The Coastal Highway Route E39 in Norway

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The Coastal Highway Route E39

Focus on: Extreme fjord crossings along the Route E39
The worlds longest.....
Lærdal tunnel (24.5 km)
Nordhordland bridge (1246 m end-anchored floating bridge)
Facts about the counties along the E39

Inhabitants 2017:

- 1/3 of the country’s population (1,870,000)
- Approx. 60% of our export value

«The Gold Coast» of Norway

Source: Central Bureau of Statistics (SSB)
Map details: Norwegian Mapping Authority
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The current Route E39

- E39 Kristiansand-Trondheim nearly 1100 km, including 7 ferry connections
- E39 ferry connection Kristiansand-Hirtshals
- Aalborg: The E39 joins the E45 which continues to Italy
- Varied road standard
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An improved and ferry free E39

- Open road 24/7
  7 ferry connections removed

- Travel time reduced from 21 hours to 11 hours

- New solutions and new competence
  - Similar bridge solutions have never been built before

  - Ambition confirmed
  - Estimated cost of 45 billion USD (340 billion NOK)
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The National Transport Plan (NTP) 2018 - 2029

• New NTP presented in April 2017

• The goal is maintained: The E39 is to become a continuous route without ferries

• June 2017: Adopted by the Parliament (Storting)

• Strong focus on cost cutting
  • Reductions possible as a result of technological development
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#### Challenging fjord crossings

<table>
<thead>
<tr>
<th>Fiord</th>
<th>Length (km)</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halsafjorden</td>
<td>2</td>
<td>5-600</td>
</tr>
<tr>
<td>Julsundet</td>
<td>1.6</td>
<td>5-600</td>
</tr>
<tr>
<td>Romsdalsfjorden</td>
<td>13</td>
<td>330</td>
</tr>
<tr>
<td><strong>Sulafjorden</strong></td>
<td><strong>3.8</strong></td>
<td><strong>500</strong></td>
</tr>
<tr>
<td>Vartdalsfjorden</td>
<td>2.1</td>
<td>600</td>
</tr>
<tr>
<td>Nordfjorden</td>
<td>1.4</td>
<td>500</td>
</tr>
<tr>
<td><strong>Sognefjorden</strong></td>
<td><strong>3.7</strong></td>
<td><strong>1250</strong></td>
</tr>
<tr>
<td>Bjørnafjorden</td>
<td>5</td>
<td>550</td>
</tr>
<tr>
<td>Langenuen</td>
<td>1.3</td>
<td>500</td>
</tr>
<tr>
<td>Boknafjorden</td>
<td>27</td>
<td>390</td>
</tr>
</tbody>
</table>

* = subsea tunnel
Alternative solutions for the large fjord crossings

- Suspension bridge
- Floating bridge (combined with suspension/cable-stayed bridges)
- Submerged floating tube bridge (floating tunnel)
- Immersed tunnel/subsea rock tunnel
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Conceptual design - across the Sognefjord
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Sub Sea Rock Tunnel

Preferred solution on the following crossings (known technology, but stretched):

- Boknafjorden (opening for traffic in 2025 or 2026)
- Romsdalsfjorden
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Single-span Suspension bridge

Prefered solution on the following crossings (proven technology):

- Julsundet
- Nordfjord
- Langenuen

Considered a viable option on the following crossings (new technology):

- Halsafjord
- Vartdalsfjord
- Sulafjord*
- Sognefjord*

*span of approx. 3 km or wider
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Multi-span Suspension bridge with fixed towers

Considered a viable option on the following crossing:

• Sulafjorden
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Multi-span Suspension bridge with floating towers

Considered a viable option on the following crossings:

• Halsafjord
• Vartdalsfjord
• Sulafjord
Submerged Floating Tube Bridge

Considered a viable option on the following crossings:

• Sulafjorden
• Sognefjorden
End Anchored Floating Bridge

Considered a viable option on the following crossings:

- Halsafjorden
- Bjørnafjorden
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Side Anchored Floating bridge

Considered a viable option on the following crossings:

- Halsafjorden
- Bjørnafjorden
Impact on Society

- Large positiv Socio-Economic impact
- Big influencer of Regional Development
- Redefining housing and labour markets along the Route through increased mobility for users
- Will be a “Gamechanger”
Major savings for freight and transport costs

- **2016**
  - Dist.avhengige kostander: 9381
  - Tidskostnader: 13477
  - Utlegg ferje/bom: 5497

- **2035**
  - Dist.avhengige kostander: 6410
  - Tidskostnader: 6996
  - Utlegg ferje/bom: 9222

- **2050**
  - Dist.avhengige kostander: 6410
  - Tidskostnader: 6996
  - Utlegg ferje/bom: 1003
Identification of design ships loads
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Identification of Environmental actions
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Investigation of ground conditions
Environment

- Major construction-related impact in a vulnerable coastal landscape

- Emissions of greenhouse gases are to be cut
  - Emissions over a 40-year period will be almost the same as for today’s E39 – despite strong increase in traffic volumes

- Underlying parameters are constantly changing; new energy sources exploited
  - Electricity, biofuels and hydrogen
  - Calculations are based on today’s vehicles, ferries etc.
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An animation of the crossings

YouTube
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Summary

- Technologically feasible
- Feasible from a planning perspective
- Large positive Socio-Economic impact
- Financially challenging
Thanks for your kind attention!