

Asphalt industry in Slovenia

- Slovenko Henigman
- 23 – 24 November 2021, České Budějovice

Motto: We will not catch Europe without good-quality pavements

Content

- 25 Years of ZAS, Slovenian Asphalt Pavement Association
- Roads, Traffic and Pavement design
- Asphalt production in Slovenia
- ASPHALT 4.0 and look forward
- Slovenija vs Czech Republic
- ZAS Colloquium on Asphalt, Bitumen and Pavements



25 Years of ZAS

The Slovenian Asphalt Pavement Association



Slovenian Asphalt Pavement Association

Founded: **1996**

Member of EAPA: 1997

Kotnikova ulica 32, Ljubljana, Slovenia

- Individuals: > **100**
 - Companies: > **55**
-

Number of employees in the Slovenian asphalt industry: cca **2.000**

ZAS activities

- Representing Slovenian asphalt Industry at home and abroad
- Striving for good quality of production and paving works
- Preparing technical documentation and specification
- Organising training courses and technical meetings
- Publishing technical asphalt pavement publications

Practical Schooling and Seminars



Members and Meetings of Slovenian Asphalt Pavement Association

PREMIUM PARTNERS:


KOLEKTOR
POMGRAD


I. RANG

ASFALTI PTUJ, d.o.o.

CGP, d.d.

CESTNO PODJETJE PTUJ, d.d.

DRI upravljanje investicij, d.o.o.

GGD, d.d.

KOLEKTOR CPG d.o.o.

MAPRI PROASFALT, d.o.o.

PETROL, d.d.

POMGRAD, d.d.

STRABAG AG, Podružnica Ljubljana

TRGOGRAD, d.o.o., Litija

VOC, d.d.

II. RANG

AMMANN, Schweiz, AG (CH)

ASFALT KOVAČ, d.o.o.

ASFALTING, d.o.o.

BMI Austria, GmbH (A)

CP Asphalt, d.o.o.

CPK, d.d.

CVP, d.o.o.

CTS Bitumen GmbH (D)

Fliegl GmbH (D)

FRAGMAT TIM, d.o.o.

GP KRK d.d., podružnica za

gradnjo v Sloveniji

HIPOX, d.o.o.

IGMAT, d.d.

JOSEPH VÖGELE, AG (D)

KOMUNALA SLOVENSKE GORICE, d.o.o.

KPL, d.o.o.

LESPATEX, d.o.o.

OMV Downstream, GmbH (A)

REMONTE NG, d.o.o.

TAČ, d.o.o.

TAK, d.o.o.

VIANOVA SLOVENIJA

ZAG

ZYDEX Industries (IN)

III. RANG

ADVANCED CHEMICAL TRADING (A)

B&A&M, d.o.o.

BEXEL Consulting, d.o.o.

BGR inženiring, d.o.o.

CESTEL, d.o.o.

CELAB, d.o.o.

CGS Labs, d.o.o.

GI ZRMK, d.o.o.

HSH Chemie, d.o.o.

INTERCHEM, HmbH (A)

KOP Brežice, d.d.

RAMTECH, d.o.o. (CRO)

RO-TEHNOLOGIJA, d.o.o.

SAINT GOBAIN ADFORS, s.r.o. (CZ)

SLOMAN, d.o.o.

STRUCTUM, d.o.o.

TAHTING, d.o.o.

UL - FAKULTETA ZA

GRADBENIŠTVO IN GEODEZIJO

WEISIG, GmbH (D)

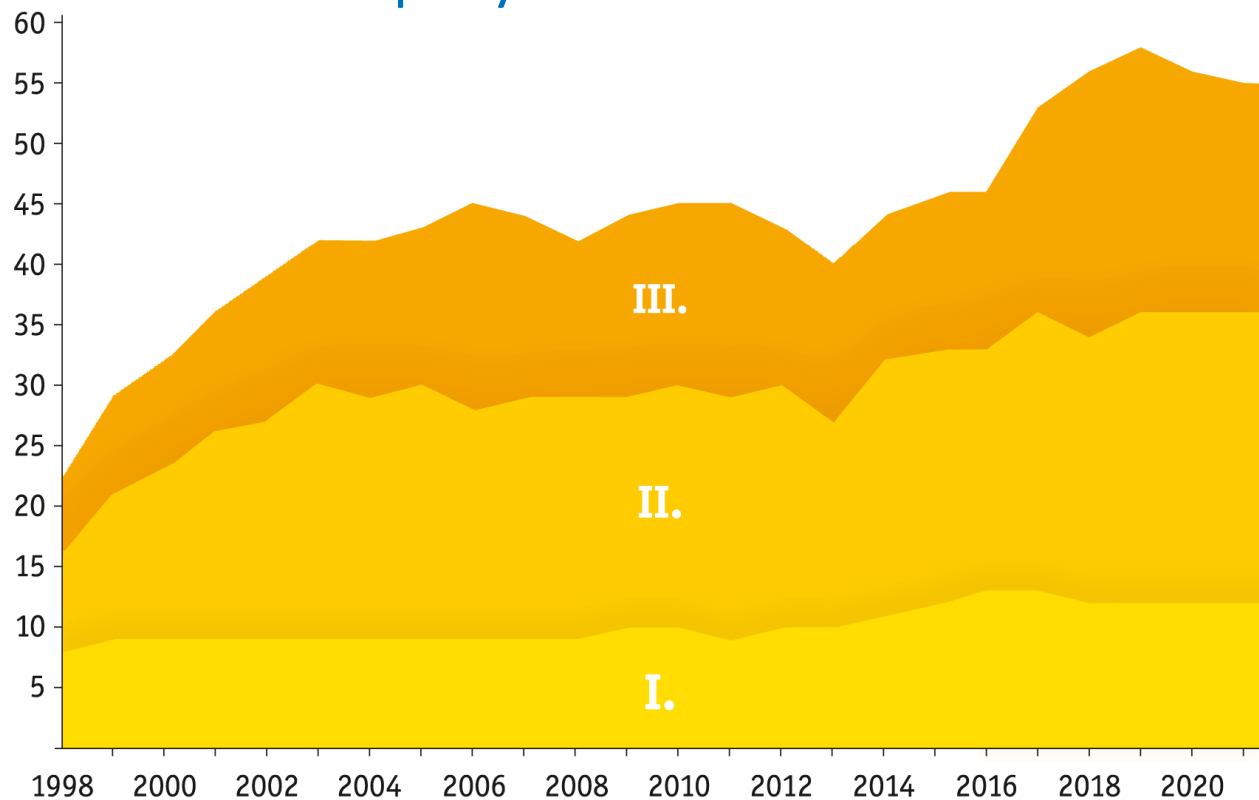
• Company members



• Individual members



Company members of ZAS



ZAS - International Activities

- **ZAS Study tours:**

- > Bratislava (Slovakia),
- > Vienna (Austria),
- > Sydney (Australia),
- > Sheffield (UK),
- > Washington & Lexington (USA),
- > Venice (Italy),
- > Bavaria (Germany)

- **E & E Congresses** (ZAS delegations):

- > Barcelona (Spain),
- > Vienna (Austria),
- > Copenhagen (Denmark),
- > Istanbul (Turkey)
- > Prague (Czech Republic)

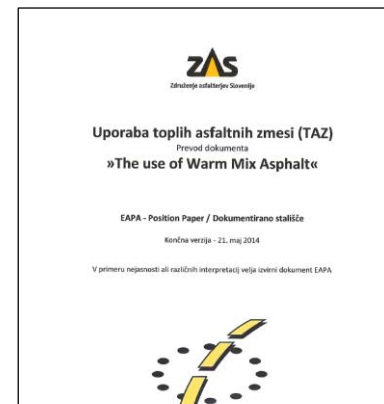
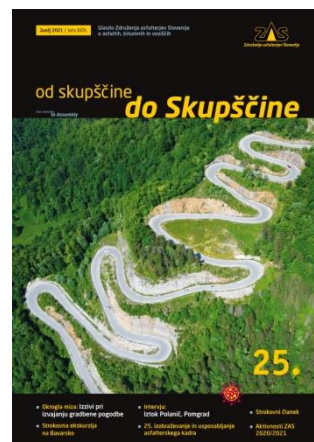
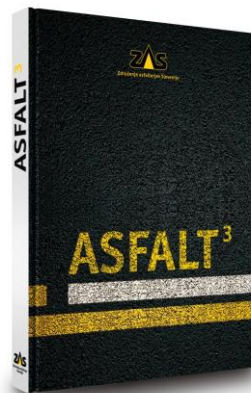


- E&E Congress Prague 2016; poster session

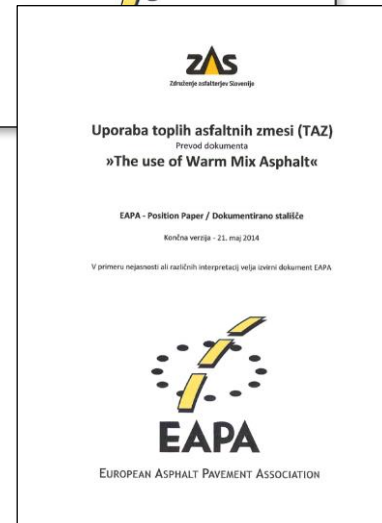
Visiting NAPA Washington, & Asphalt Institute Lexington 2015



Publishing



V primeru nejasnosti ali različnih interpretacij velja izvirni dokument EAPA.



EAPA - Position Paper / Dokumentirano stališče
Končna verzija - 21. maj 2014
V primeru nejasnosti ali različnih interpretacij velja izvirni dokument EAPA.



EUROPEAN ASPHALT PAVEMENT ASSOCIATION



25 Years of ZAS

Slovenian Asphalt Pavement Association

EVENTS 1996 - 2021

Events	Number	Speakers	Participation
General Assembly	27		2.000
Different events	64	152	6.000
Schooling	28	139	3.729
Colloquium on asphalt and bitumen	17	301	4.244
Together	119	452	13.817*

SWOT analysis

ADVANTAGES

- The asphalt industry in Slovenia has a tradition and reputation.
- Manufacturers and contractors are evenly distributed all over the country and have reliable technology.
- The asphalt industry is necessary and crucial for road network maintenance.
- The asphalt industry is well connected through ZAS, which provides domestic and international connectivity and cooperation.

OPPORTUNITIES

- Digital transformation of the industry in the entire Scope - ASPHALT 4.0.
- To present the industry as green, development-oriented and modern.
- To lower the production temperature of asphalt mixtures by 30 degrees Celsius.
- Asphalt can be 100% reusable - taken advantage of.
- Development of new technologies in the field of recycling, warm and less noisy asphalts.
- Development of new products such as asphalts with high modules, use of networks in special conditions.
- To establish a fairer delivery system and encourage the best through the public procurement system.
- To acquire staff for the new digital transformation.

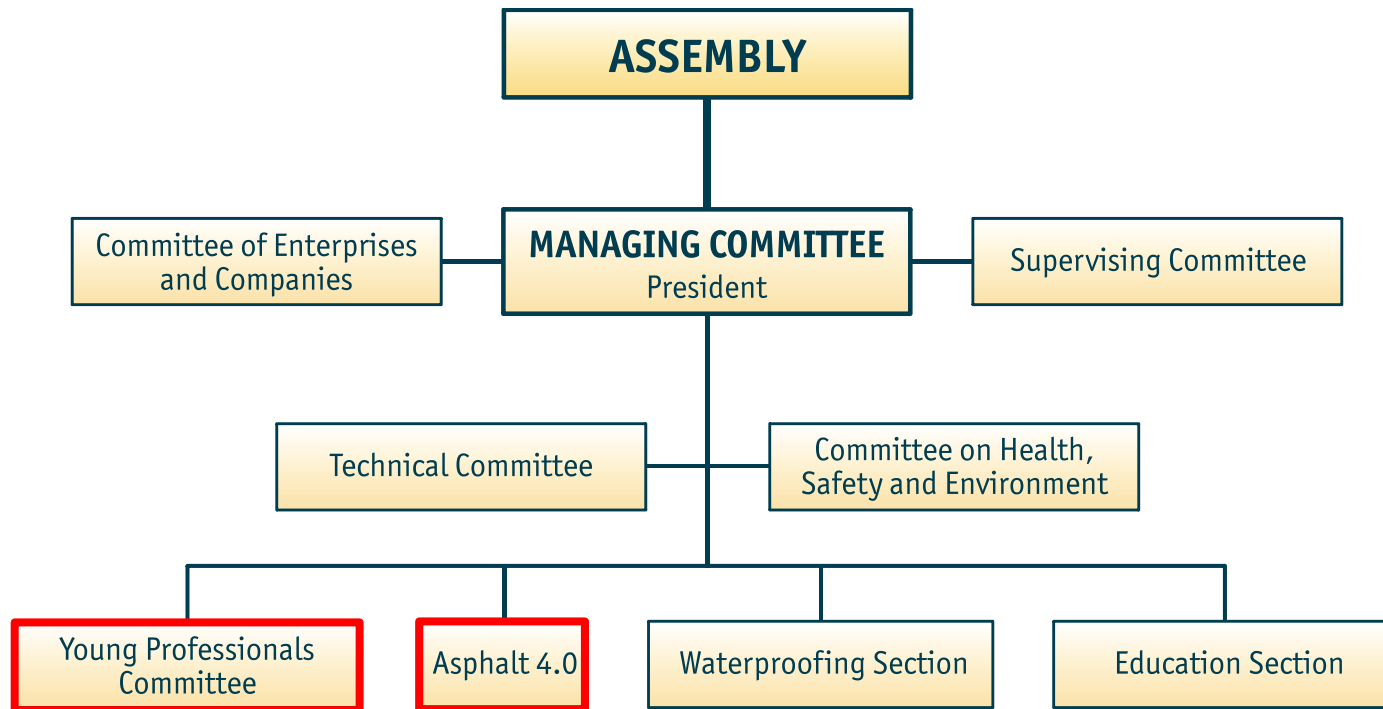
WEAKNESSES

- Professional potential of manufacturers and contractors as well as engineers and clients is also better, but still weakened.
- The scope of routine tasks is large, the existing staff is employed full-time, which prevents it from additional development activities and more training.
- Individual companies don't or can't invest in new equipment.
- Uneven delivery of works that concentrates the performance at the end of each year.
- Everyone takes care of their own narrow area of operation; there is no interest in anything else.
- Lack of development-oriented staff.

DANGERS

- The pandemic does not end in 2021 and acquires new dimensions.
- Power is taken over by the parties which are against any investing in roads.
- Negative image of traditional industries.
- Entry of other economic entities into the field of the asphalt industry.
- Import of asphalt mixtures from neighboring countries - unfair competition.
- In setting limit values of requirements, climate changes have to be taken into account.
- Dependence on individual monopoly suppliers.
- Too little ambition and satisfaction with the existing in terms of development, equipment and expansion activities.

ZAS - Organisation



Roads, Traffic and Pavement Design

Slovenian Roads

Motorways + Expressways	762 km
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Main and regional roads	5.936 km
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Local roads and public ways	32.224 km
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All together:	38.933 km
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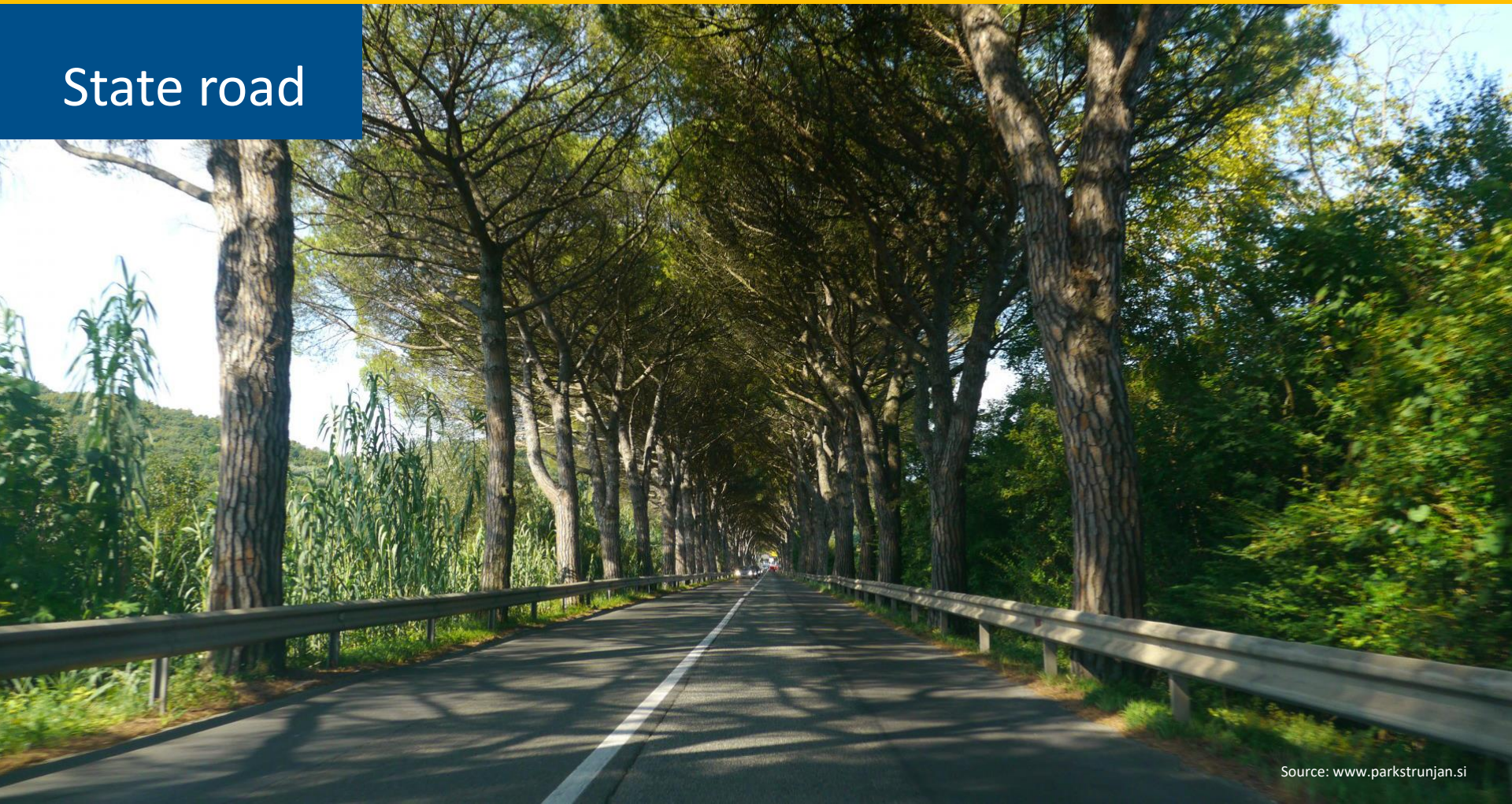
Slovenian Roads



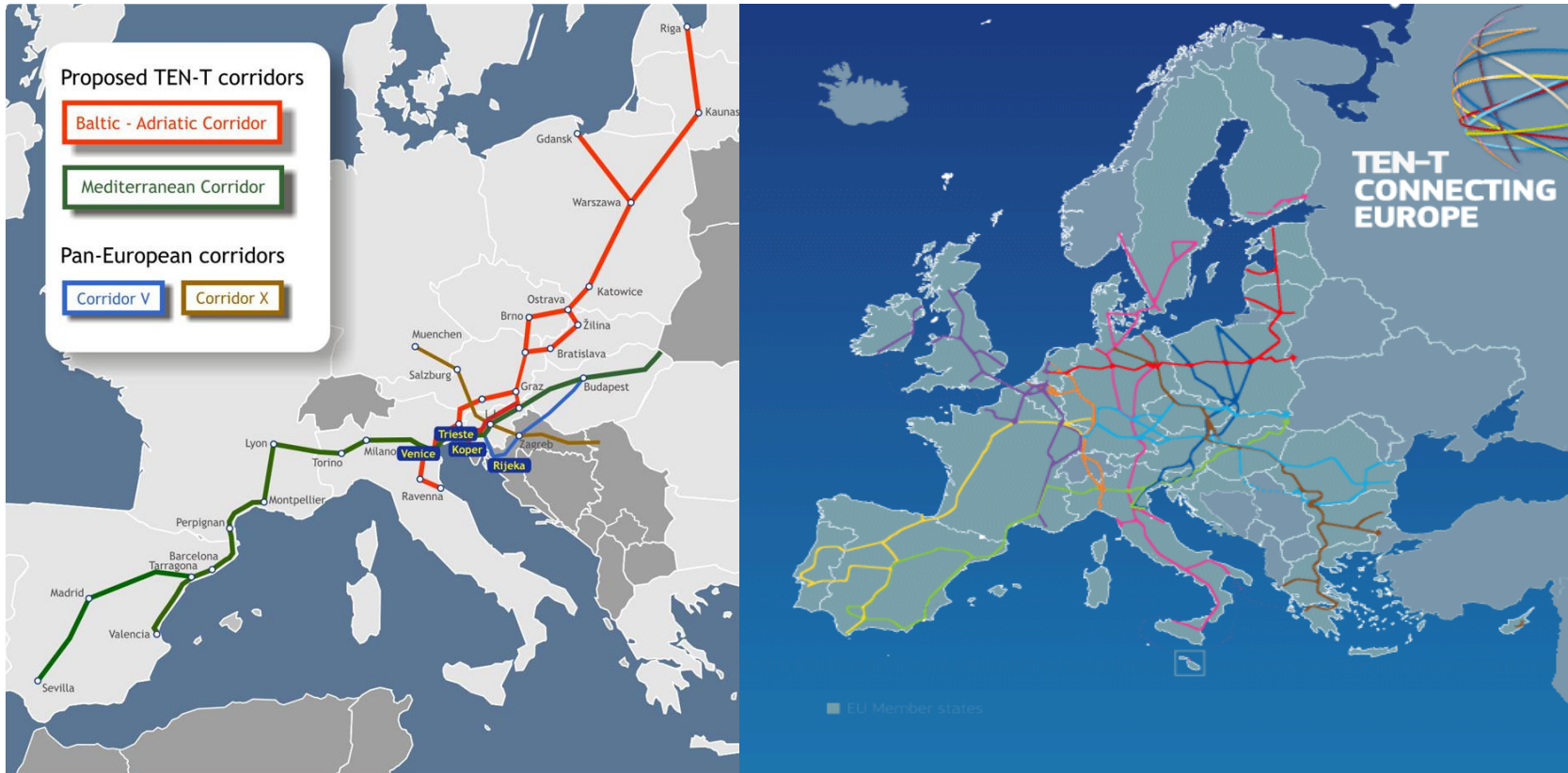
Motorway



State road



Slovenia is covered by two TEN-T corridors

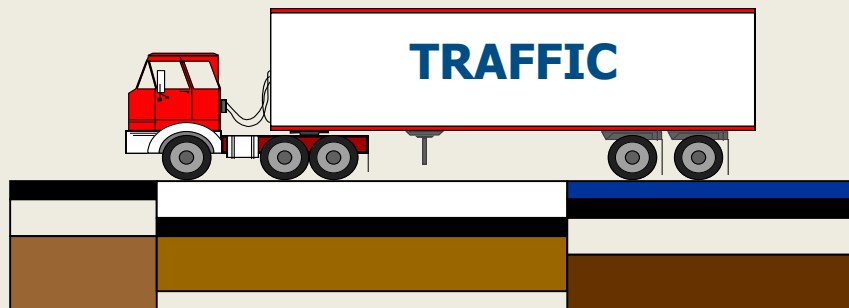


Traffic and Traffic Loads



Traffic Load

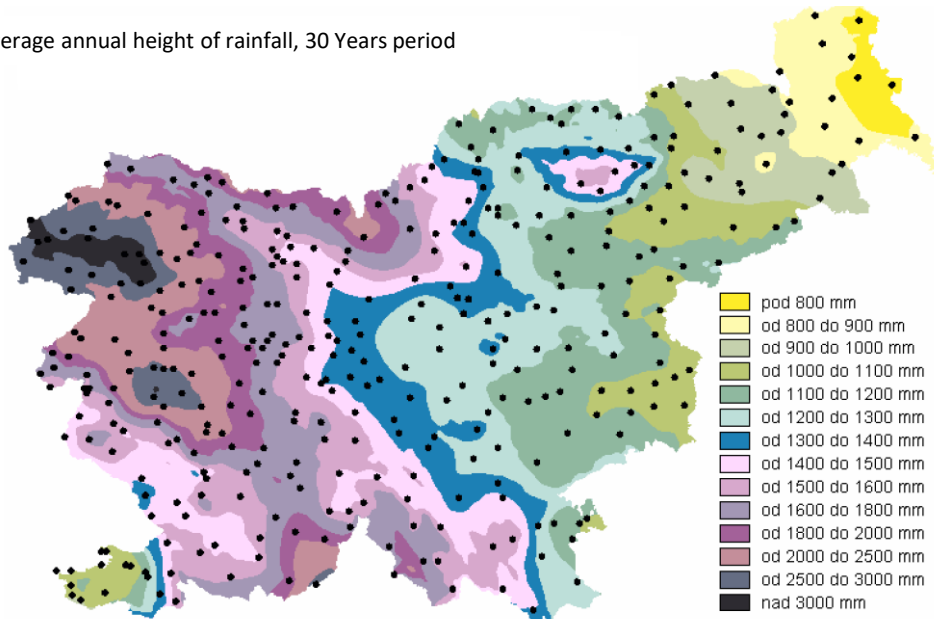
3 mio heavy vehicle
went cross Slovenia per Year



Temperature and rainfall in Slovenia

Temperature	Weather monitoring station			
	Portorož	Ljubljana	Slovenj Gradec	Murska Sobota
- highest - °C	36,3	37,1	34,5	37,9
- lowest - °C	- 10,3	- 20,3	- 27,0	- 26,9

Average annual height of rainfall, 30 Years period



3. Pavement Design Workshop, Lednice, Czech Republic 2018



SLOVENIAN ASPHALT
PAVEMENT ASSOCIATION



3. workshop

PAVEMENT DESIGN

*unique meeting of European experts
on Pavement design*

Term: 15–16 November 2018

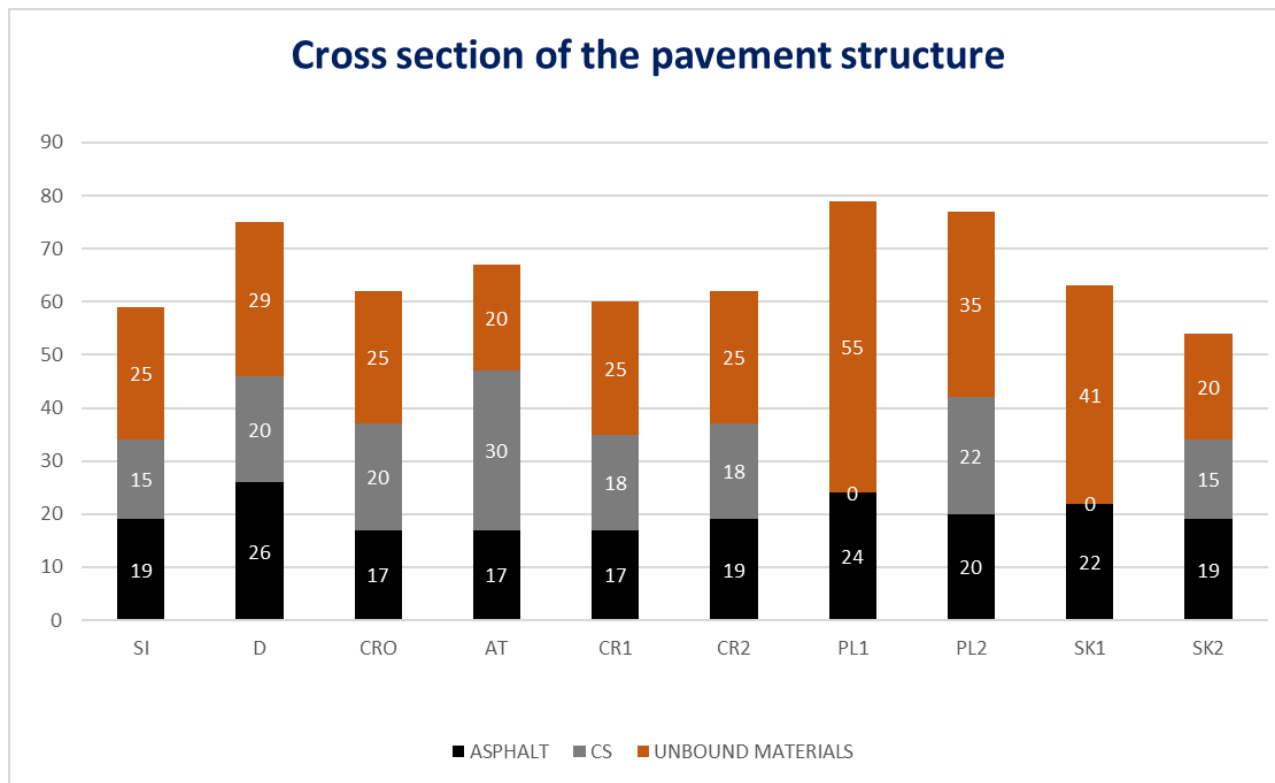
Place: Hotel Galant Lednice, Southern Moravia



3. Pavement Design Workshop, Lednice, Czech Republic 2018

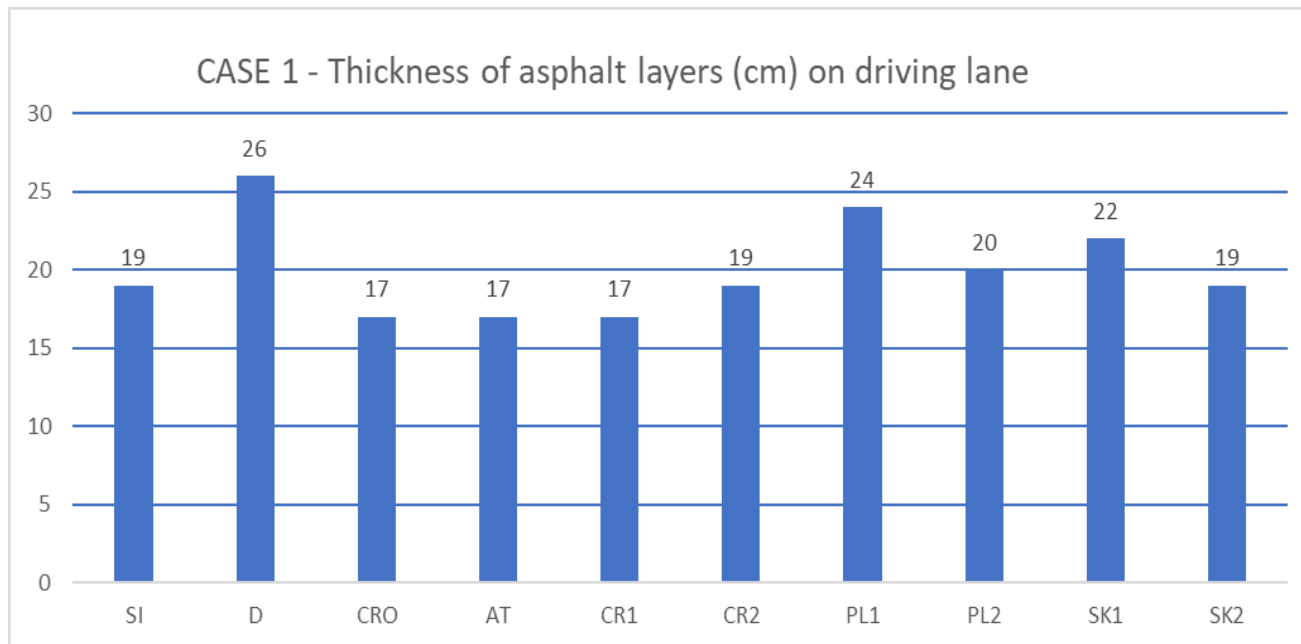


3. Pavement Design Workshop, Lednice, Czech Republic 2018



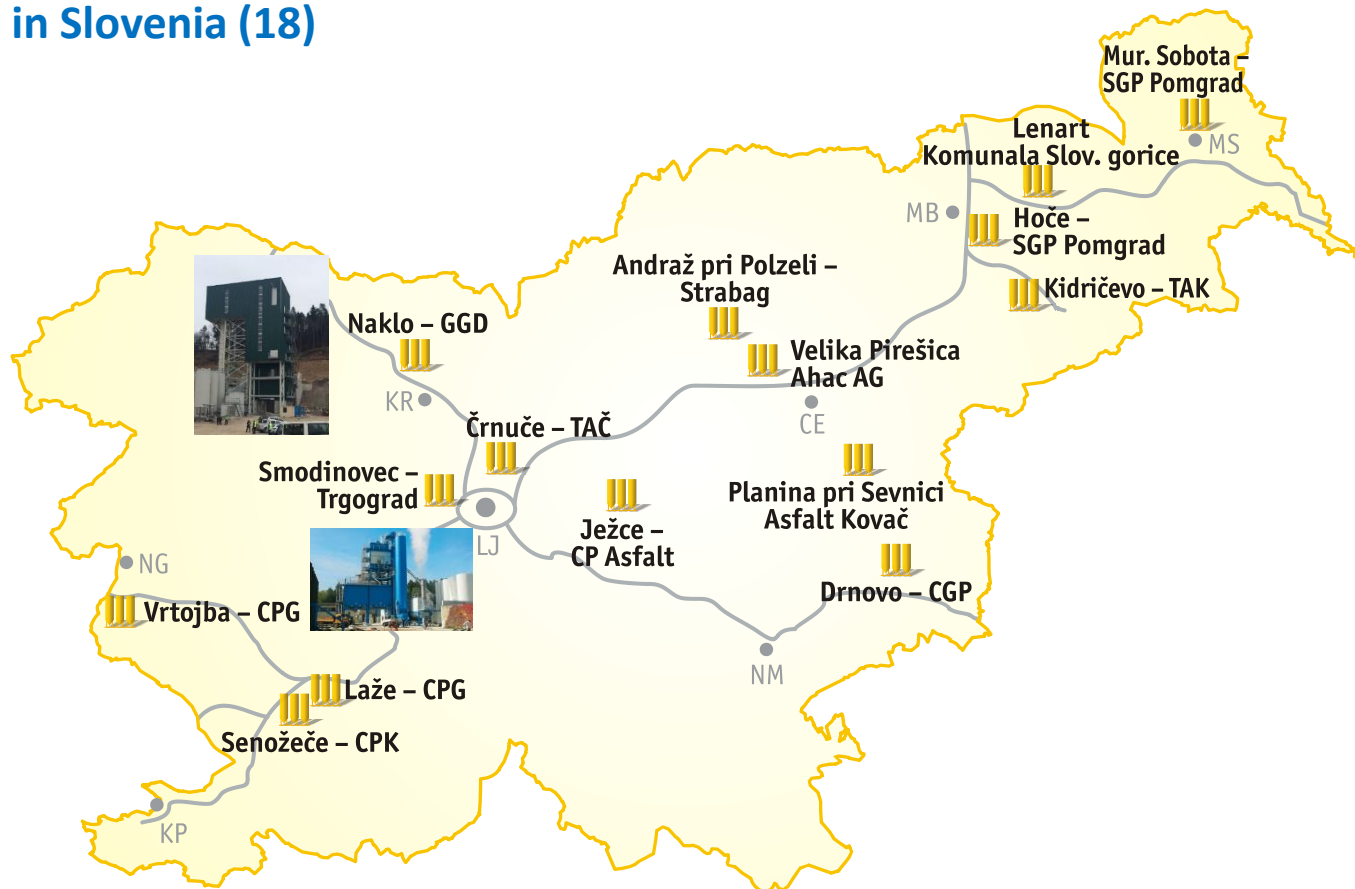
3. Pavement Design Workshop, Lednice, Czech Republic 2018

Comparison of asphalt thickness -

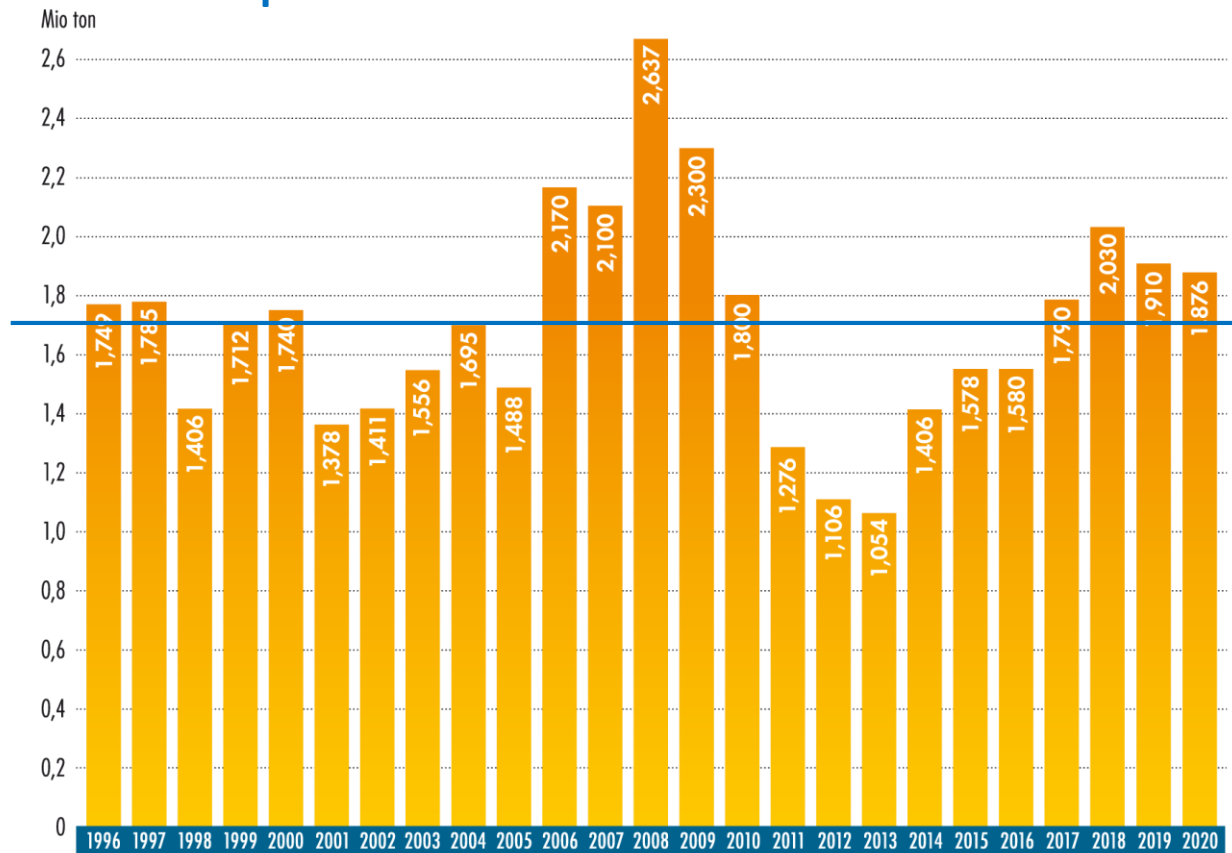


Asphalt Production in Slovenia

Asphalt plants in Slovenia (18)



Asphalt Production in Slovenia 1996 - 2020



42,571
mio ton
= 1,7 mio
ton/Year

ASPHALT 4.0 and look forward

Today's challenges

3 D printing

Internet Of Things

Industry 4.0

Digital Twin

Big data

BIM

Cloud



Autonomous Vehicle



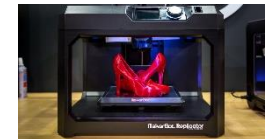
Robotisation

Block Chain



SPIMES = SPace+tIMES

Artificial Intelligence



ASPHALT 4.0

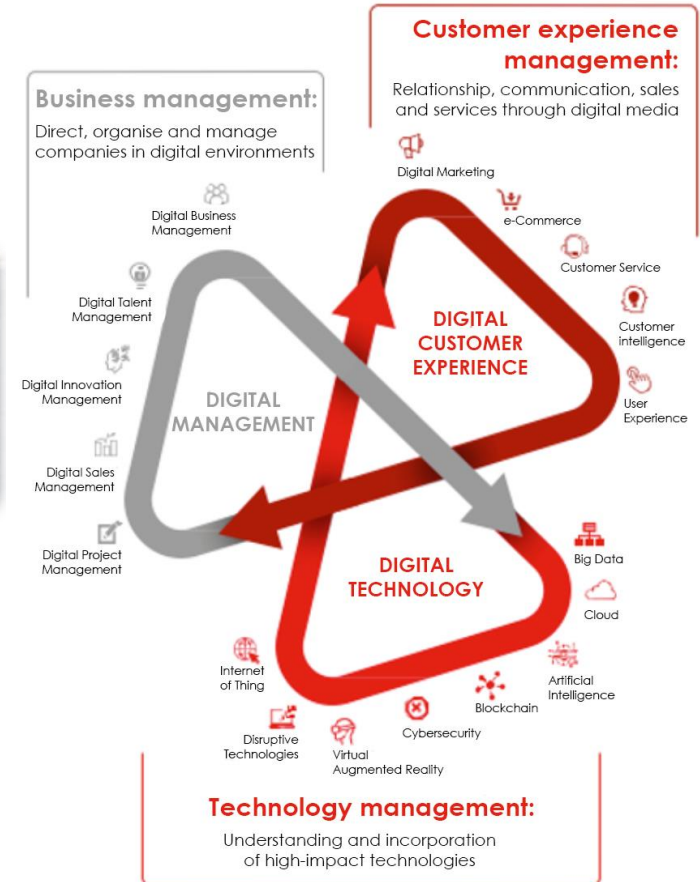
Digital transformation of road paving:

- series of smart and autonomous systems fueled by big data,
- machine learning,
- artificial intelligence,
- blockchain,
- internet of things (IoT), etc.



Capacity to significantly push forward:

- the efficiency,
- productivity,
- quality,
- reliability and
- sustainability of asphalt roads.



Prime objective strategy

Reducing the required asphalt production temperature for 30 °K in the next 3 years, for all asphalt mixtures.



Main goal strategy
-30°K

EN 13108-1:2006 (E)

Table 10 — Retained strength, β

Minimum retained strength %	Category β
100	β_{100}
85	β_{85}
70	β_{70}
55	β_{55}
No requirement	β_{NR}

5.2.10 Temperature of the mixture

When using paving grade bitumen, the temperatures of the mixture, measured according to EN 12697-13, shall be within the limits of Table 11. The maximum temperature applies at any place in the plant; the minimum temperature applies at the delivery.

Table 11 — Temperature limits of the mixture

Paving grade of binder	Temperature °C
20/30	160 to 200
30/45	155 to 195
35/50, 40/60	150 to 190
50/70, 70/100	140 to 180
100/150, 160/220	130 to 170
250/330, 330/430	120 to 160

When using modified bitumen or hard grade bitumen or additives, different temperatures may be applicable. These shall then be documented and declared on the CE mark certificate.

5.2.11 Durability

Asphalt Concrete produced in accordance with the requirements of this European Standard may be considered durable for a reasonable working life.

NOTE: A reasonable working life within the context of this European Standard is the period of time during which the performance of the works will be maintained at a level compatible with the declared performance of the characteristics.

5.3 Empirical requirements

5.3.1 Composition, grading, binder content and additives

5.3.1.1 General

At the target composition the grading shall conform to 5.3.1.2.

At the target composition the binder content shall conform to 5.3.1.3.

ASPHALT 4.0 Strategy in Slovenia

1. Implementation of A. 4.0 strategy at the national level
2. Introduction of new materials and technologies
3. Grain (material) and temperature segregation
4. Management of temperature
5. Conclusions and outlook

1. Implementation of Asphalt 4.0 strategy at the national (international) level

Provide conditions for:

- Sustainability
- Safety and comfort driving
- Lower carbon footprint
- Lower energy consumption
- Reuse (recycling)
- Low noise



REPUBLIKA SLOVENIJA
MINISTRSTVO ZA INFRASTRUKTURO

DARS

DRI



KOLEKTOR



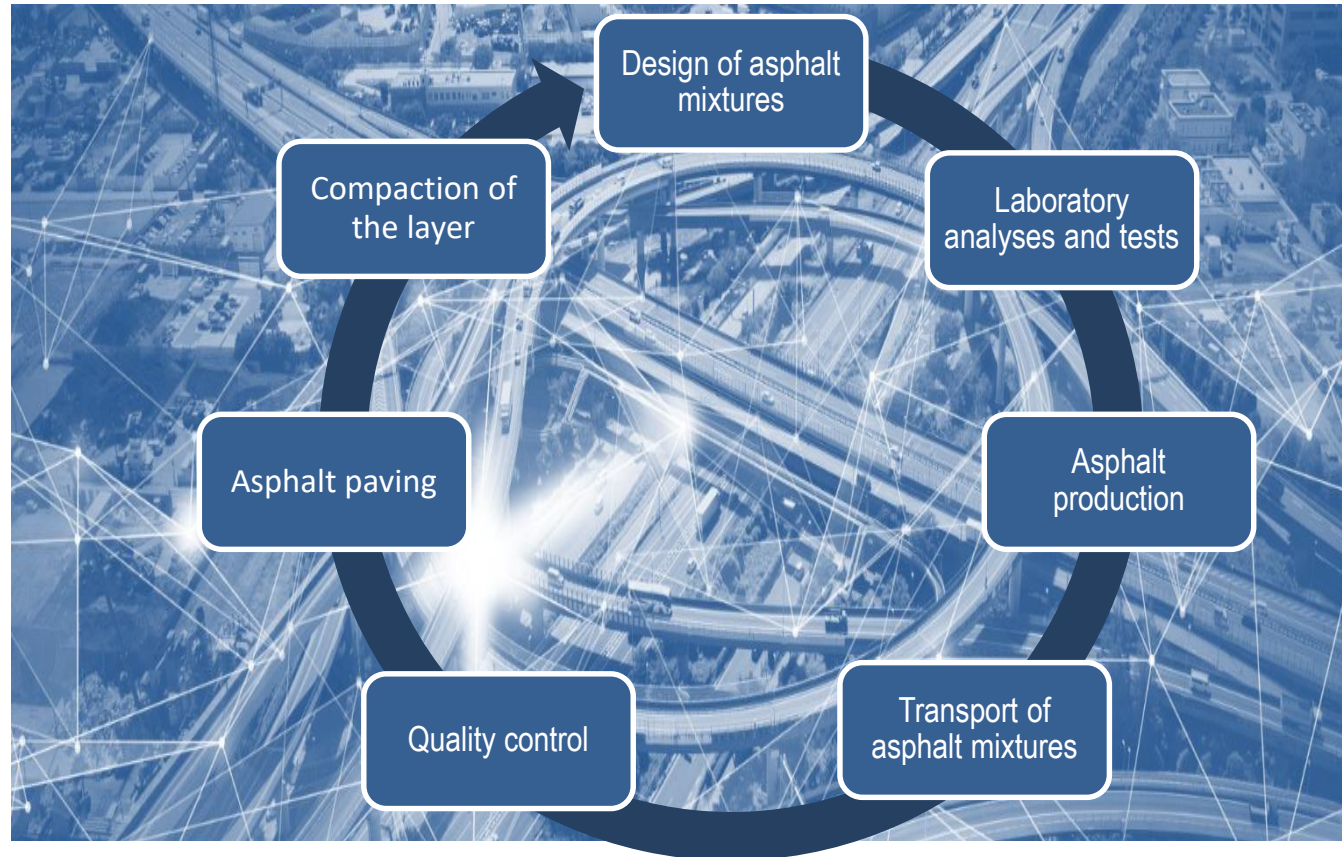
POMGRAD

trgoograd



NEW TECHNICAL REGULATIVE
AT THE NATIONAL LEVEL

2. Introduction of new materials and technologies



DESIGN OF ASPHALT MIXTURES

- Asphalt mixtures using recycling materials
- Asphalts with high modules
- Warm asphalts
- Drainage and semi-drainage asphalts
- Asphalts with additives (rubber, natural bitumen, viscosity reducing additives, admixtures for better adhesion, ...)



LABORATORY ANALYSES AND TESTS

Dynamic investigations (simulation of real conditions in the laboratory)

Surface, binder and base layer:

- stiffness,
- fatigue,
- wheel tracking
- low temperature tests.



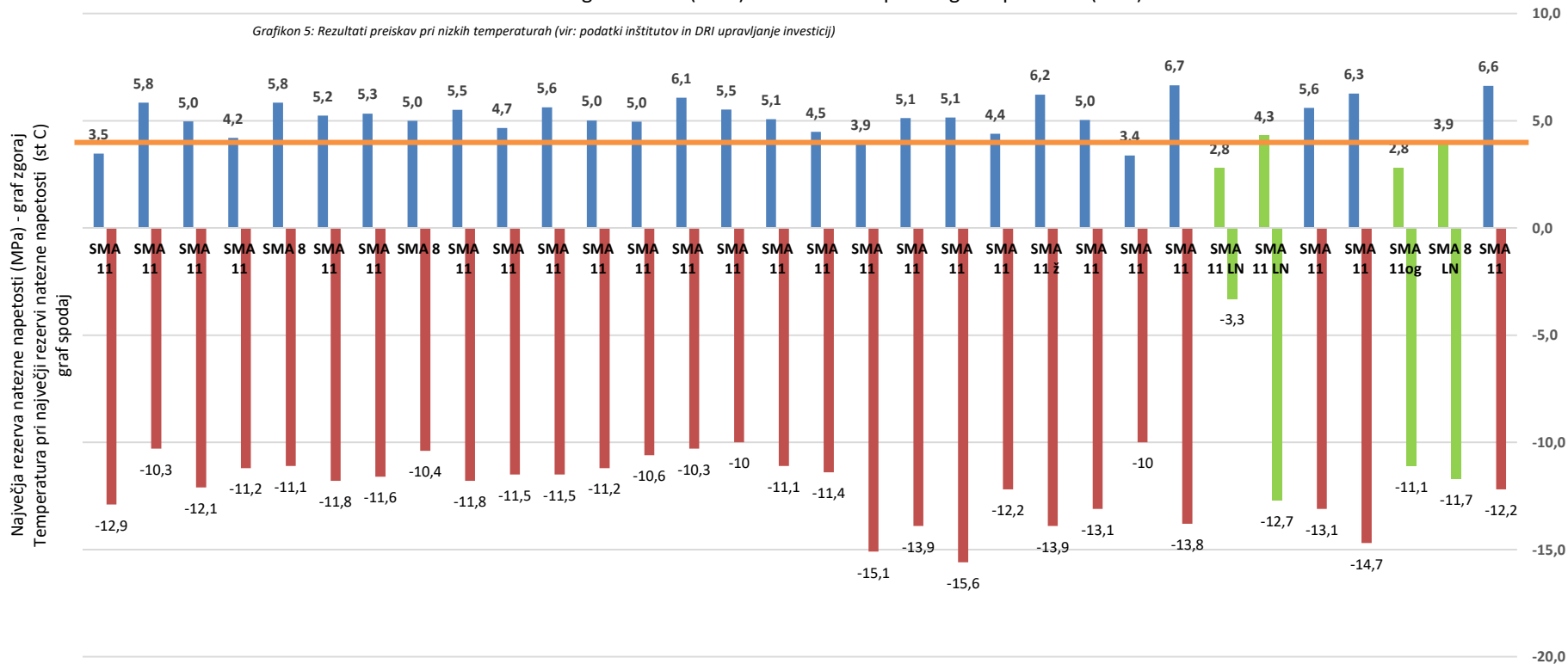
Low Temperature Behaviour



Dynamic laboratory tests – Low Temperature Behaviour

Tensile Strength Reserve (MPa) with the corresponding temperature (st. C)

Grafikon 5: Rezultati preiskav pri nizkih temperaturah (vir: podatki inštitutov in DRI upravljanje investicij)



ASPHALT PRODUCTION

„Smart“ asphalt plants

- digitization in all segments of the plant
- technology for the use of asphalt granulate
- technology for reduction the production temperature
- plant suitability for adding all types of additives



TRANSPORT OF ASPHALT MIXTURES

- Transport and dosing technology to prevent grain segregation (asphalt feeder),
- transport and dosing technology to prevent temperature segregation (push-off trailer),
- use of insulated caissons in connection with the use of an asphalt feeder during installation,
- digital monitoring and logistical management of transport.



QUALITY CONTROL

- IRI measurements,
- continuous measurements of friction properties (Scrimtex),
- continuous noise measurements (CPX),
- continuous temperature measurements (Road scan),
- continuous layer thickness measurements (Georadar),
- measurement of temperature segregation.



ASPHALT PAVING

- Technologies for ensuring evenness of the asphalt layer ("big ski"),
- technology for monitoring the temperature of the laid layer (road scan),
- digital monitoring and ensuring a continuous supply of asphalt mixtures (eg "vitos"),
- installation technology to prevent grain segregation (asphalt mixture feeder, or the use of push reversal),
- installation technology to prevent temperature segregation (asphalt mixture feeder, or the use of push-off trailer).

COMPACTI ON OF THE LAYER

- Technologies for continuous asphalt monitoring (»asphalt manager«),
- technology for adjusting the direction and amplitude of vibrations (oscillation)



5. Conclusions and outlook



THE ASPHALT INDUSTRY will be forced to significantly reduce the production temperature of asphalt mixtures in the next short term.

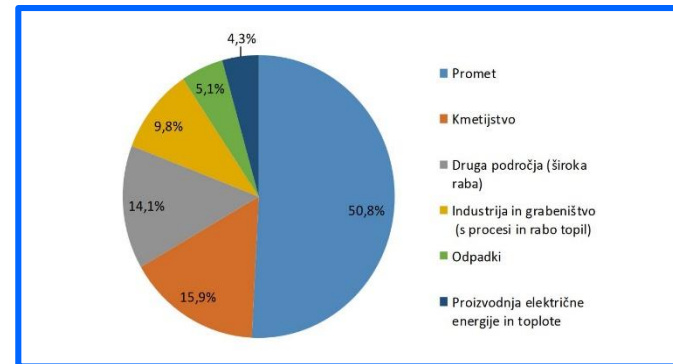


Due to the need to reduce the production temperature of asphalt, it will be **NECESSARY** to **REDUCE TEMPERATURE SEGREGATION TO A MINIMUM**.



TRANSPORT AND PAVING of asphalt in terms of temperature segregation are the weakest link in the whole asphalt paving process.

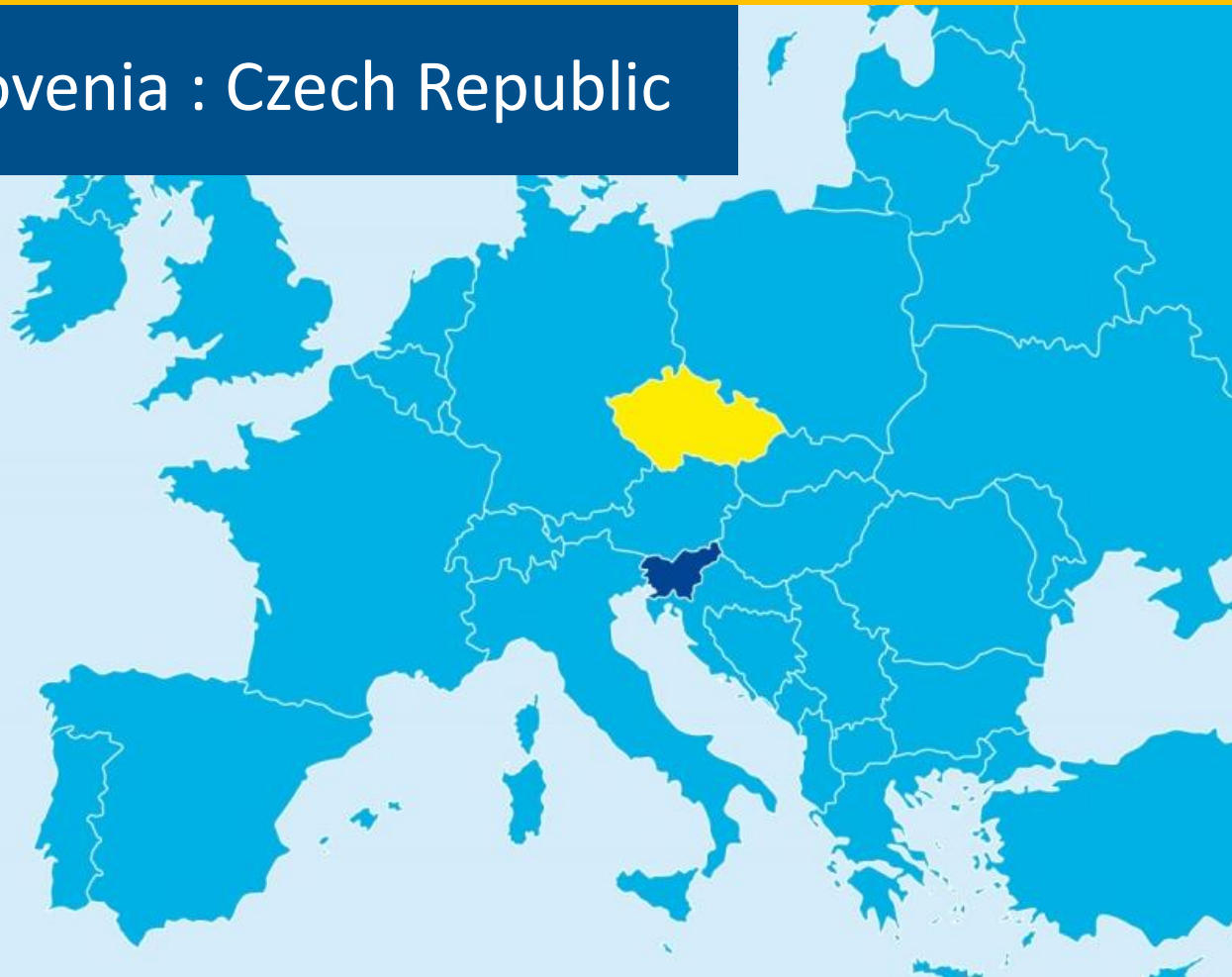
Reducing of CO₂ emission from 40% to 55% until 2030 in comparison to 1990.





Slovenija vs Czech Republic

Slovenia : Czech Republic



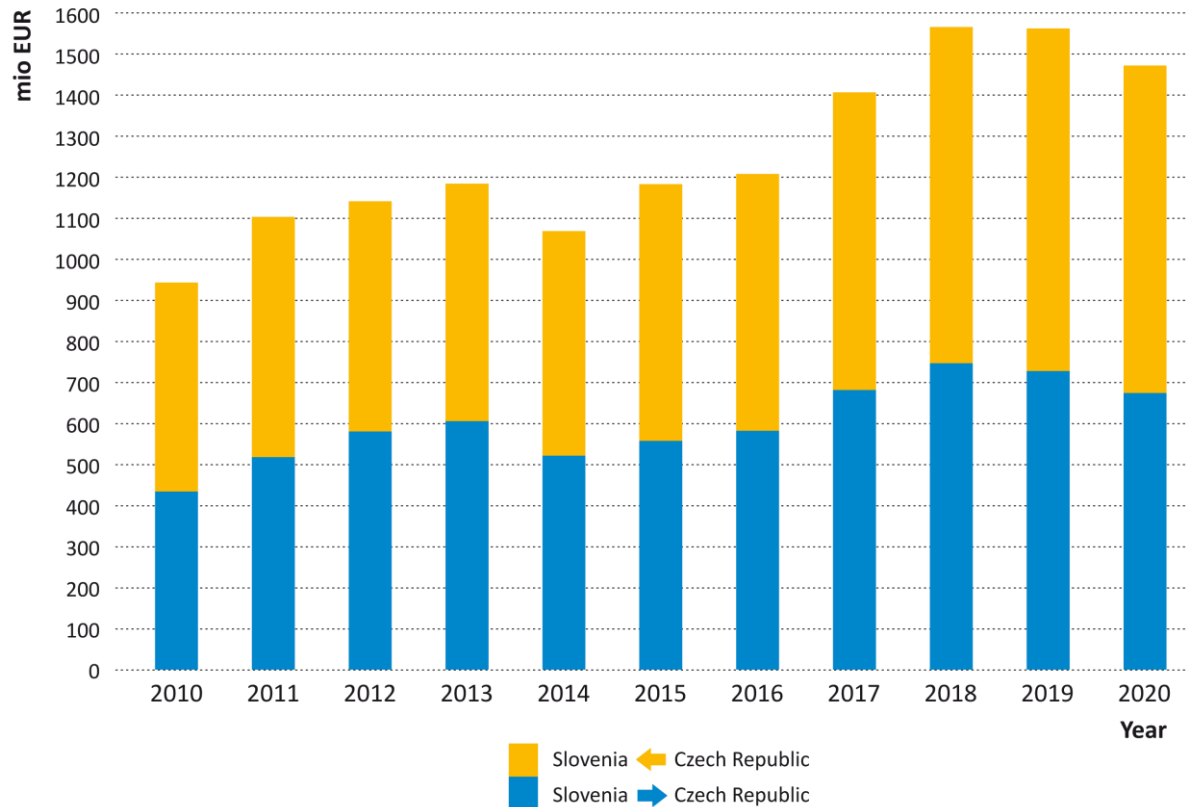
Surface 1 : 4

Population 1 : 5

Asphalt Production 1 : 4

1,7 mio t : 6,65 mio t

Trade between Slovenia and Czech Republic



18th Colloquium

ASPHALT, BITUMEN and PAVEMENTS

The largest international meeting of construction
and maintenance of pavements in Slovenia

Rikli Balance hotel | Bled | Slovenia

2. - 3. december | 2021

1. december 2021:

14.00 Ministry of Infrastructure - ZAS - EAPA

16.00 Enterprises and companies committee - ZAS

18.30 Opening of exhibition spaces



Združenje asfalterjev Slovenije

Slovenian Asphalt Pavement Association

PETROL

ZAS with cooperation of PETROL,
the leading Slovenian energy company



Facts of Colloquiums 1996 -2019

Number of Papers
217

Number of Lecturers
301

Number of Participants
4.244

Number of Exhibitors
513

Additional information:
www.kolokviji.si

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info@zdruzenje-zas.si



Colloquium on Asphalt and Bitumen | Bled



The largest international meeting of construction and maintenance of pavements in Slovenia



Thank you for attention!
