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Sustanaibility of bituminous mixes

manufactured at lower temperatures.

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Outline

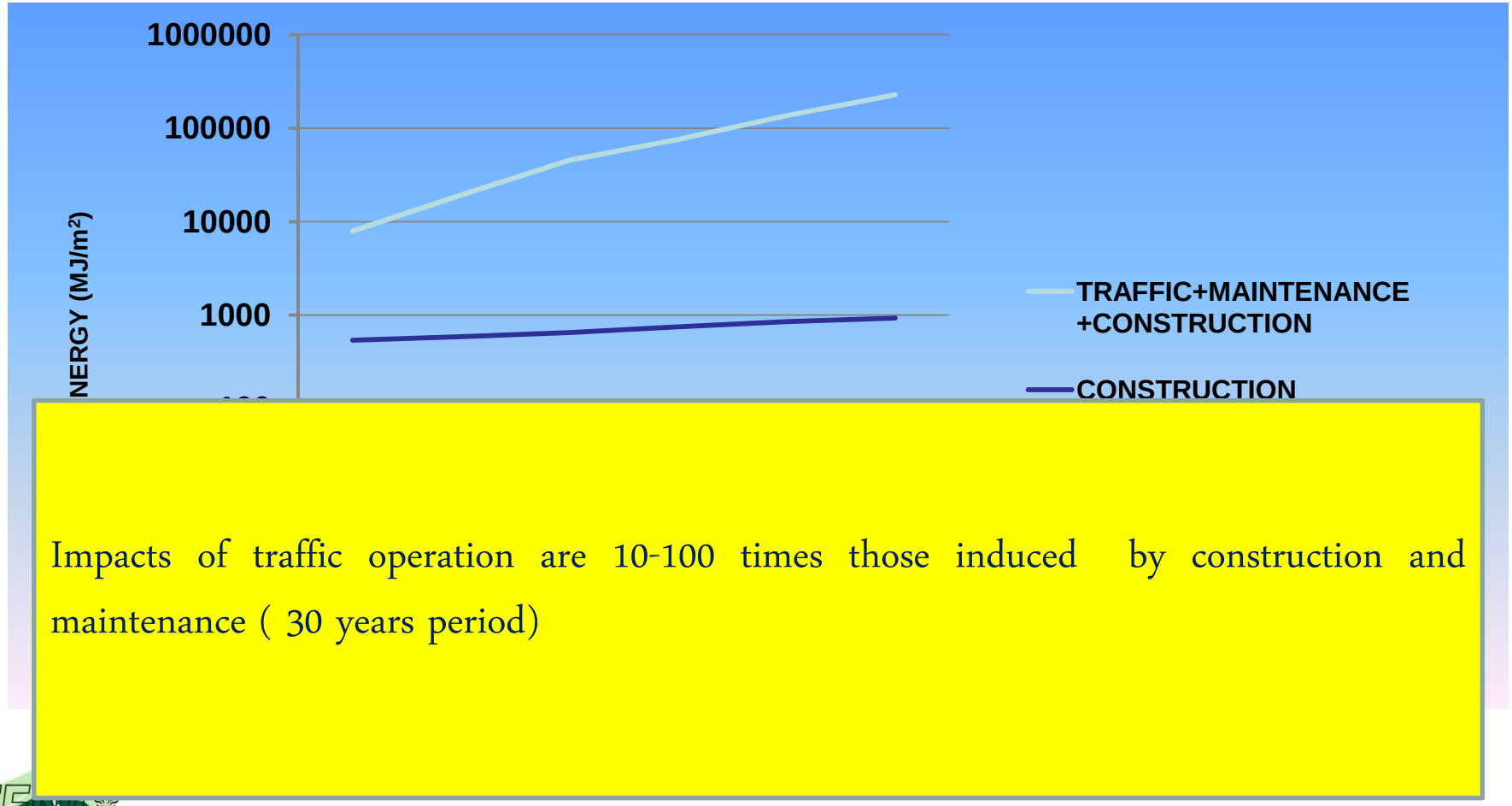
- The use of LCA in the evaluation of bituminous mixes.
- Comparison of hot and low temperature mixes.
- Key parameters to improve sustainability of pavements.

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

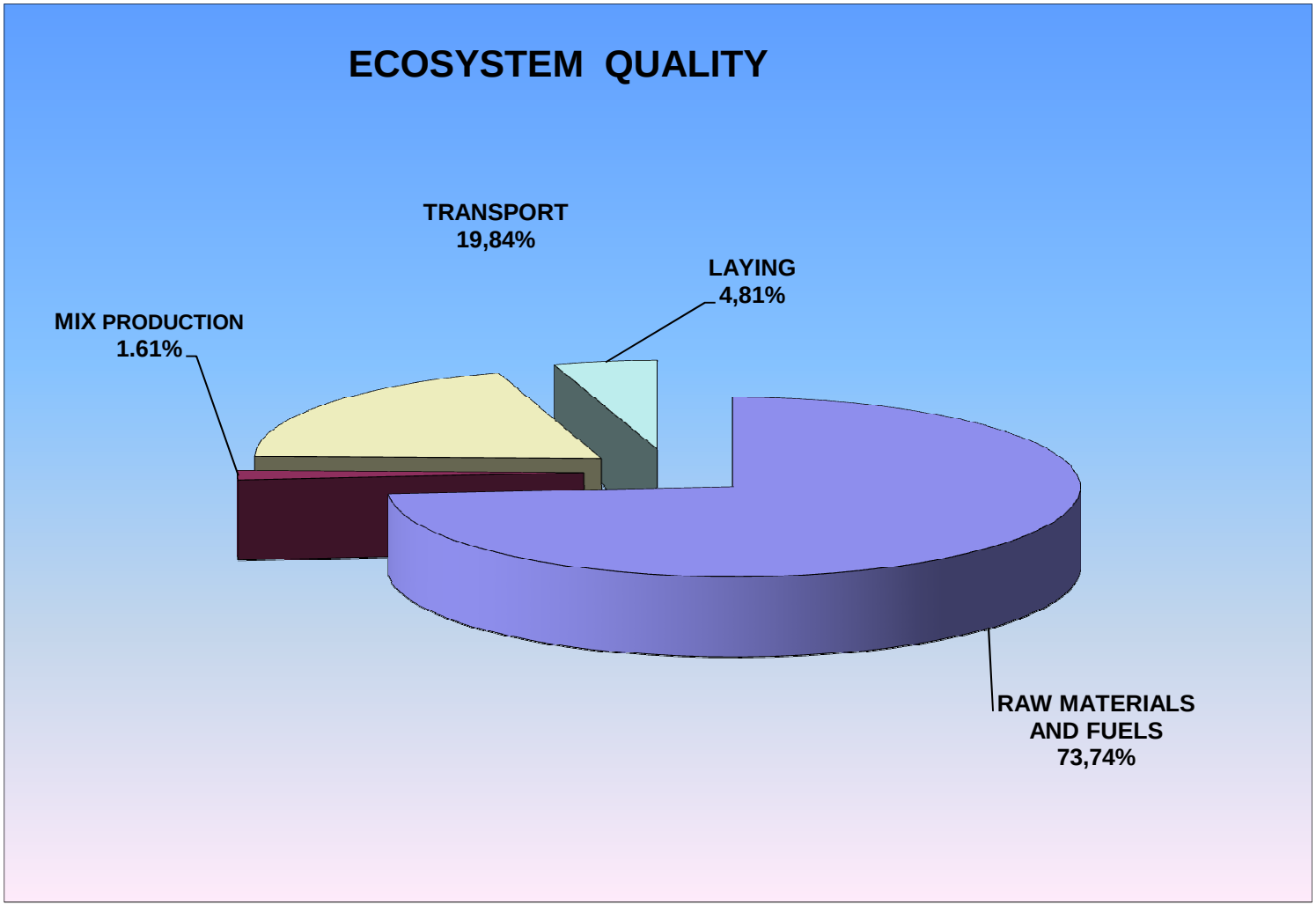
"from the cradle to the grave"



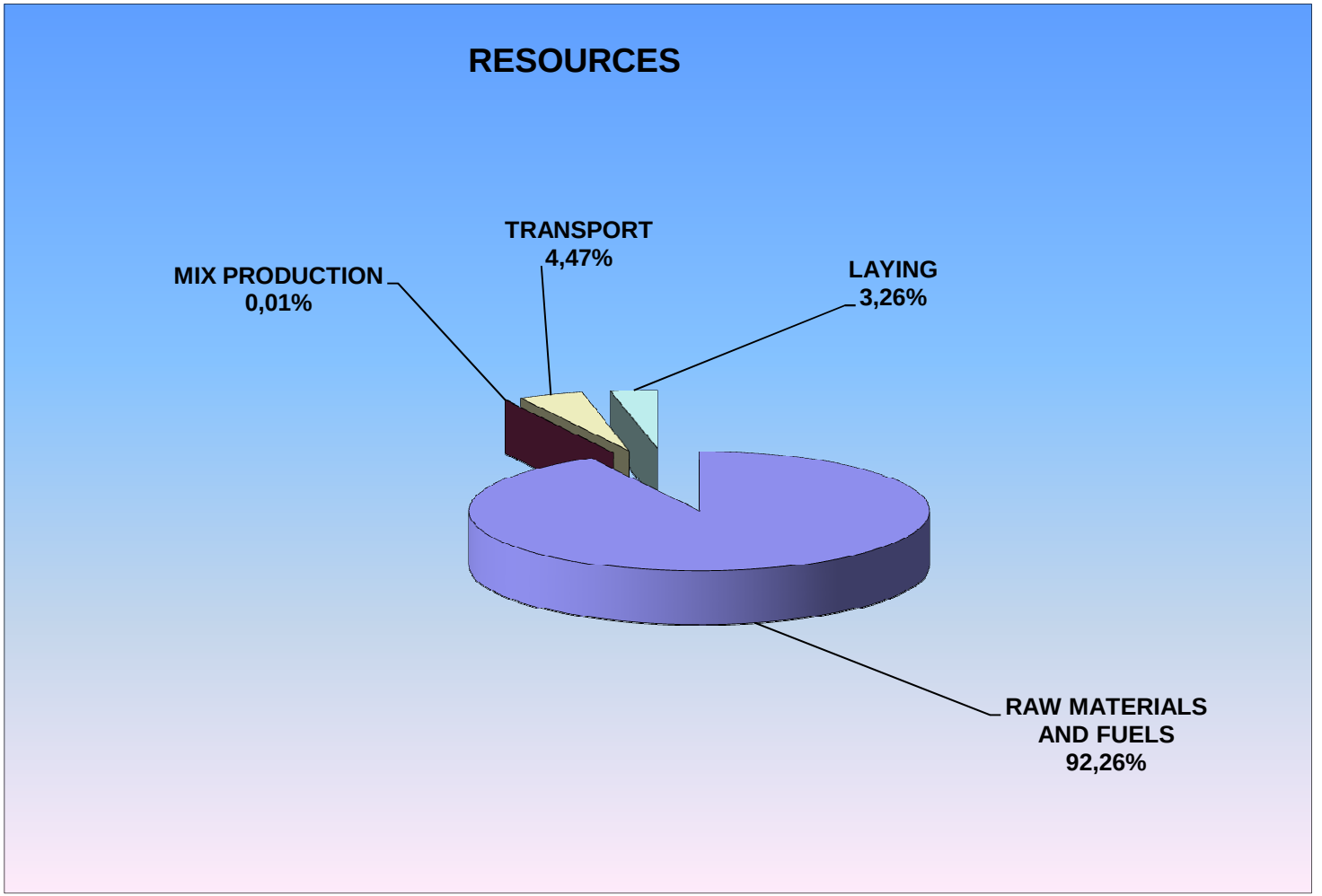
Impacts of traffic operation are 10-100 times those induced by construction and maintenance (30 years period)

Source: Chappat M., Bilal J. (2003)

LCA EVALUATION OF ASPHALT CONCRETE



LCA EVALUATION OF ASPHALT CONCRETE



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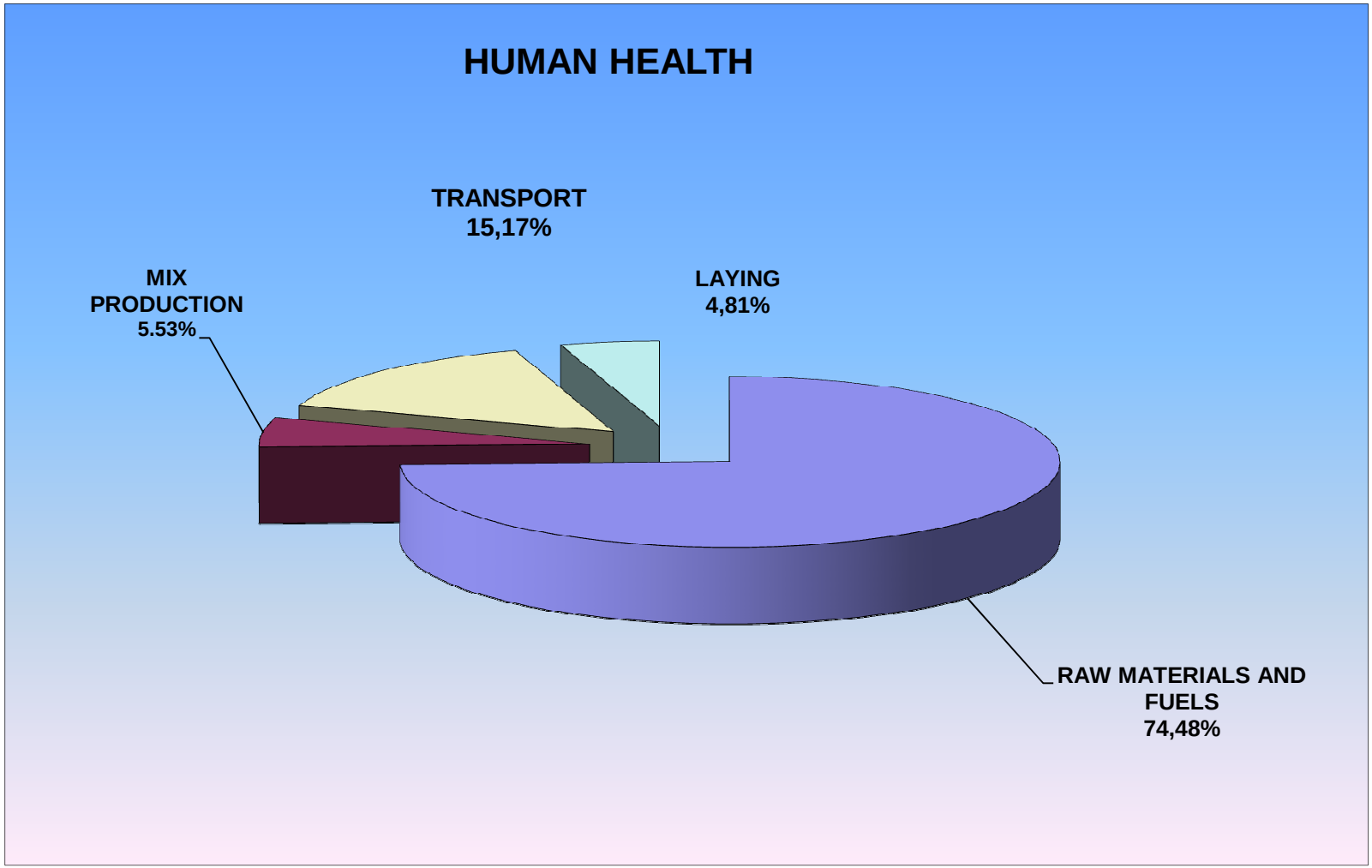

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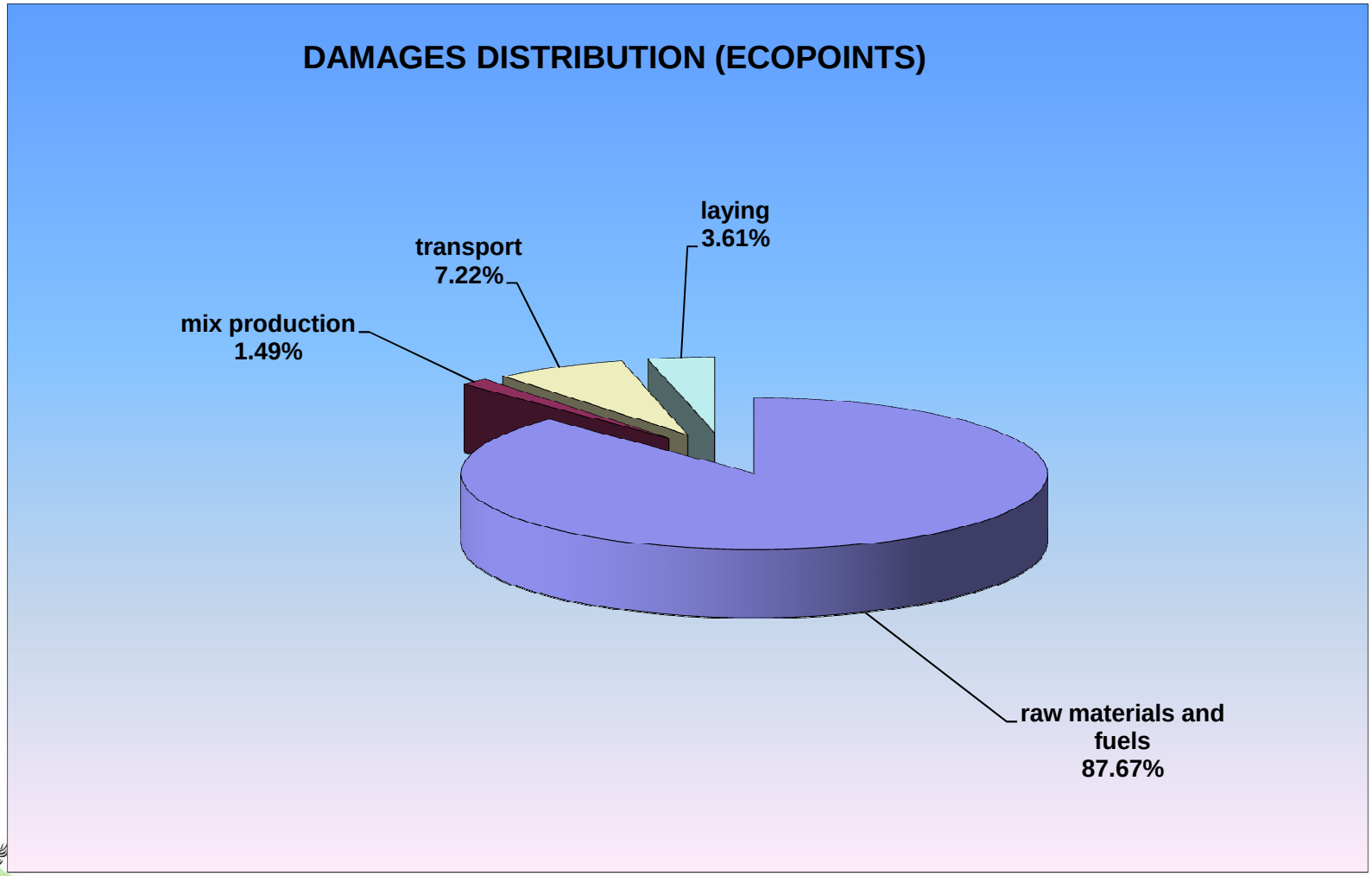

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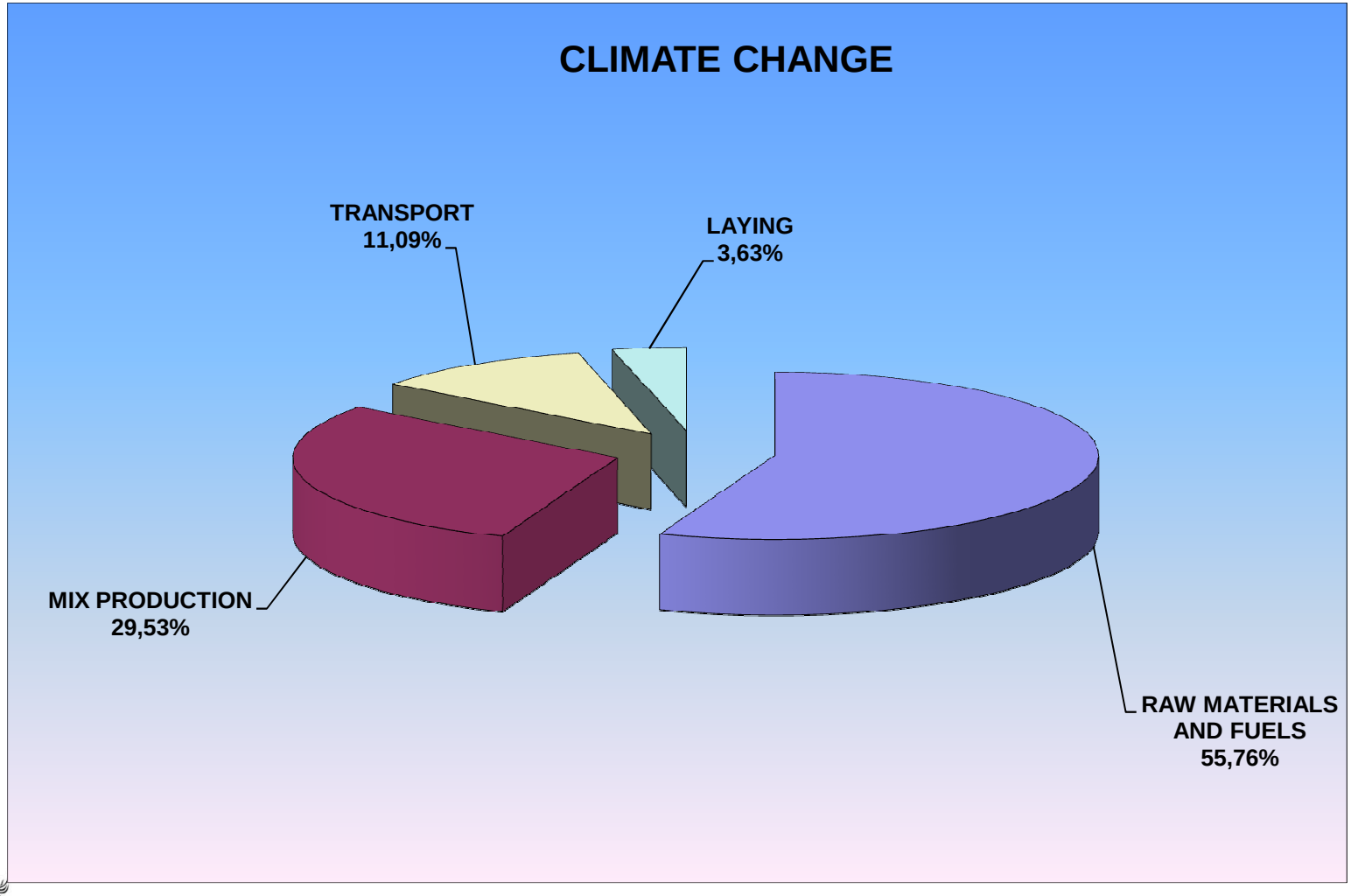
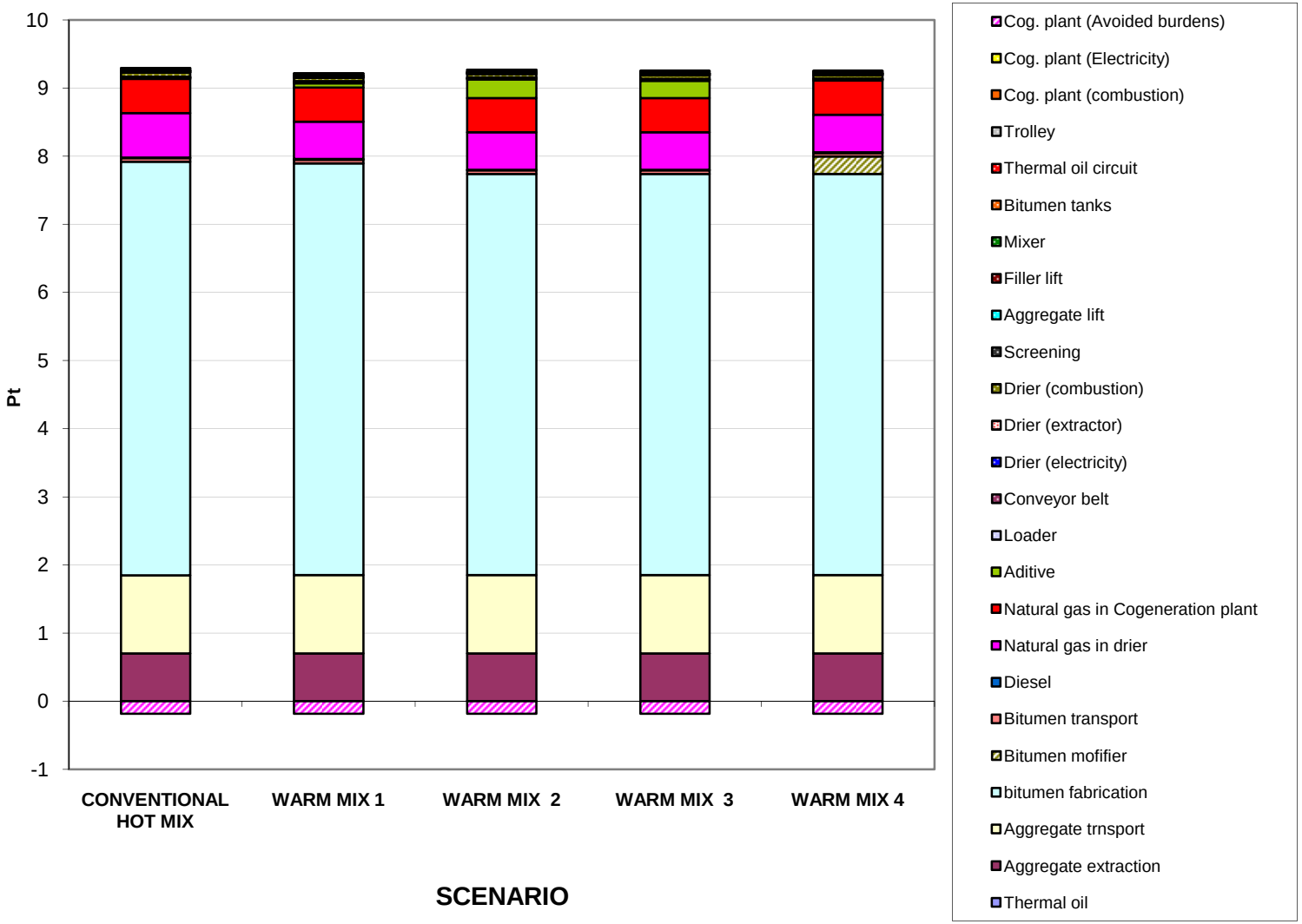


- Main claims of warm and half-warm mixes:

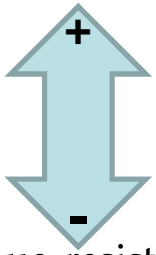
  - ❑ Energy savings
  - ❑ Lower GHG emissions
  - ❑ Lower COV emissions (health and safety).

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



DURABILITY

- Stiffness.



- Fatigue resistance.
- High resistance to stripping.

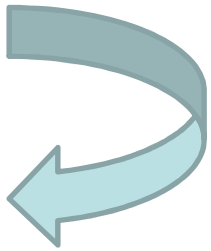
STIFFNESS (I)

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

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

STIFFNESS (II)

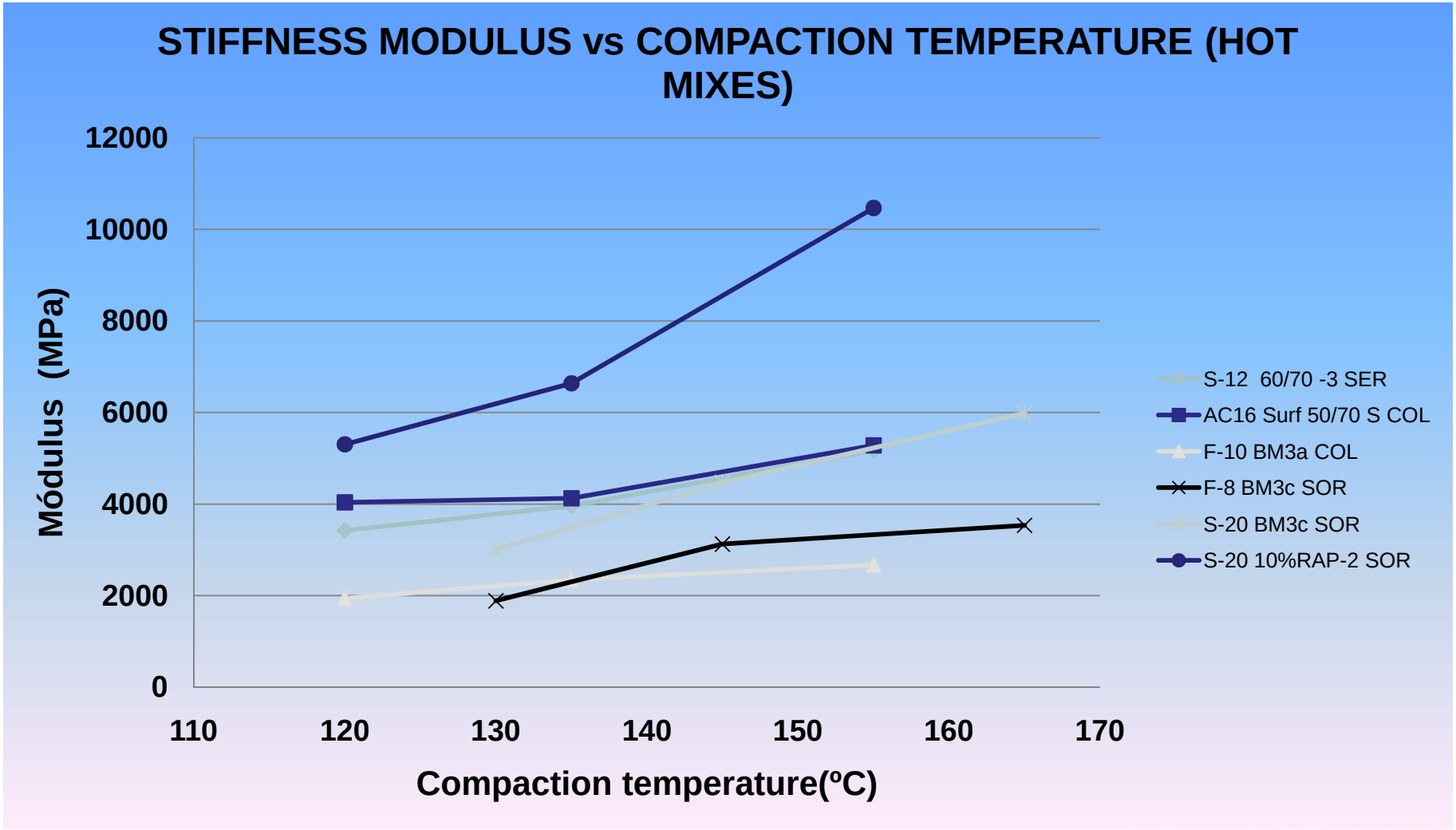
Mix temperature	Recovered binder
155-160ºC	23
120-125ºC	29



-25% stiffness

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

KEY PROPERTIES OF BITUMINOUS MIXES



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 throroughly studied according to performance criteria.

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Thank you for your attention !

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