The Danish Road Directorate

Sustainable or Smart (SOS) pavements?

PhD, Matteo Pettinari, map@vd.dk
Specialized Consultant

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The Danish Road Directorate

Ministry of Transport, Building, and Housing

Is responsible for the national road network:

Motorways

Expressways

Main roads

Bridges

Is a part of:

We work in these main areas:

Planning

We conduct studies and plan in order to determine where new roads are to be built and where there is a need for increased traffic safety or capacity on the national road network

Construction

We construct new roads, roundabouts, cycle paths and bridges and also put up noise barriers and develop the existing road network

Operation

We operate and maintain the roads and the surrounding areas – we lay new asphalt, mow the grass and clear the roads of snow

Traffic administration and management

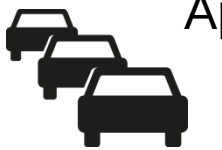
We guide road users through the traffic, for example, in the event of accidents or road works via signposting, electronic information boards and traffic information in various media

The national road network

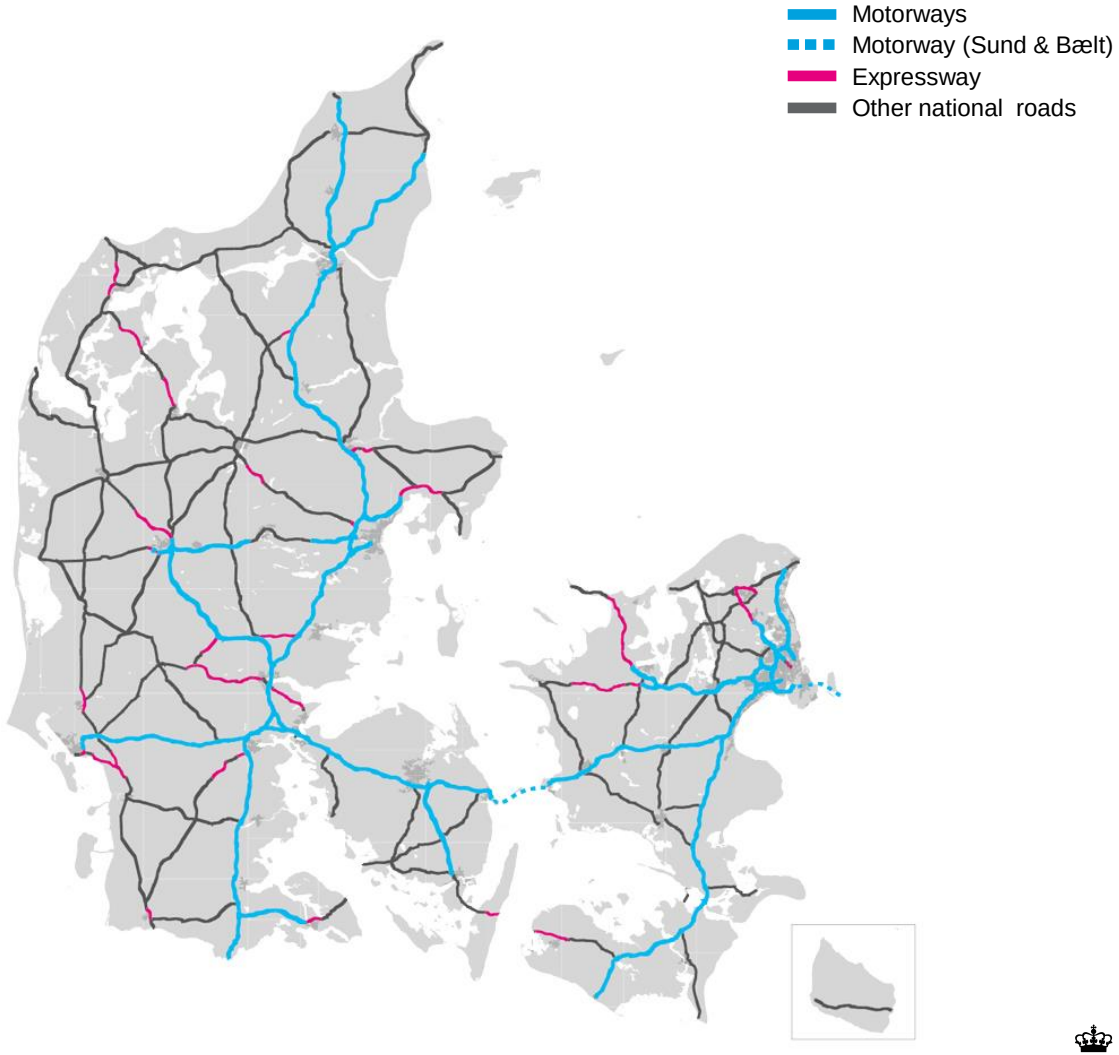
Consists of **3,801km***

1,188 km of which are motorways

This corresponds to approximately **5%** of the total public road network in Denmark
(74,497 km)



Approximately **45%** of road traffic runs on the national road network



** 1.1 2015 Excluding Sund & Bælt Holdings 41 km*

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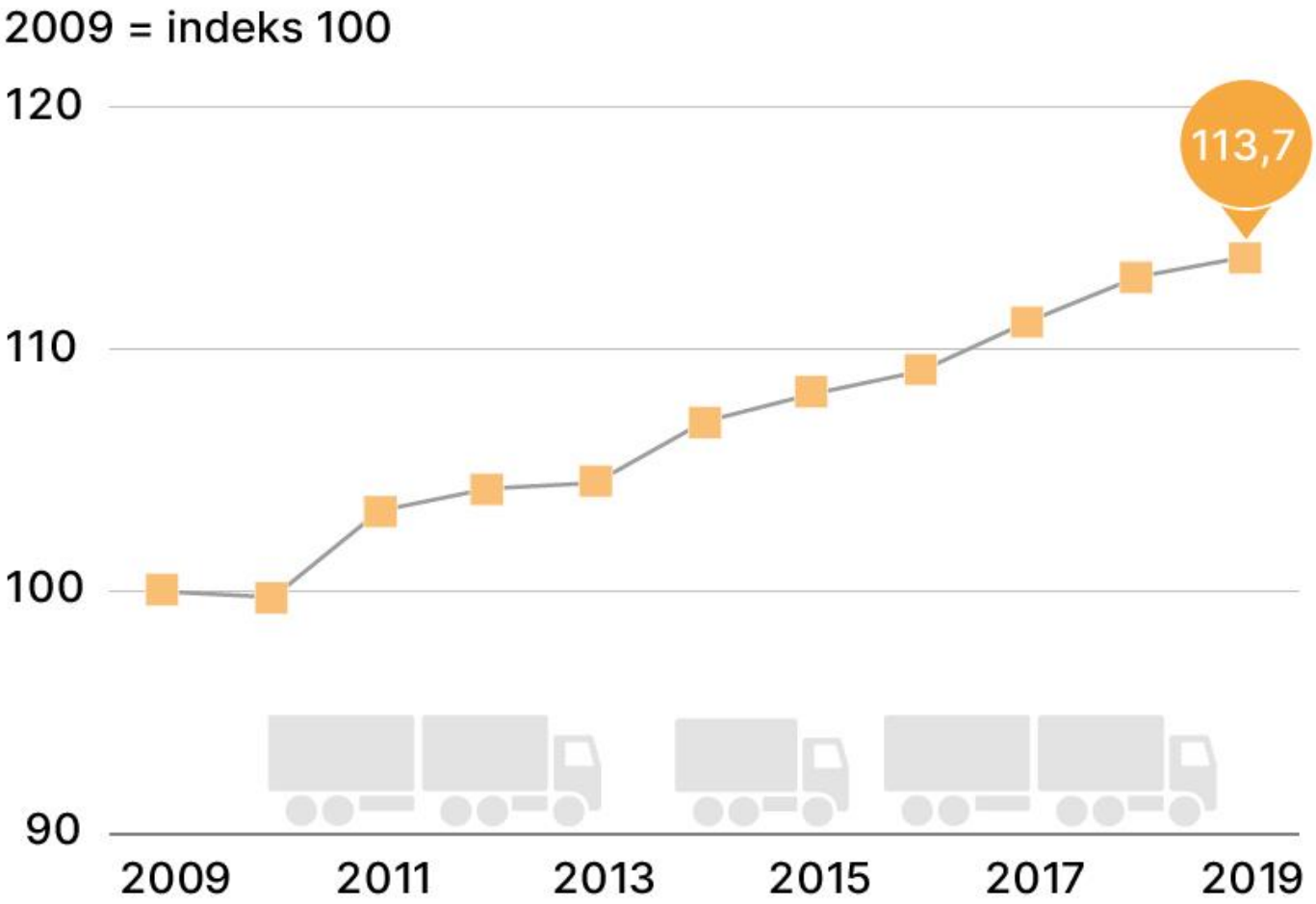
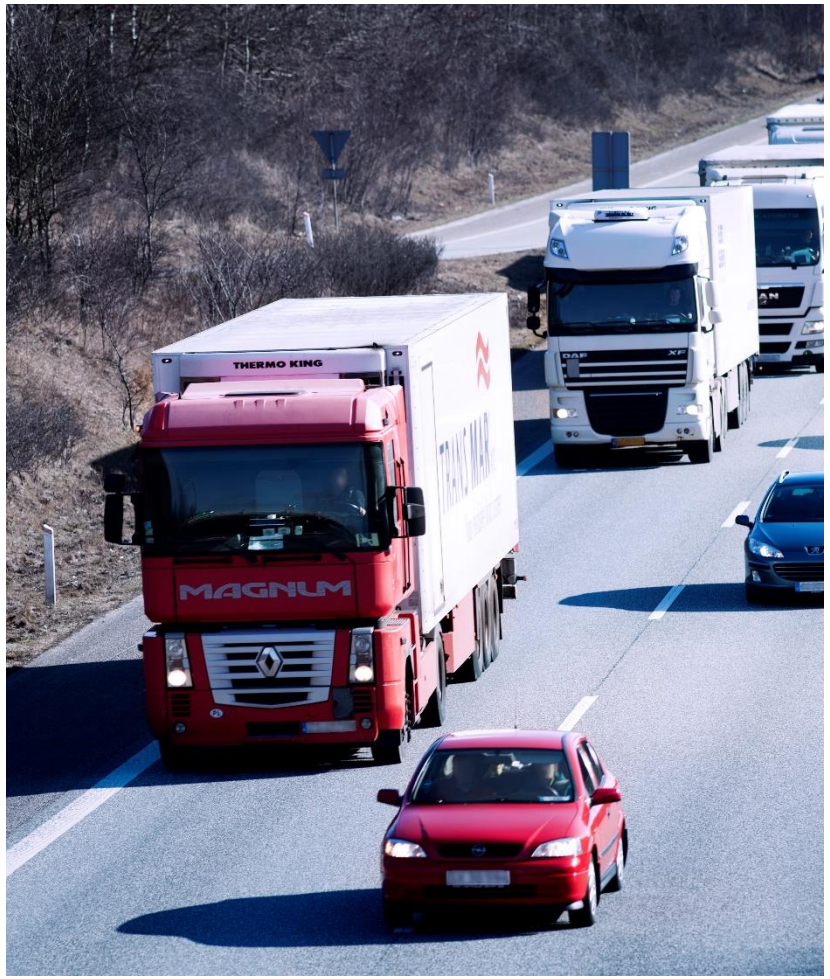
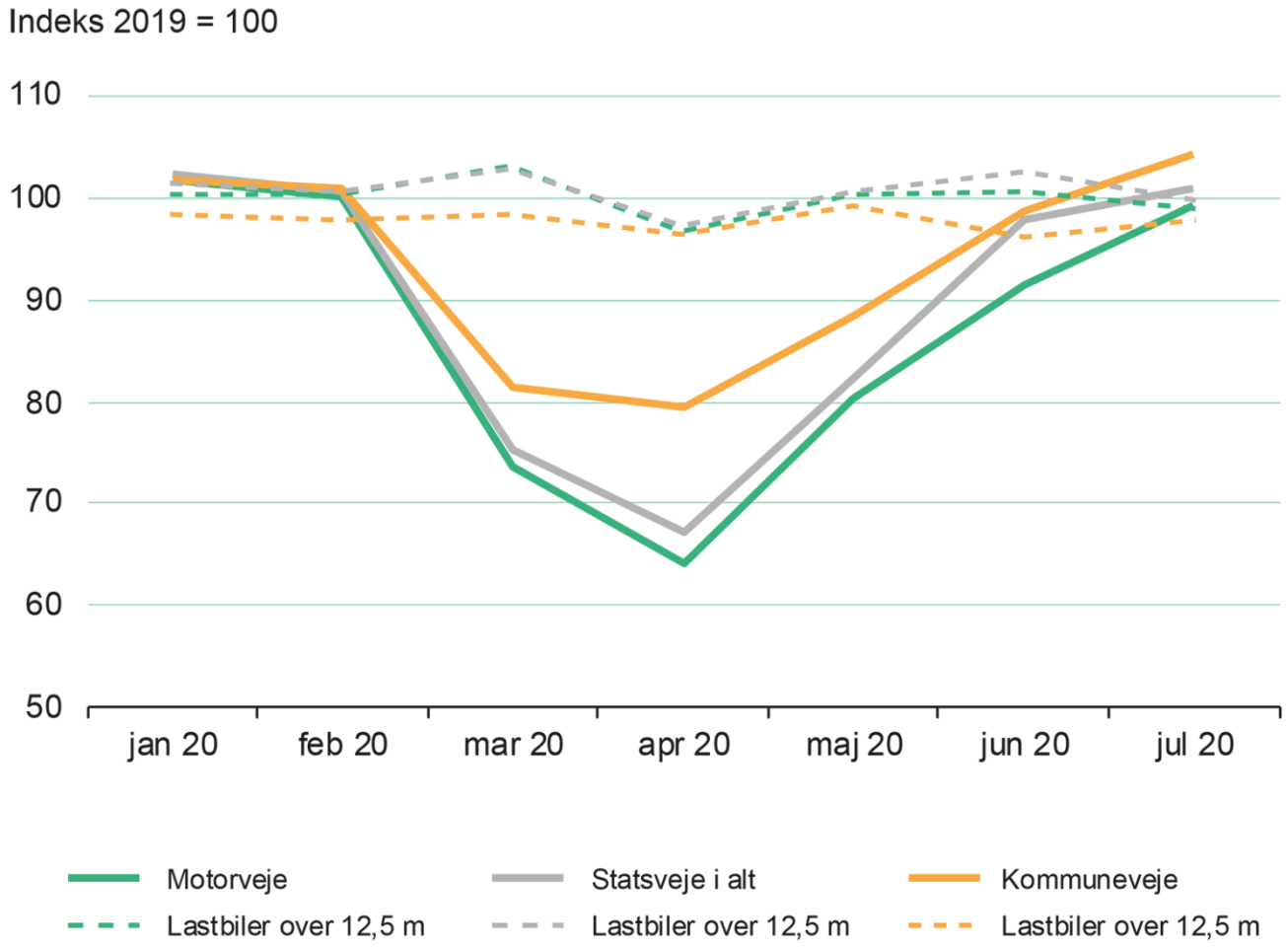
Progress in truck traffic





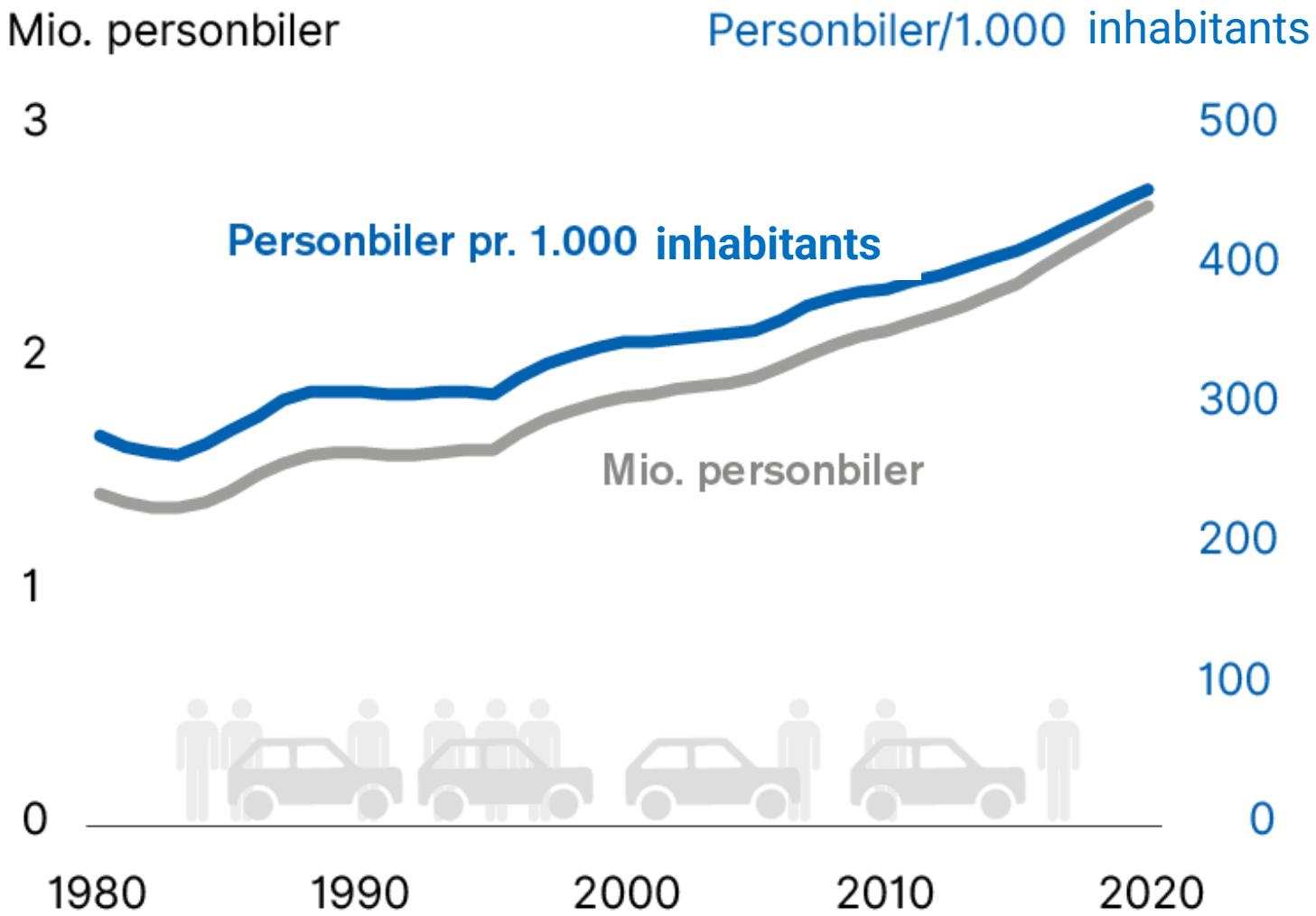
Since 2010, truck traffic has grown by almost 14%

COVID-19 pandemic and traffic



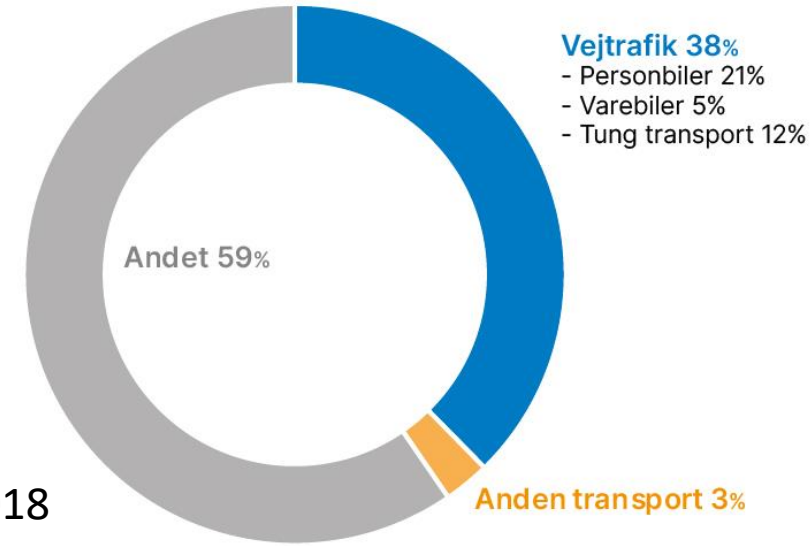
On Friday 20 March 2020, traffic fell to ***49% of normal levels***

What about cars (personbiler)?

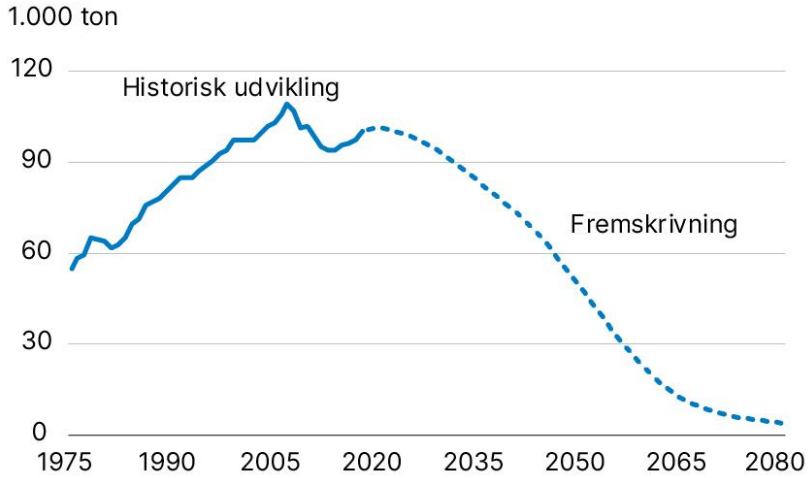


Considering the Danish Policy and infrastructure Needs can we integrate

Sustainable & or Smart development when referring to pavements?



2018



Development and projection of road traffic CO2 emissions

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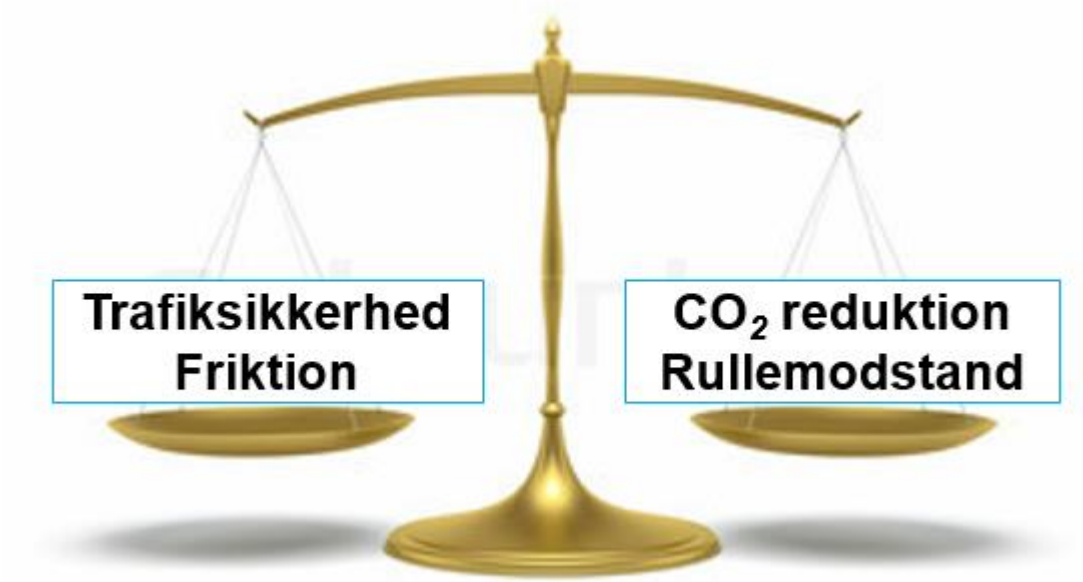
DRD Strategy in the coming years

- Implementing Low Rolling Resistance pavements
- Focus on Low Noise emissions
- Increase use secondary materials and RAP
  - BSM
  - Test section with 40% RAP
- PRE-ADAPT – NordFou project
- LiRA and CEDR project “Remote Condition Monitoring of Physical Road Assets”

Low Rolling Resistance pavements

- **Objective**
  - Development of a wearing course material which reduces CO_2 emissions from vehicles, through a lowering of the fuel consumption by a reduction of the rolling resistance, as well as;
    - *Increased durability of the material and thus a reduced need for maintenance & repair (M&R) activities*
  - The wearing course should meet all friction requirements



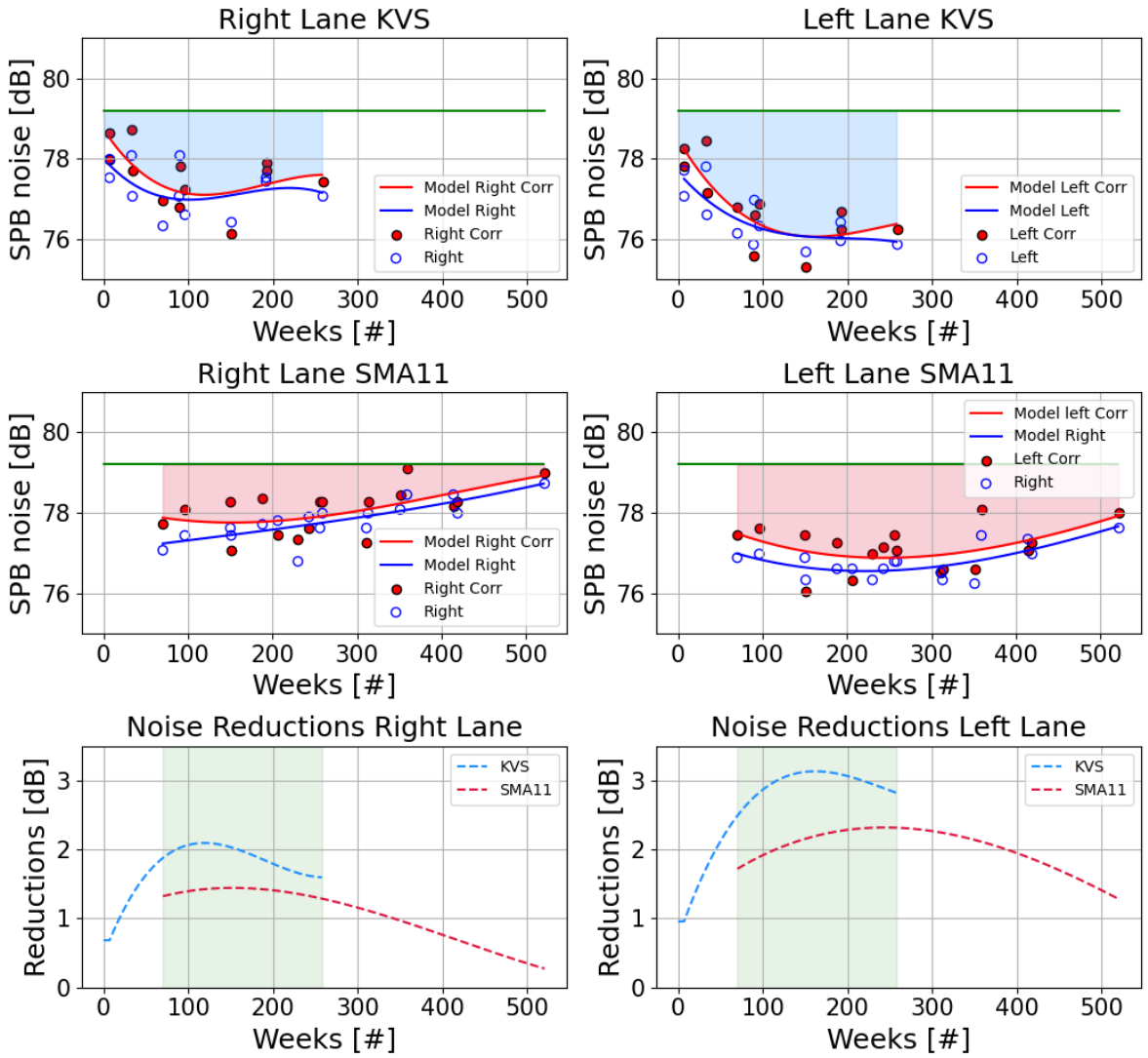
≈ 1.0 % reduction in fuel consumption by optimizing mix texture

Low Rolling Resistance pavements

1. *CAN bus reader to extract FC*
2. *Texture laser – MPD, RMS, Skewness, Wavelenghts*
3. *Gyroscope for road pitch*
4. *Wind measurement*
5. *Speed controlled*

Low noise pavements

- Business case to understand where to implement porous layers
- Assess noise emissions at network level
- Use CPX on project level



PRE-ADAPT

NordFoU

Pe**R**formanc**E**-b**A**se**D** evaluation of **A**s**P**halt mix**T**ures

i) ***moving towards performance-based specifications*** by identifying reliable test methods to use during tendering processes or when approving the implementation of non-conventional mixes.

ii) ***developing a material performance catalogue***, which will *support NRAs with information when introducing new and more sustainable mixes* into the road net.

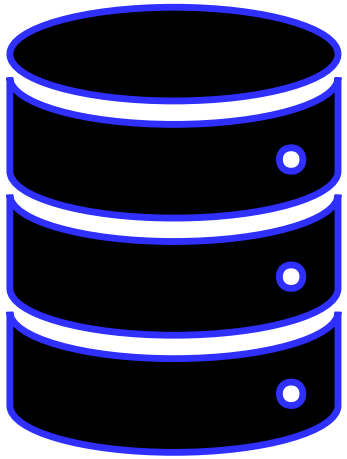
iii) ***Optimizing guidelines*** to define how ***fundamental inputs could be used when designing pavements with innovative mixes***

PRE-ADAPT

NordFoU

Pe**R**formanc**E**-b**A**se**D** evaluation of **A**s**P**halt mix**T**ures

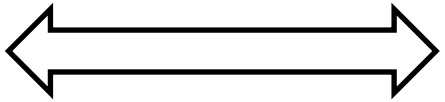
1) We defined a common test program

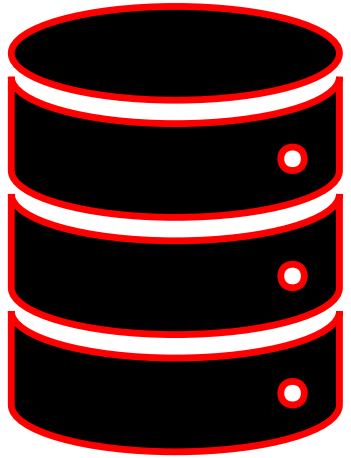


2) New Material ⇨ Database

Including Georeferenced information about the section where this material is paved

3) Monitor sections with Standard vehicles





We measure how field properties evolve over time

Framework shared between Scandinavian Countries

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LiRA and CEDR project "*Remote Condition Monitoring of Physical Road Assets*"

Live Road Assessment (LiRA): is a proof-of-concept attempt to assess road conditions based on in-vehicle sensors on a city scale

CEDR project (Call 2021): Undertake research into current best practice on the remote monitoring and inspection of physical road assets and provide *advice on implementing new techniques as business practice*.

a) PAVEMENTS
b) BRIDGES

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Conclusions

We must be *Sustainable* and *Smart*

Digitization is the way