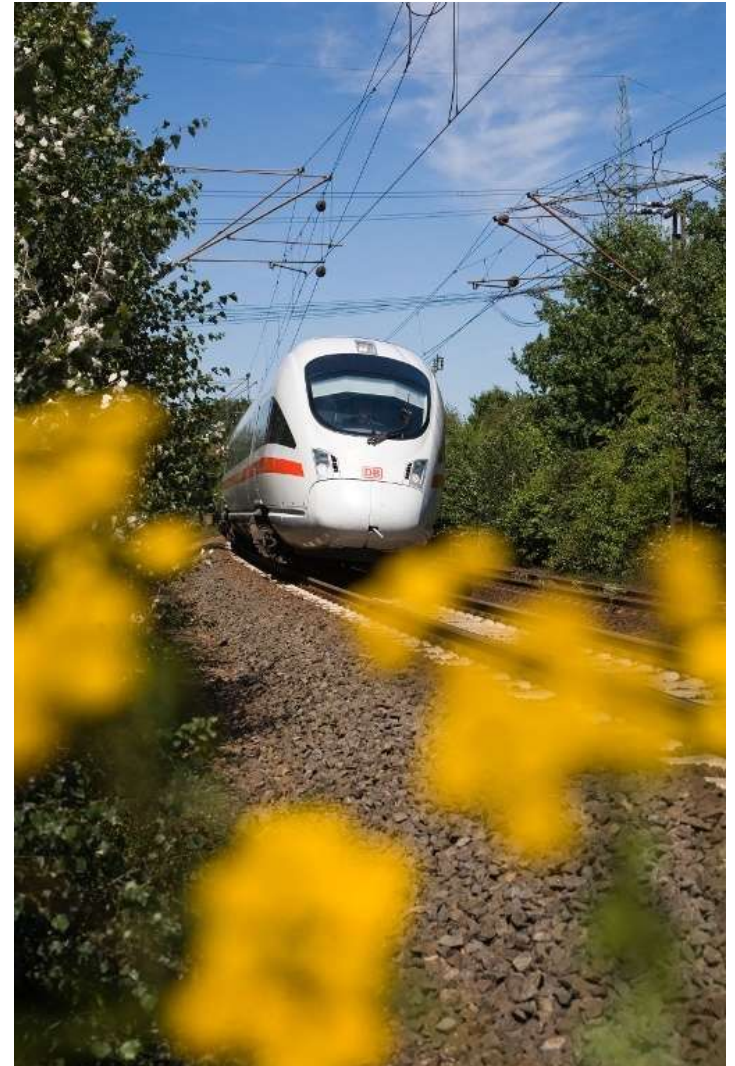
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Environment and Socio-Economic Evaluation

Caused by change of modal split (2025):

		Scenario 1	Scenario 2
Avoidance of CO ₂	Tonnes/a	642 000	682 000
Cost of avoided accidents	NOK/a	1092	1213
Cost of time savings (P)	NOK/a	2707	3187



Cost / Benefit Analyses

Financially assessed Criteria

- Travel Costs
- Travel Time
- Emissions
- Accident Costs
- Induced Traffic
- Availability Fees
- Concession Fees

Not quantified Criteria

- Travel Comfort
- Noise, Landscape, Flora and Fauna
- Economic Development
- Construction related Costs
- Avoided Costs of existing railway operation
- Avoided Train Operator Profit
- Resettlement, Barriers, Accessibility

Financial Results

- Revenues from passenger and freight operation will exceed Operation and Maintenance costs
- Return of equity (financing by state, 30 years concession for operator)
Scenario 1: 3.5 % and Scenario 2: 2.6 %

Socio-Economic Results

		Scenario 1	Scenario 2
Economic benefits	Bil. NOK (NVP 2025)	292.0	338.4
Economic costs	Bil. NOK (NVP 2025)	186.4	234.4
Benefit/Cost ratio		1.56	1.44

Summary

- **The Oslo-Hadeland-Gjøvik-Moelv High Speed Line as part of a High Speed network including Oslo-Hamar-Trondheim and Dombås-Ålesund will produce a positive economic result.**
- **Revenues will exceed Operation and Maintenance costs. In case of financing by the state, 3.5 % (scenario 1) and 2.6 % (scenario 2) return of equity can be expected.**
- **Construction of the Oslo-Hadeland-Gjøvik-Moelv HSL may be an alternative or an addition to Oslo-Hamar-Moelv section of the Oslo-Hamar-Trondheim line.**
- **The Oslo-Hadeland-Gjøvik-Moelv HSL will cause significant modal split shifts from air and road to rail with all connected economic benefits.**
- **The new railway line will provide cost-effective transport solutions to improve the economic quality and competitiveness of the connected regions.**

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norsk bane
– Nye lider for Norge



Thank you

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