Pavement asset management practice in Norway

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Norway - Public roads, total: 93 500 km

- National roads (state-owned): 10 500 km
- County roads: 44 000 km
- Municipal roads: 39 000 km

Including 10 000 km of footpaths and cycle paths

 Majority of roads have relatively low levels of traffic
Distribution of traffic volumes

- National roads (10 500 km)
  - 0-1500: 35.8%
  - 1501-4000: 32.1%
  - 4001-6000: 9.2%
  - 6001-12000: 12.1%
  - 12001-20000: 5.7%
  - 20001-: 5.1%

- County roads (44 000 km)
  - 0-1500: 82.0%
  - 1501-4000: 12.6%
  - 4001-6000: 2.4%
  - 6001-12000: 2.4%
  - 12001-20000: 0.6%
  - 20001-: 0.1%
Vision Zero for traffic safety – no fatalities or serious injuries

Road safety

Fatalities

94 133 310 560 338 452 352 255 224 187 135
Our budget breaks down as follows:

- **Operation, maintenance and development**
  - High cost

2017 Annual Budget

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total budget</td>
<td>NOK 36 billion</td>
</tr>
<tr>
<td>Government funds</td>
<td>29.6 bn</td>
</tr>
<tr>
<td>External funds</td>
<td>6.3 bn</td>
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</tbody>
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1 bn. NOK ≈ 14 bn. JPY
NPRA responsible for 55 000 km National Roads and County Roads

Total annual cost for operations and maintenance 2016

\[ \sim 5.2 \text{ (nat.)} + 7.4 \text{ (county)} = 12.6 \text{ bn. NOK} \]

- 25% Pavements
- 21% Road equipment and environmental measures
- 19% Winter operations
- 7% Tunnels
- 5% Bridges and ferry quays
- 5% Drainage
- 1% Road base layers (NB! usually financed as investments)
- 17% Other tasks and adm.

1 bn. NOK ≈ 14 bn. JPY
Pavement management in Norway is a challenge!
Framework for Maintenance Management in NPRA

Network level analyses

Defined maintenance standards

MOTIV
Agency costs of keeping maintenance standard levels

Optimizing agency costs within the limits of the maintenance standards

Existing and future management systems at the project level

PMS2010, BRUTUS, Plania, Linje...
Measuring rutting/roughness/crossfall and texture with ViaPPS:

- 360° scanning
- Double resolution compared to old eq.
- Better possibility for detection of damages (cracks, texture, homogenity)

Potential for new areas of use:
ViaPPS – Example of measurement
R&D: Homogenity– Measurement of texture/separation

Segregation

Bleeding
Pavement condition development 2008-2016 (National roads)

Satisfactory: rutting < 18 mm  IRI < 3.1 mm/m (20-meter median)
Pavement condition development 2008-2016
(County roads)

Satisfactory condition (%)
Pavement condition development 2008-2016
(County roads)

Satisfactory: rutting < 18 mm  IRI < 3,1 mm/m
(20-meter median)
PMS – System architecture
Pavement management system
Other measurements on pavements (not for whole road network)

- Falling weight deflectometer (FWD)
- Georadar
- Friction (summer)
- Core sampling
Future possibilities: cars as data-source
Thank you for your attention!

“Sohlbergplassen” – National tourist route fv27