HRVATSKO ASFALTERSKO DRUŠTVO

ROAD CONDITION, MUCH MORE THAN CONFORT AND SAFETY - FUEL CONSUMPTION AND EMISSION

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STANJE CESTE, MNOGO VIŠE OD UDOBNOSTI I SIGURNOSTI – POTROŠNJA GORIVA I EMISIJA

• Dr. JUAN JOSE POTTI, ASEFMA

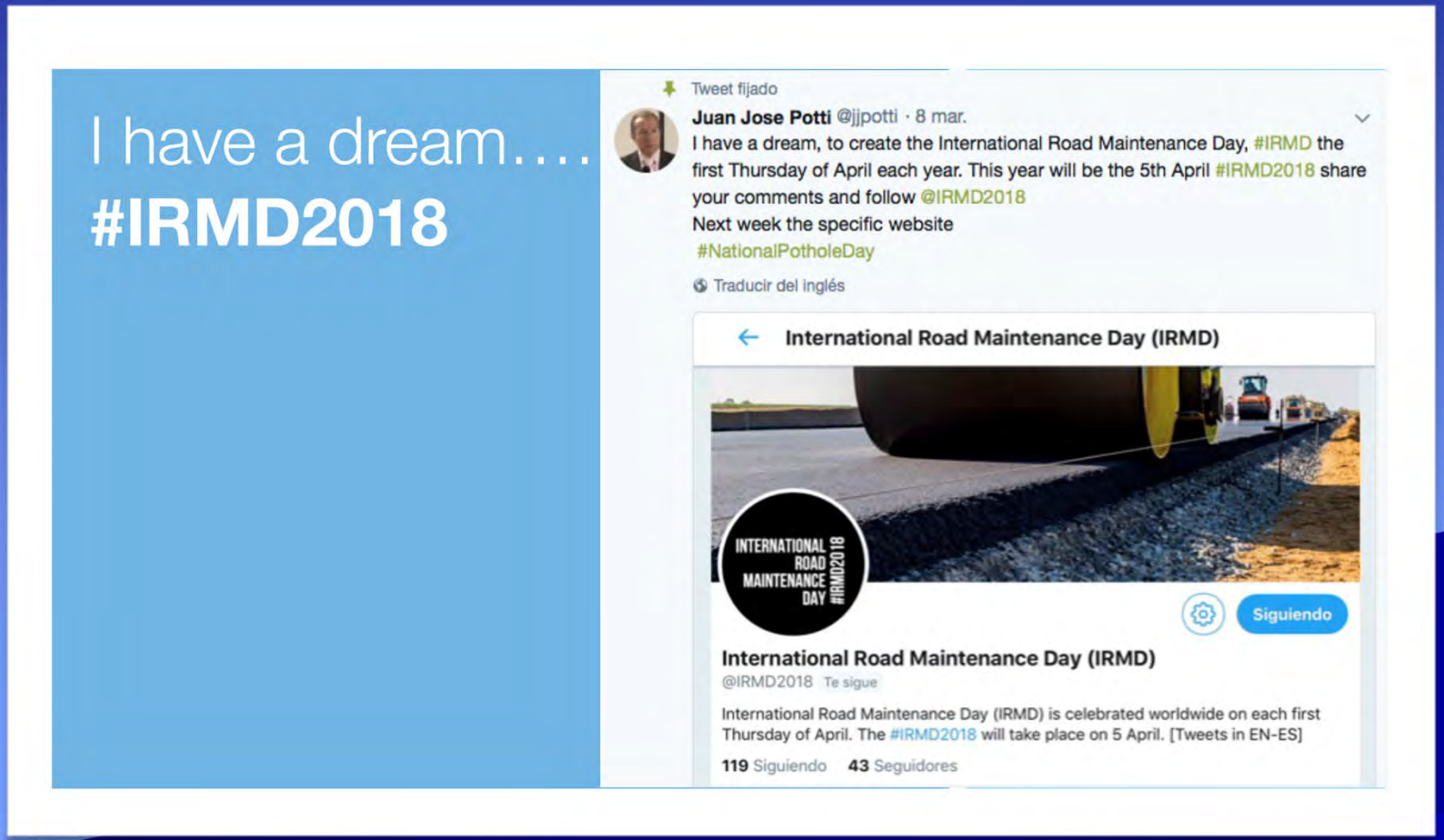
• 9. MEĐUNARODNA KONFERENCIJA ASFALTNI KOLNICI 2025
• 9. INTERNATIONAL CONFERENCE ASPHALT PAVEMENTS 2025
• OPATIJA 08. – 09. 05. 2025.

Once upon a TIME

- Parlamentary breakfast, 18/11/2016
- Document made by EAPA, EUPAVE and FEHRL: “Road pavement industries highlight huge CO2 savings offered by maintaining and upgrading roads”

Once upon a TIME

- The first IRMD was made on 5th April 2018
- See website: http://roadmaintenanceday.org



8 years later…let's think about strategy

- If more than 20% of emissions generated in the European Union come from road transport
- If we already have, thanks to big data, confirmation about the quantification of savings in terms of emissions and energy that we can reduce in vehicles that circulate on the road
- If we can now accurately quantify how much energy we can save annually and how many emissions we can save annually

GOBIERNO DE ESPAÑA
MINISTERIO DE TRANSPORTES Y MOVILIDAD SOSTENIBLE

seitt

Impact of pavement rehabilitation activities on CO2 emissions and vehicle fuel consumption. Case study of the M-50 highway-

Camino Arce Blanco

Technical and Business Development Manager

camino.arce@seitt.es

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

April 3, 2025

Xouba
DATA FOR SAFER ROADS

Introduction

SEITT is in charge of the OPERATION MANAGEMENT of:

- ✓ 9 Toll Highways (485 km)
- ✓ 14 associated free motorways (215 km)
- ✓ 25 Service Areas
- ✓ 540 people

Investment plan 2025-2028: 385 M€

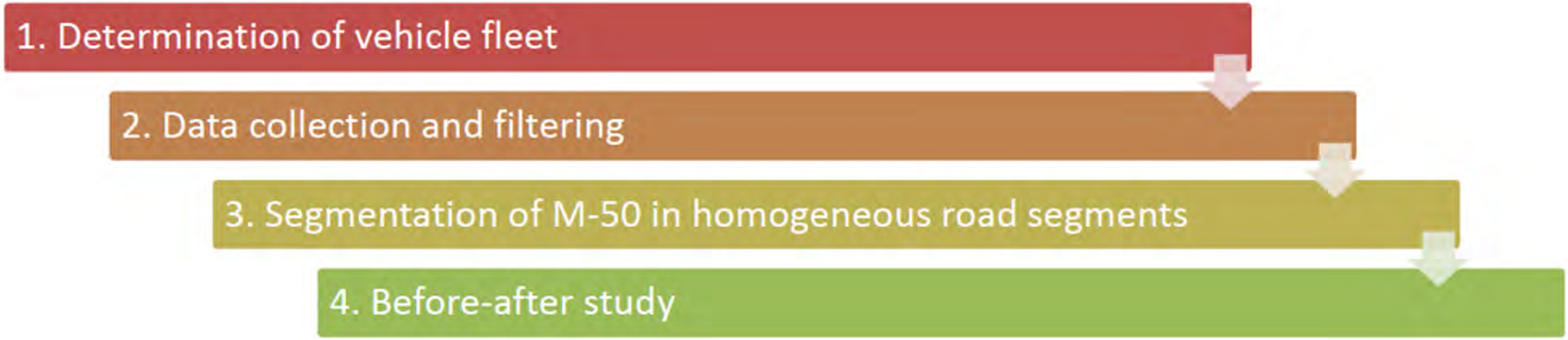
- ✓ Pavements: 223,0
- ✓ Tunnels: 28,7
- ✓ Structures: 53,3
- ✓ Installations: 30,0
- ✓ Lighting: 32,2
- ✓ Noise: 10,8
- ✓ Signaling: 7.0

Introduction

M50: 73 M€ in Pavement

- ✓ Lenght: 85 km
- ✓ ADT $_{2024}$:
  - ✓ TR 1: 44.131
  - ✓ **TR 2: 100.000**
  - ✓ **TR 3: 89.875**

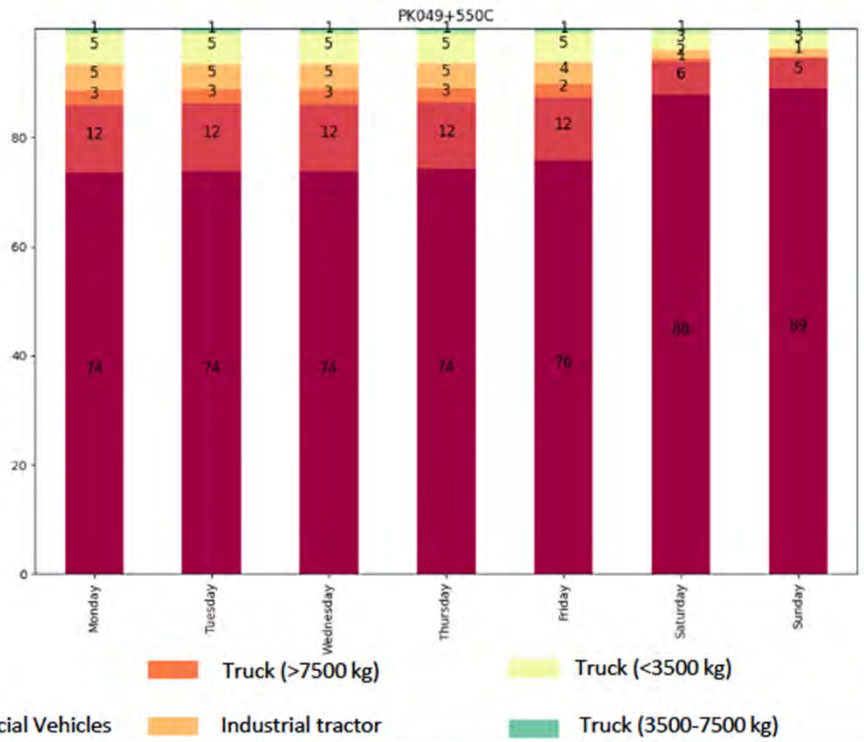
Methodology



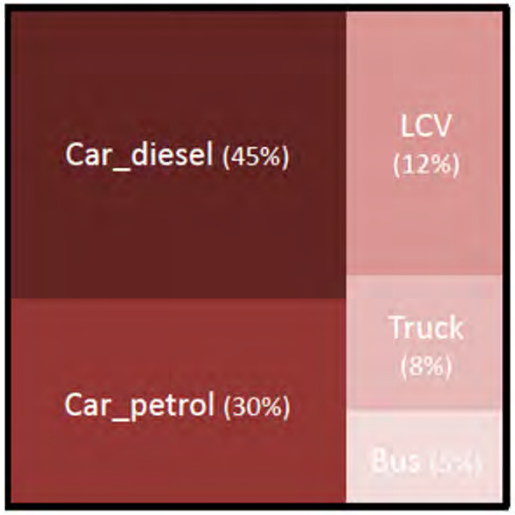
Methodology

seitt

1. Determination of vehicle fleet
2. Data collection and filtering
3. Segmentation of M-50 in homogeneous road segments
4. Before-after study



Vehicle fleet on weekdays



Methodology

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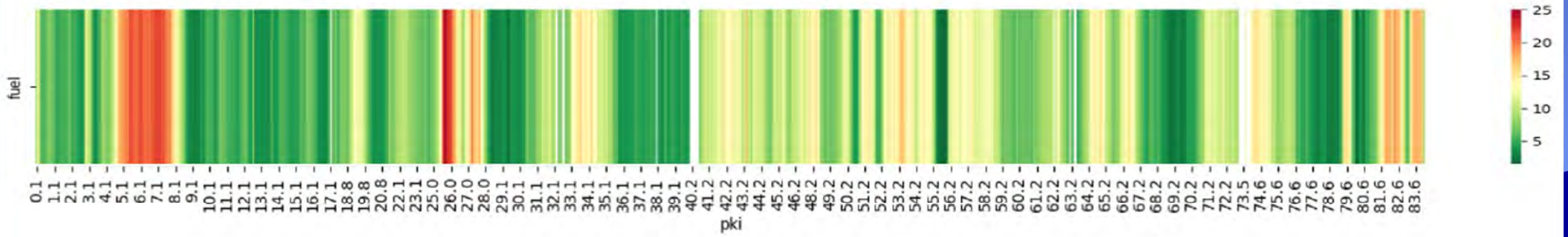
Data from Connected and Autonomous Vehicles (CAV)

- Fuel consumption

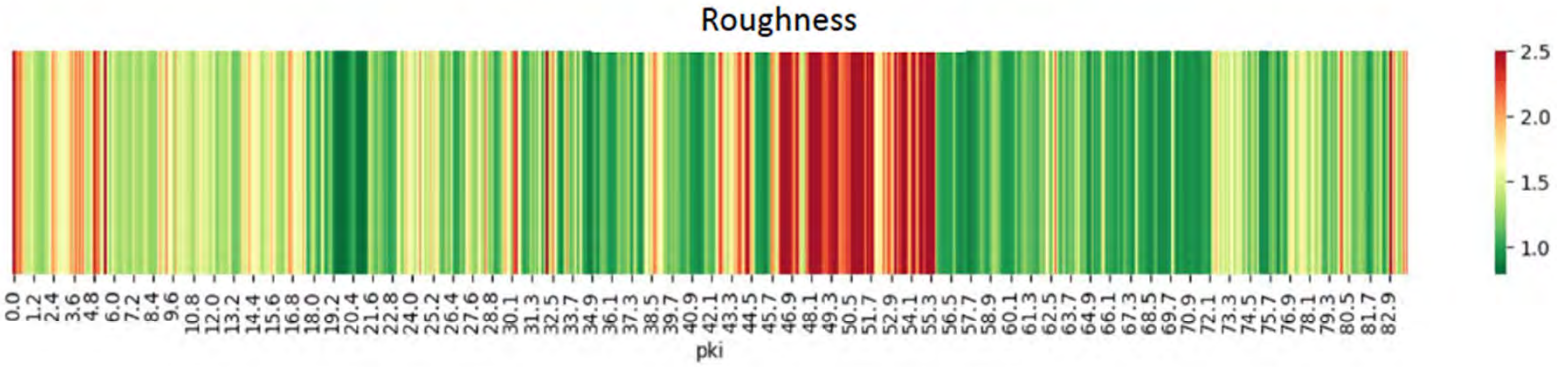


Methodology

1. Determination of vehicle fleet → **2. Data collection and filtering** → 3. Segmentation of M-50 in homogeneous road segments → 4. Before-after study

Data from Connected and Autonomous Vehicles (CAV)

- Pavement condition



Methodology

1. Determination of vehicle fleet → 2. Data collection and filtering → 3. Segmentation of M-50 in homogeneous road segments → 4. Before-after study

Identification of homogeneous road segments

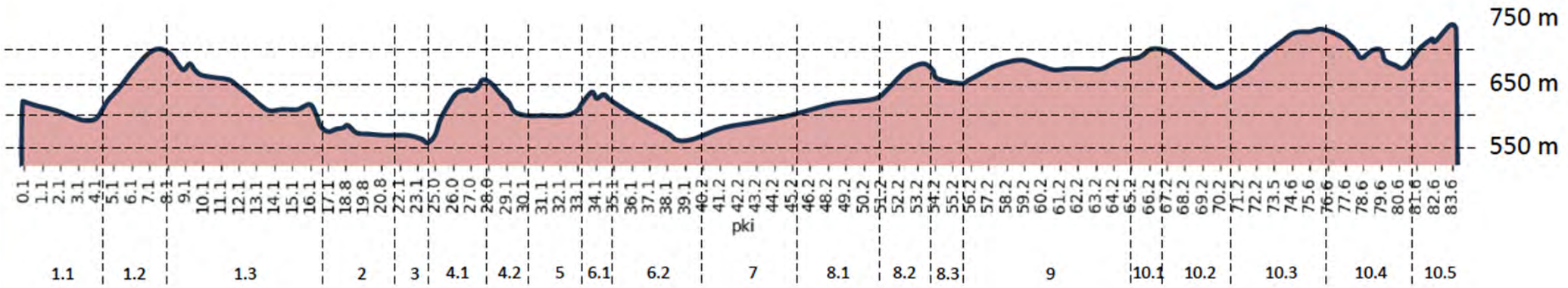
- Repaving works

Methodology

1. Determination of vehicle fleet → 2. Data collection and filtering → 3. Segmentation of M-50 in homogeneous road segments → 4. Before-after study

Identification of homogeneous road segments

- Vertical alignment



Methodology

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Identification of homogeneous road segments

- Pavement condition before works

Id	PK_i	PK_f	L (km)
5	30.30	33.60	3.30
7.1	40.10	42.30	2.20
7.2	42.40	45.80	3.40
8.1	45.90	51.00	5.10
8.2	51.10	54.00	2.90
8.3	54.10	55.40	1.30
9	55.50	65.40	9.90

Methodology

1. Determination of vehicle fleet
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Before (nov. 23)

Vs

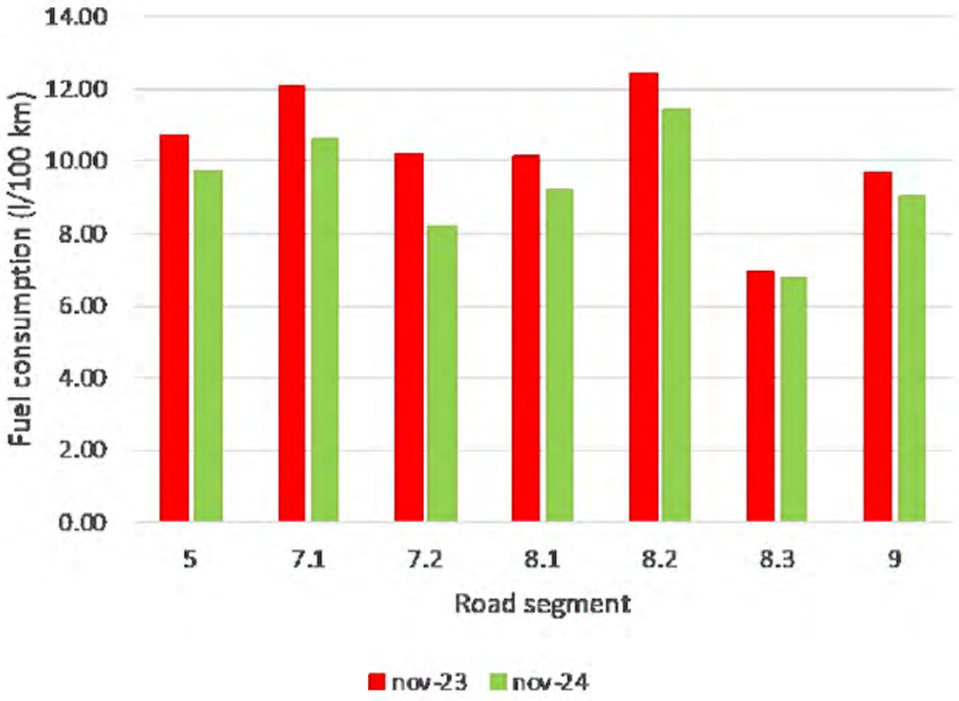
On weekdays during off-peak hours

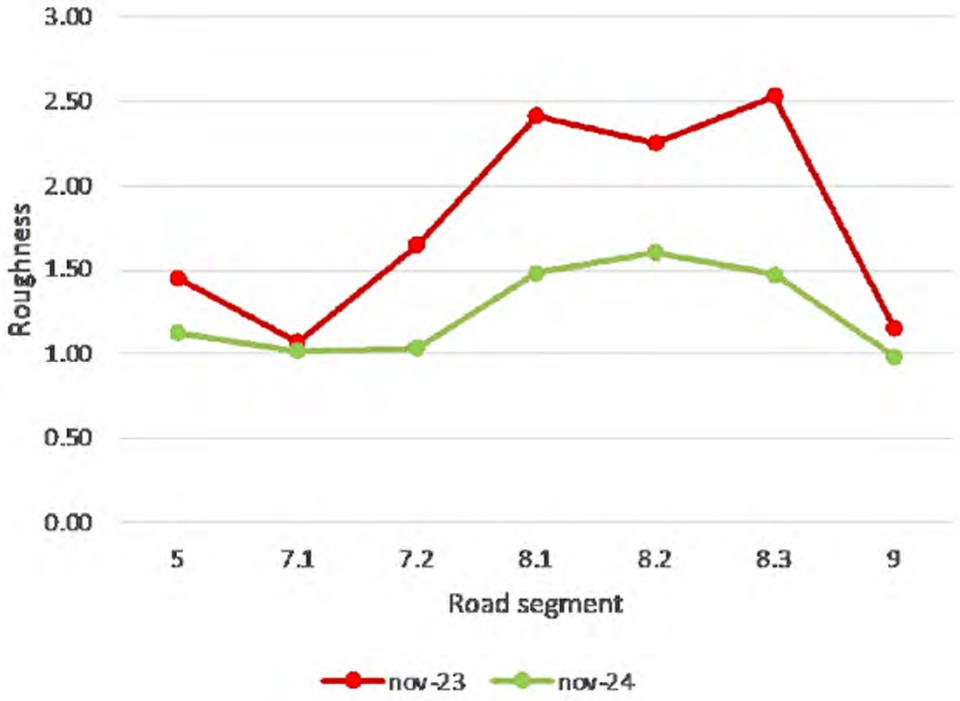
After (nov. 24)

Before-After analysis

					nov-24 - nov-23			
	pki	pkf	L (km)	Average grade (%)	Roughness	C (ml/veh)	E (kg de CO2/veh)	V (km/h)
5	30.30	33.60	3.30	0.14%	-0.32	-33.57	-0.088	2.29
7.1	40.10	42.30	2.20	1.14%	-0.05	-32.34	-0.085	1.52
7.2	42.40	45.80	3.40	0.80%	-0.61	-71.23	-0.188	3.97
8.1	45.90	51.00	5.10	0.50%	-0.93	-46.84	-0.126	3.96
8.2	51.10	54.00	2.90	2.07%	-0.65	-31.20	-0.083	4.56
8.3	54.10	55.40	1.30	-2.30%	-1.06	-2.72	-0.008	4.68
9	55.50	65.40	9.90	0.40%	-0.17	-63.93	-0.167	5.35

Before-after analysis





Before-after analysis

Estimate of savings

- $AADT_{2025}$ = 115.000 veh/day

					nov-24 - nov-23				Savings in 2025 per day	
	pki	pkf	L (km)	Average grade (%)	Roughness	C (ml/veh)	E (kg de CO2/veh)	V (km/h)	C (l)	E (t de CO2)
5	30.30	33.60	3.30	0.14%	-0.32	-33.57	-0.088	2.29	-3860.6	-10.2
7.1	40.10	42.30	2.20	1.14%	-0.05	-32.34	-0.085	1.52	-3719.4	-9.8
7.2	42.40	45.80	3.40	0.80%	-0.61	-71.23	-0.188	3.97	-8191.9	-21.6
8.1	45.90	51.00	5.10	0.50%	-0.93	-46.84	-0.126	3.96	-5387.1	-14.5
8.2	51.10	54.00	2.90	2.07%	-0.65	-31.20	-0.083	4.56	-3587.8	-9.5
8.3	54.10	55.40	1.30	-2.30%	-1.06	-2.72	-0.008	4.68	-313.1	-0.9
9	55.50	65.40	9.90	0.40%	-0.17	-63.93	-0.167	5.35	-7352.1	-19.2
									-32412.0	**-85.7**

28.10 km

In 2025 =

-11.830 m³

17,75 M€

+

11.830.380

31.280,5

-31.269 t

2,19 M€

MUCH MORE THAN CONFORT AND SAFETY

- What are the most common arguments used to defend the need for a proper road maintenance?
  - Comfort and Safety (CS)

- Given the current data, what are the updated reasons for defending the need to properly maintain roads?
  - Reducing Emissions, reducing Consumption and Energy consumption of vehicles, Comfort and Safety (ECECS)
    - To facilitate the pronunciation, I propose you this new acronym: CESCE

CESCE, the new acronym/strategy

- Let's now consider how to communicate and defend the need to properly maintain roads under the CESCE philosophy
  - Let's consider drafting road construction projects
  - Let's think about communicating with citizens through construction signage
  - Let's think about national and European decarbonization goals
  - Let's think about national and European energy-saving goals

Road construction projects, according CESCE philosophy

- Change its title to: “Projects for the reduction of emissions and fuel/energy consumption of vehicles circulating between kilometer point xxx.xx and kilometer point yyy.yy”

- - Quantify in each project, based on the estimated traffic and the proposed rehabilitation actions, the amounts of emission reduction and reduction of fuel/energy consumption of vehicles circulating between kilometer point xxx.xx and kilometer point yyy.yy

Communicating to the citizens, CESCE philosophy

- We used to say:
- - “Asefma, reinforcing the road, consolidating the future”
- Now we say: - “Asefma, reducing emissions, reinforcing the roads”
- We should stop talking about road rehabilitation projects
- Instead: Projects to reduce emissions and fuel/energy consumption of vehicles circulating between kilometer point xxx.xx and kilometer point yyy.yy

Communicating to the citizens, CESCE philosophy

- According the quantification in the project, based on the estimated traffic and the proposed rehabilitation actions, the amounts of emission reduction and fuel/energy consumption of vehicles circulating between kilometer point xxx.xx and kilometer point yyy.yy
- We can share to the citizens, on the signals?
  - You reduce here
  - 6,9% of fuel consumption
  - and we reduce xx tons
  - of GEI emissions

Conclusions/recommendations

- Preventative road maintenance can be a very important way to reduce emissions and energy at UE
- Preventative road maintenance can be a very important way to reduce consumption/energy of the vehicles circulating
- We should make an emissions map associated with the roads. And even more so, an emissions reduction map
- Road rehabilitation projects should be called “emission and energy reduction projects”
- We can share to the citizens, on the signals?
- Think about CESCE philosophy to defend road maintenance

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