

LISBOA 2010 MAY 25/28

16th World Meeting



Sustainability of bituminous mixes
manufactured at lower temperatures.

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Sustanaibility of bituminous mixes manufactured at lower temperatures





Sustainability of bituminous mixes
manufactured at lower temperatures

Outline

- The use of LCA in the evaluation of bituminous mixes.
- Comparison of hot and low temperature mixes.
- Key parameters to improve sustainability of pavements.



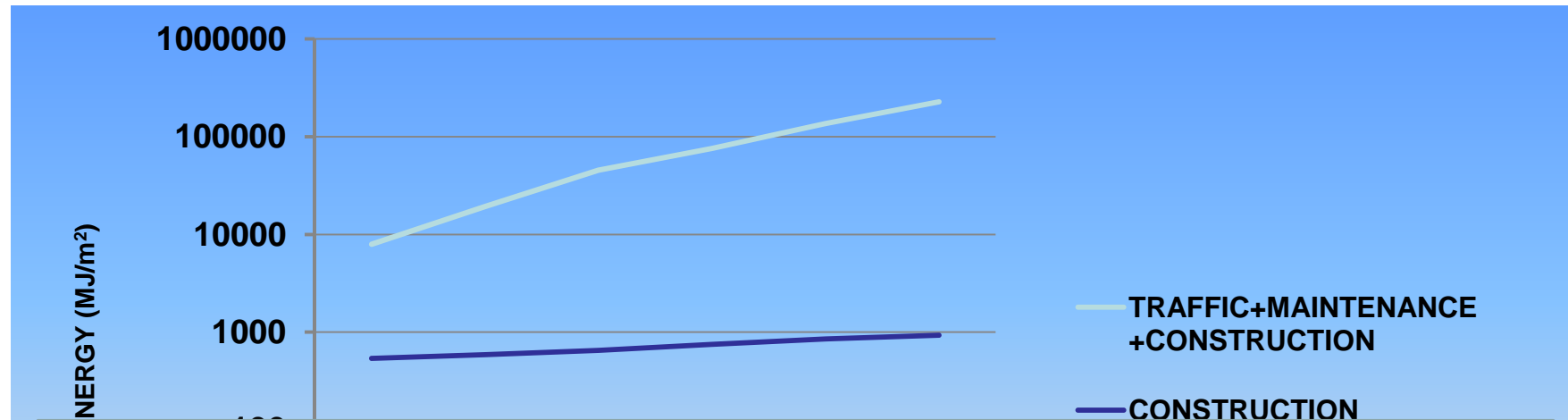
LIFE CYCLE ASSESSMENT

How has been implemented LCA in Proyecto Fénix?

- Ecoindicator 99
- Egalitarian version
- Types of damages evaluated :
 - Ecosystem quality.
 - Resources
 - Human health

GLOBAL LCA EVALUATION OF A PAVEMENT

“from the cradle to the grave”



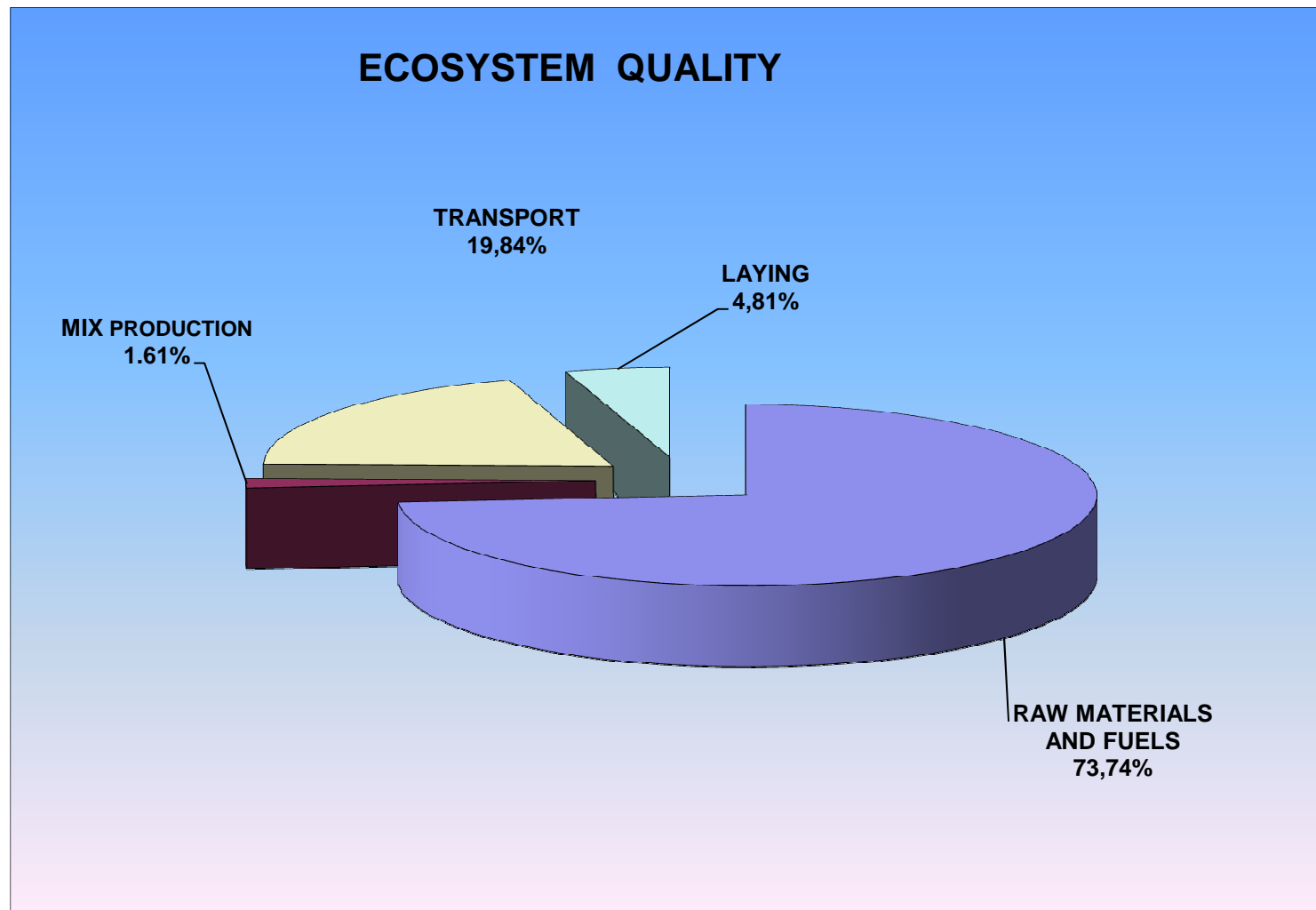
Impacts of traffic operation are 10-100 times those induced by construction and maintenance (30 years period)



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LCA EVALUATION OF ASPHALT CONCRETE

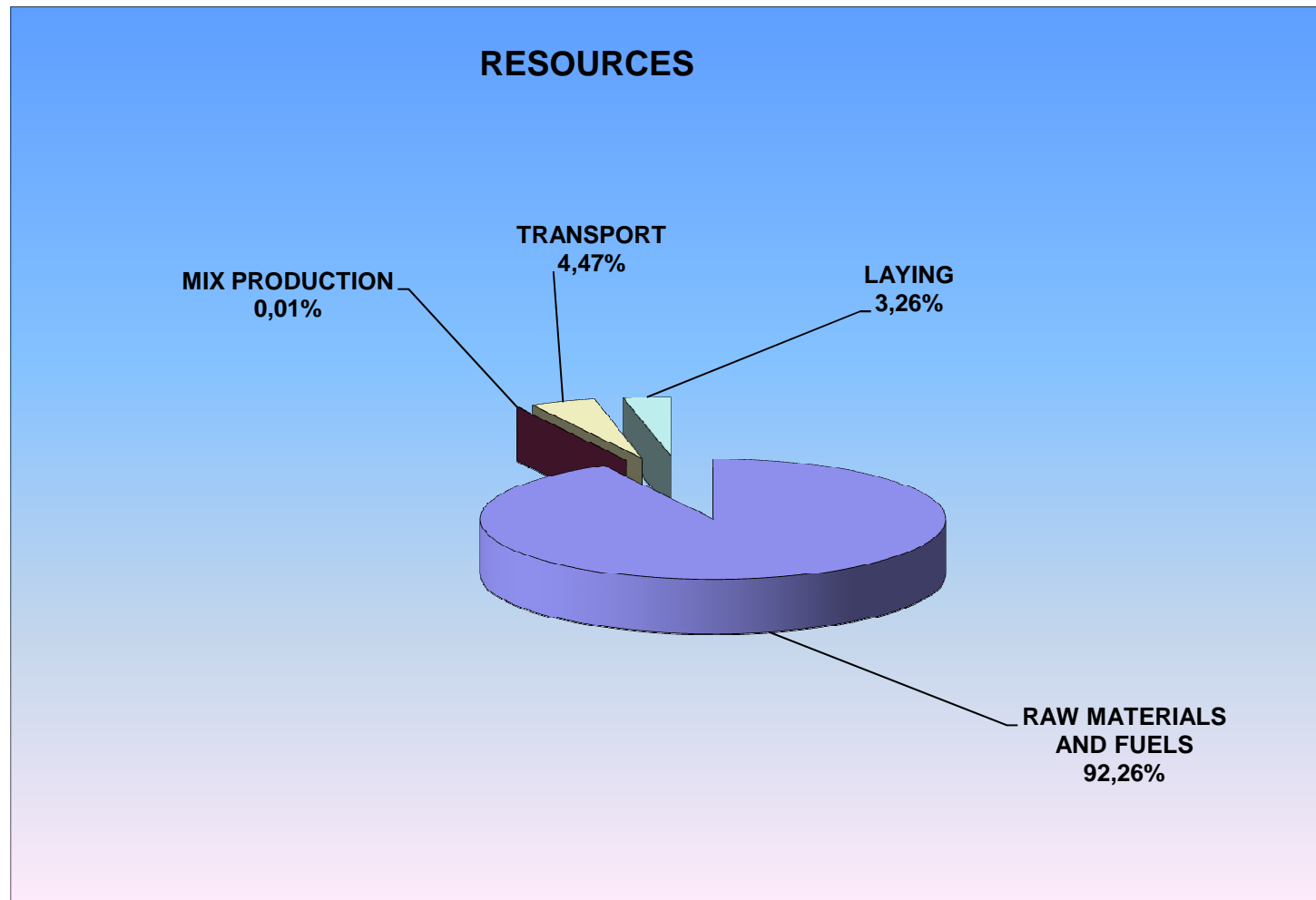




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LCA EVALUATION OF ASPHALT CONCRETE

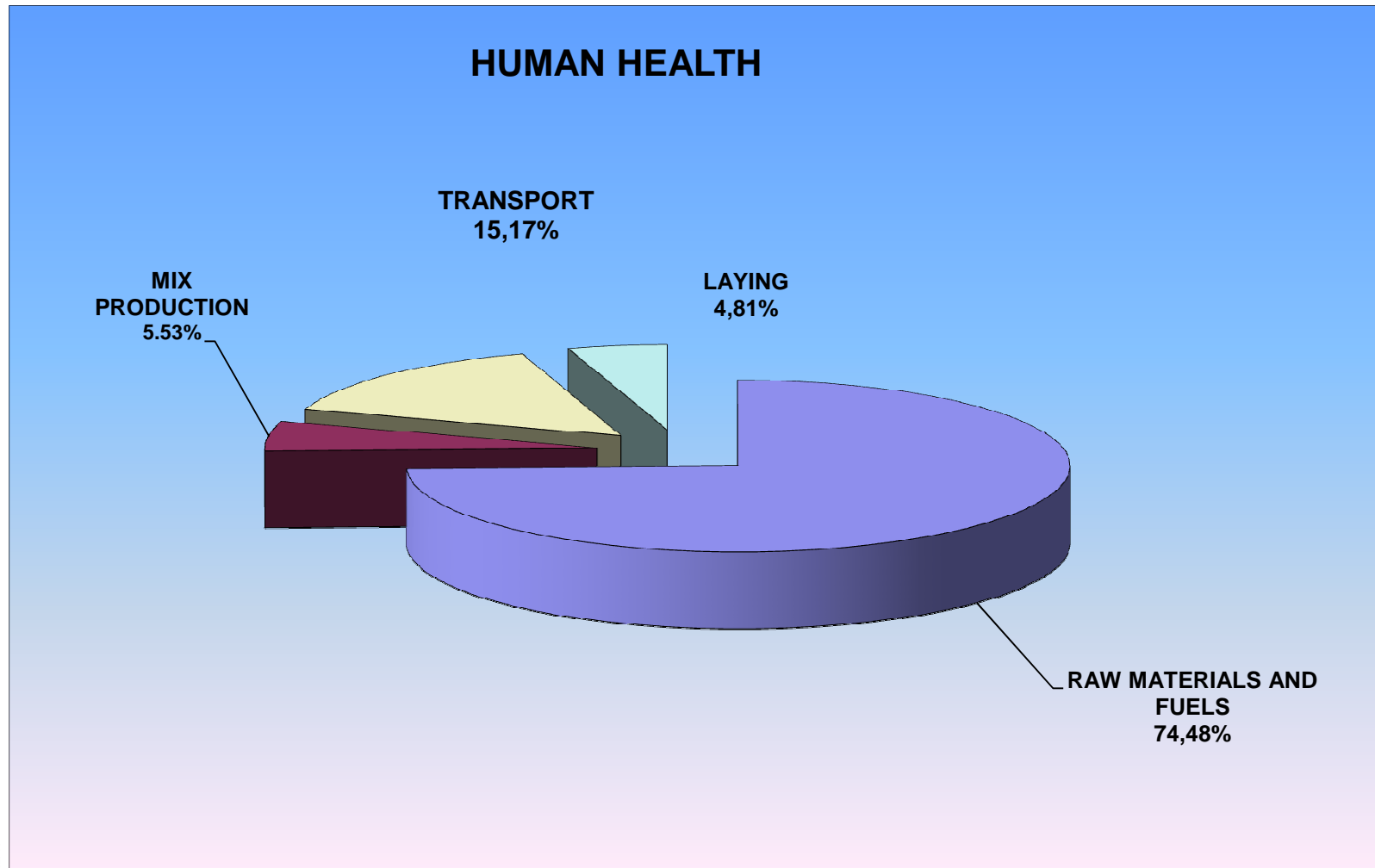




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LCA EVALUATION OF ASPHALT CONCRETE



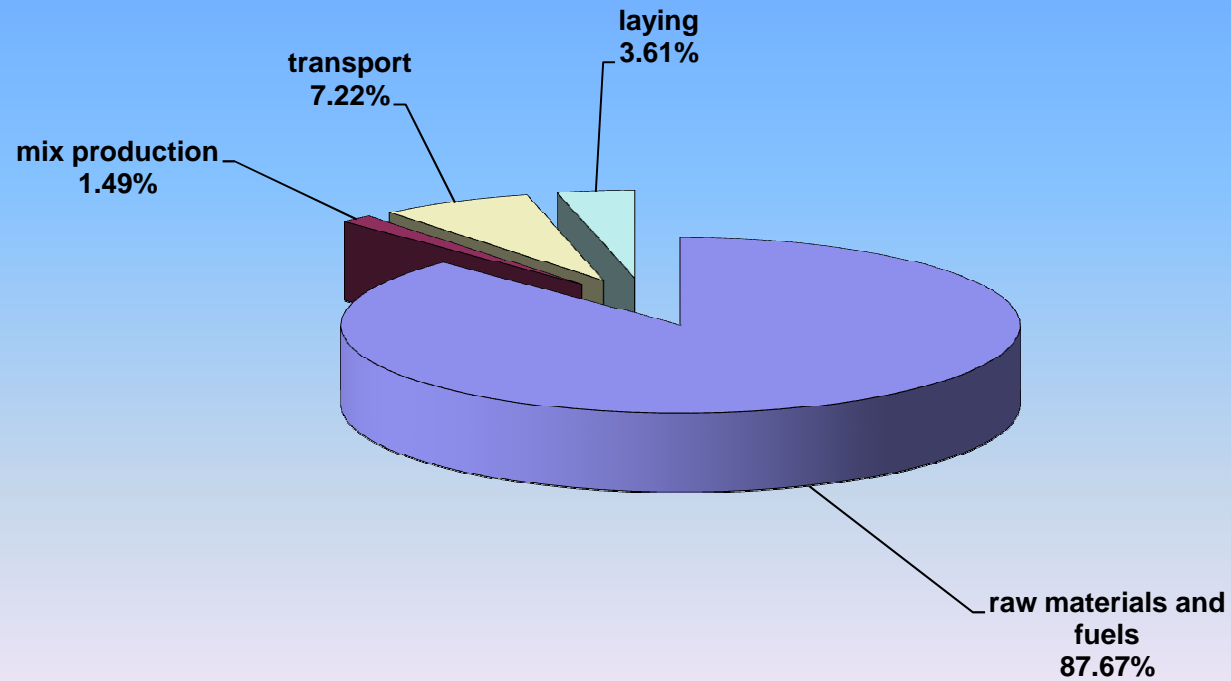


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LCA EVALUATION OF ASPHALT CONCRETE

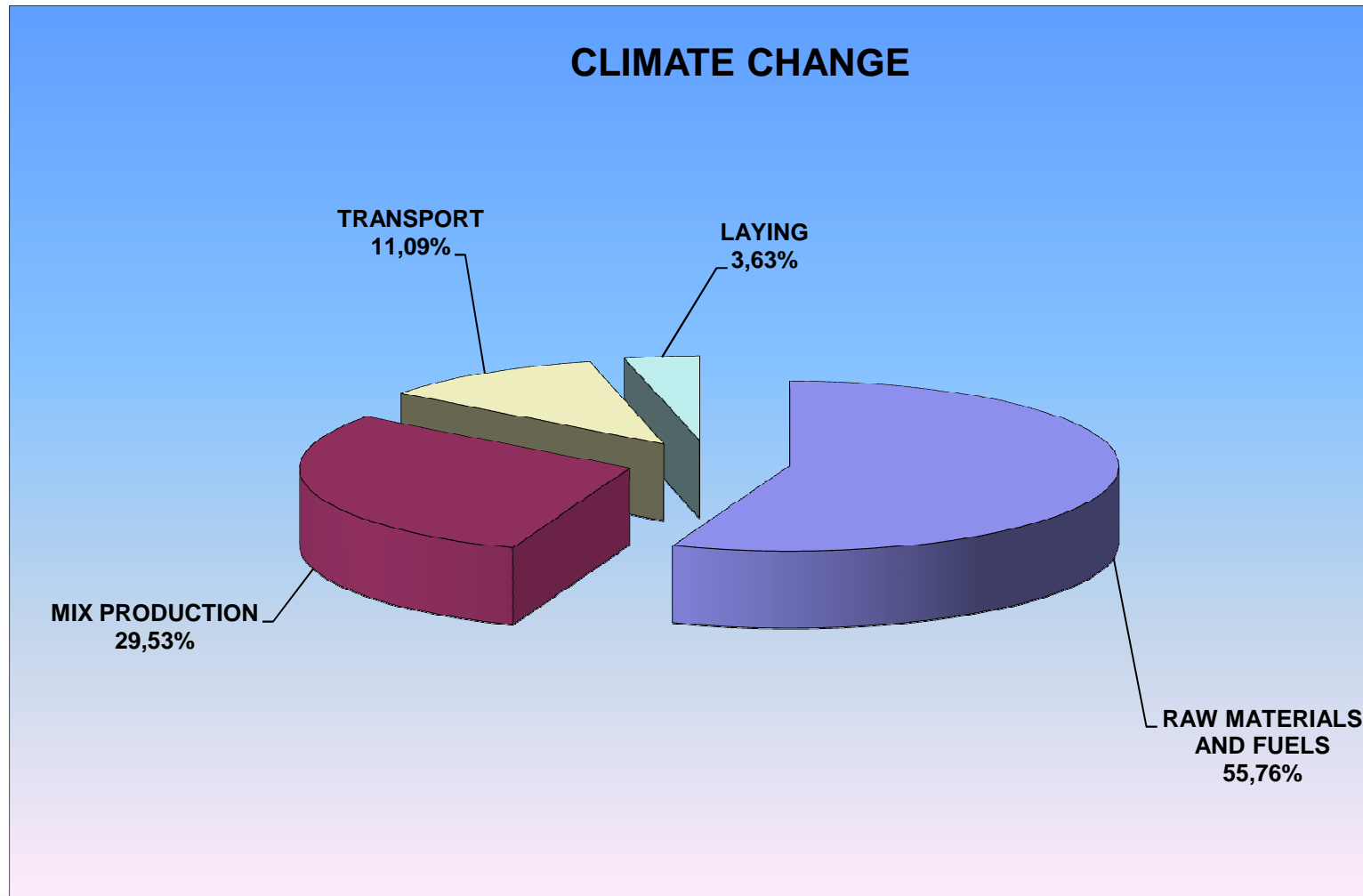
DAMAGES DISTRIBUTION (ECOPOINTS)





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LCA EVALUATION OF ASPHALT CONCRETE



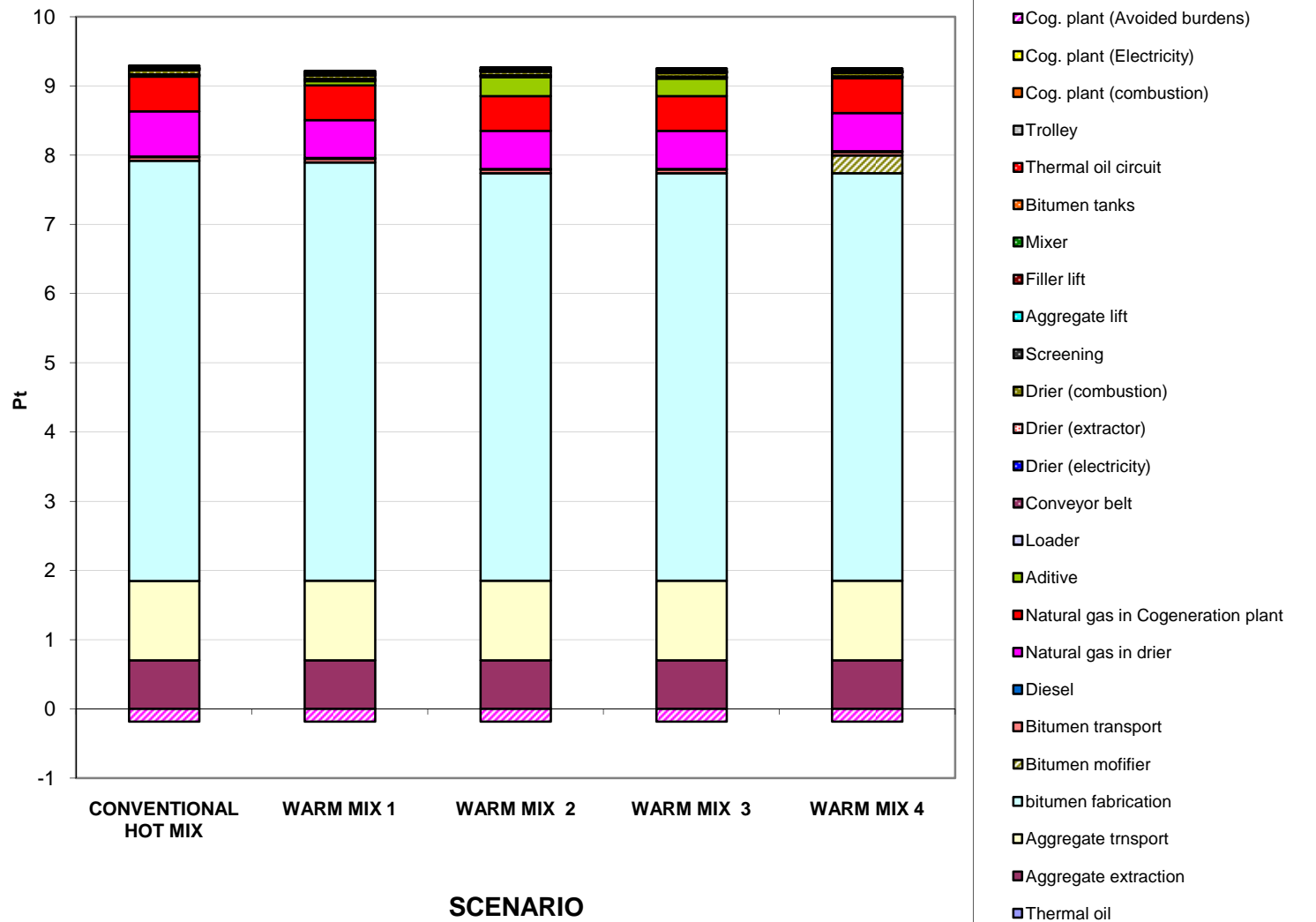


Sustainability of bituminous mixes manufactured at lower temperatures

- Main claims of warm and half-warm mixes:
 - Energy savings
 - Lower GHG emissions
 - Lower COV emissions (health and safety).



ENVIRONMENTAL IMPACTS OF HOT vs WARM MIXES (UP TO MANUFACTURING)



KEY PROPERTIES OF ASPHALT PAVEMENTS

DURABILITY

– Stiffness.



– Fatigue resistance.

– High resistance to stripping.

KEY PROPERTIES OF BITUMINOUS MIXES

STIFFNESS (I)

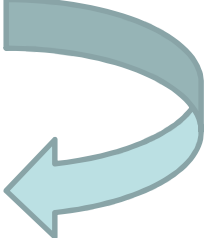
35-50 BITUMEN (PENETRATION 50 X 0,1 MM)

Mix temperature	Recovered binder (penetration x0,1 mm)
155-160°C	23
120-125°C	29

KEY PROPERTIES OF BITUMINOUS MIXES

STIFFNESS (II)

Mix temperature	Recovered binder
155-160°C	23
120-125°C	29

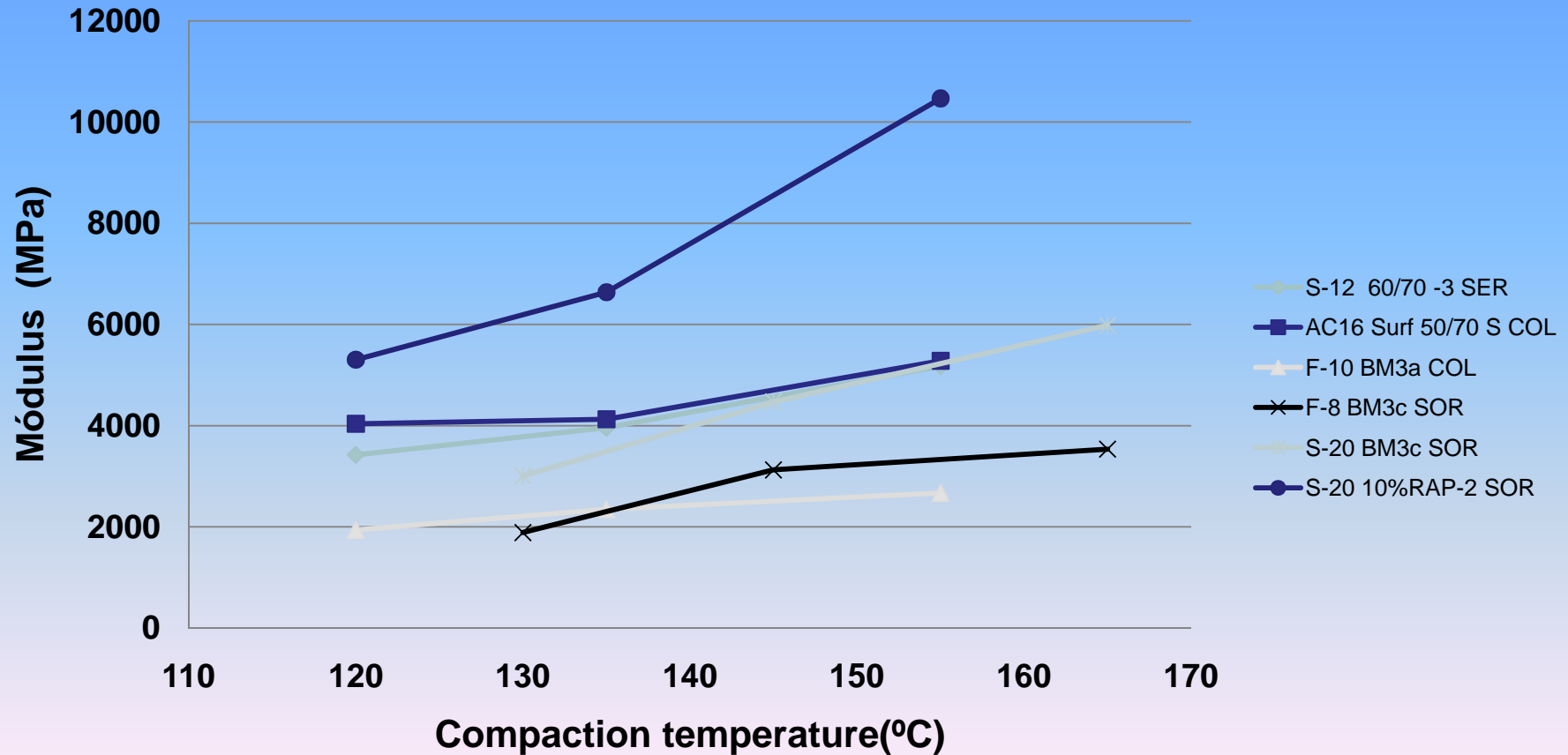


-25%
stiffness

- Should we consider the lower stiffness to redesign the pavement ?
- Is there any improvement in fatigue?

KEY PROPERTIES OF BITUMINOUS MIXES

STIFFNESS MODULUS vs COMPACTION TEMPERATURE (HOT MIXES)





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Conclusions

- LCA allows a wider vision to get real sustainability.
- Durability of the pavement is the main goal.
- Warm and half-warm mixes are in the right way but must be thoroughly studied according to performance criteria.





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Thank you for your attention !

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