Pavement Preservation: What about Energy and GHG

COLAS Inc.

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What About Energy and GHG?

- The Agenda
  - Basics Colas = Cold Asphalt
  - COLAS Eco-software
  - Some results
  - Some examples of PP
  - Conclusions

Sustainable development:

« development that meets the needs of the present
without compromising the ability of future generations to meet their own needs »

Basics

- **Sustainable pavement** :

"A safe efficient and environmentally-friendly pavement
which meets the needs of present-day users
without compromising those of future generations".

Basics

- **Reducing energy consumption,**
- **Reducing impacts on the greenhouse effect (GHG emissions),**
- Optimizing the use of natural resources
- Limiting pollution (air, water, ground, noise, etc.),
- Improving health, safety and risk prevention,
- Ensuring a high level of user comfort and safety

COLAS ideas

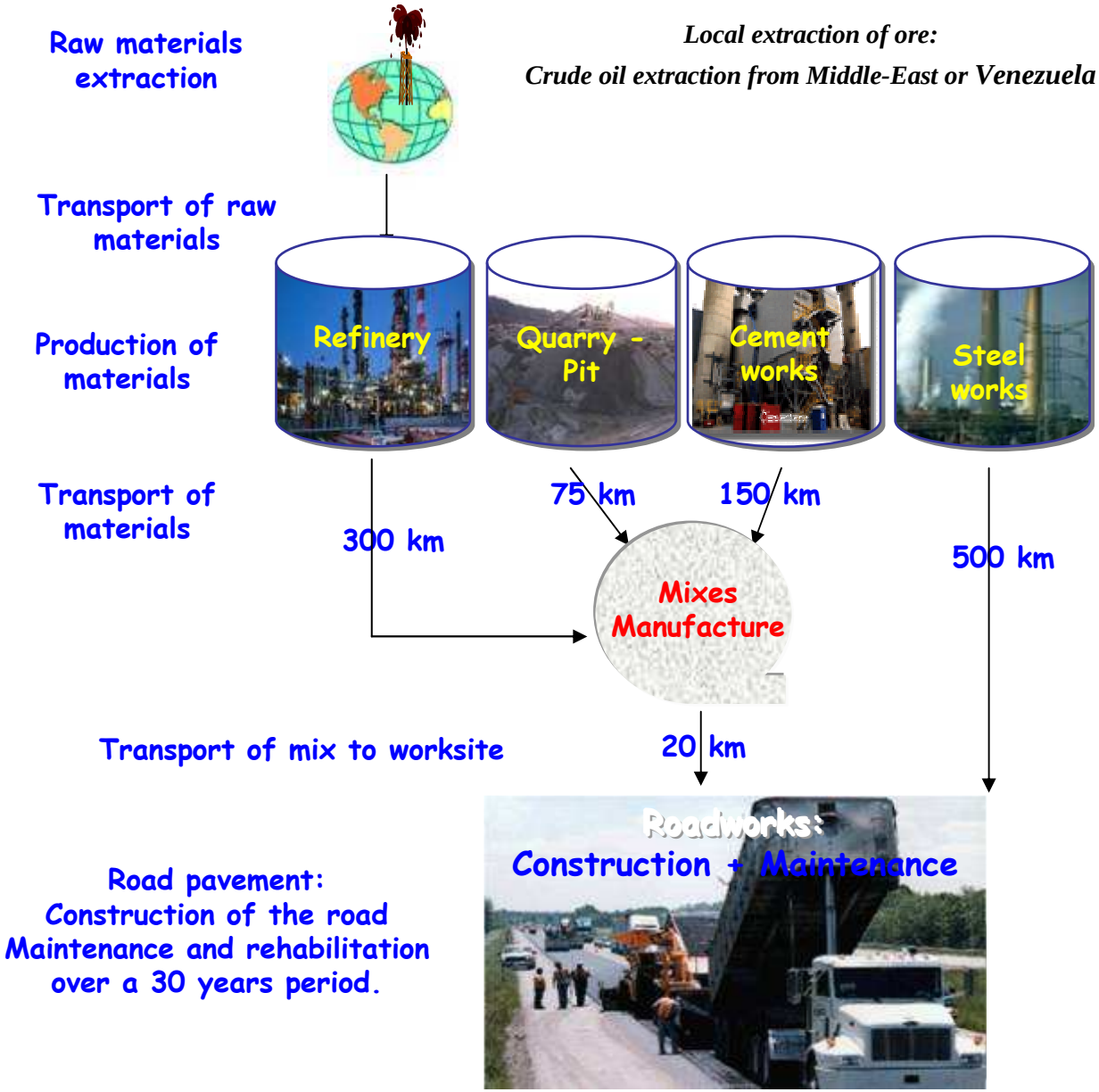
- How can we impact in our business?
  - HMA plants
  - Quarry plants
  - Emulsion plants
  - Operations
  - Permits, rules, ethics,….

COLAS ideas

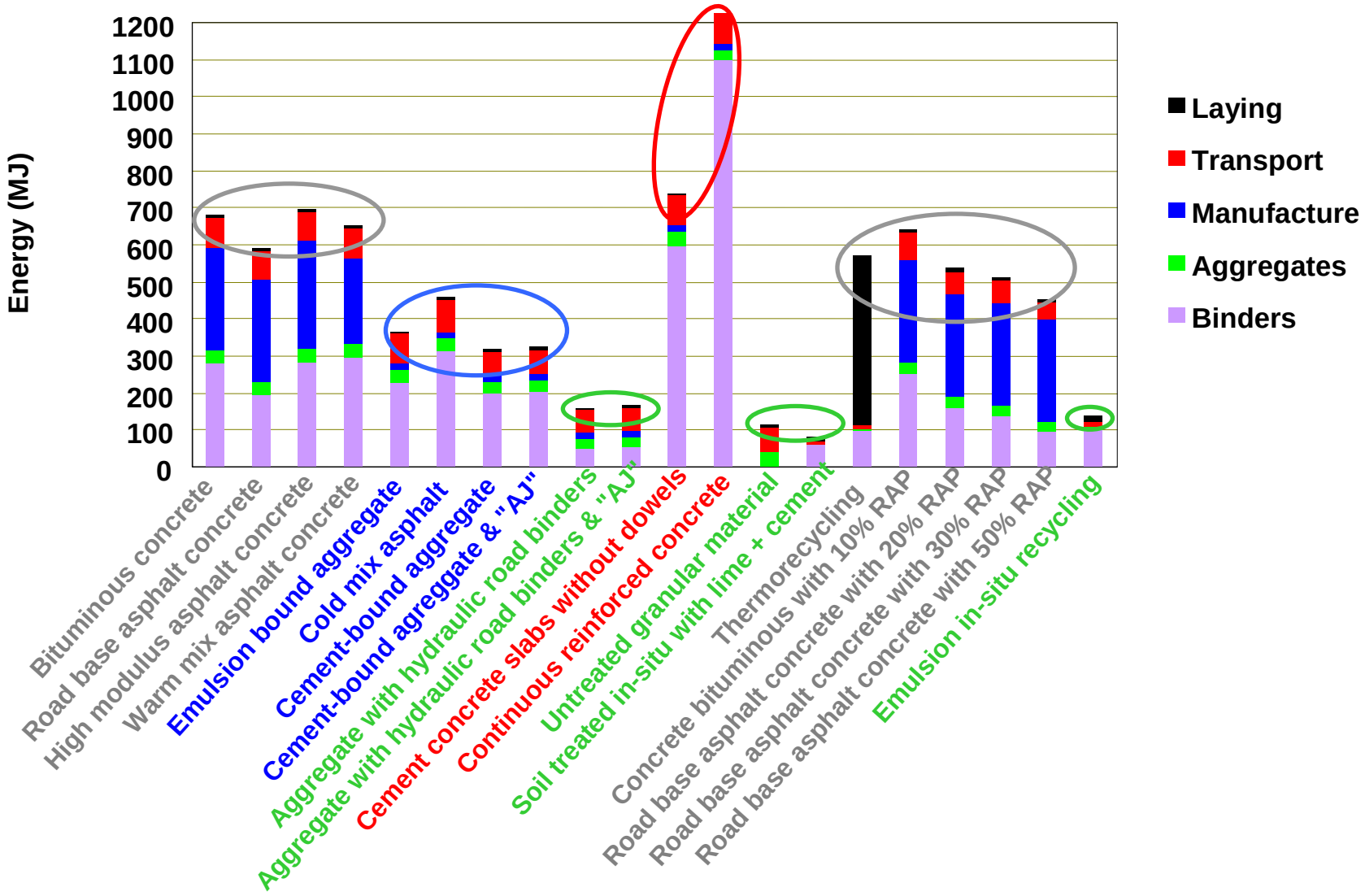
- How can we impact in our business?
  - Energy
    - Moisture at the HMA Plant
    - Power Peaks,…
  - GHG
    - Optimizing burners for example
  - What about the structure and the techniques?

COLAS projects

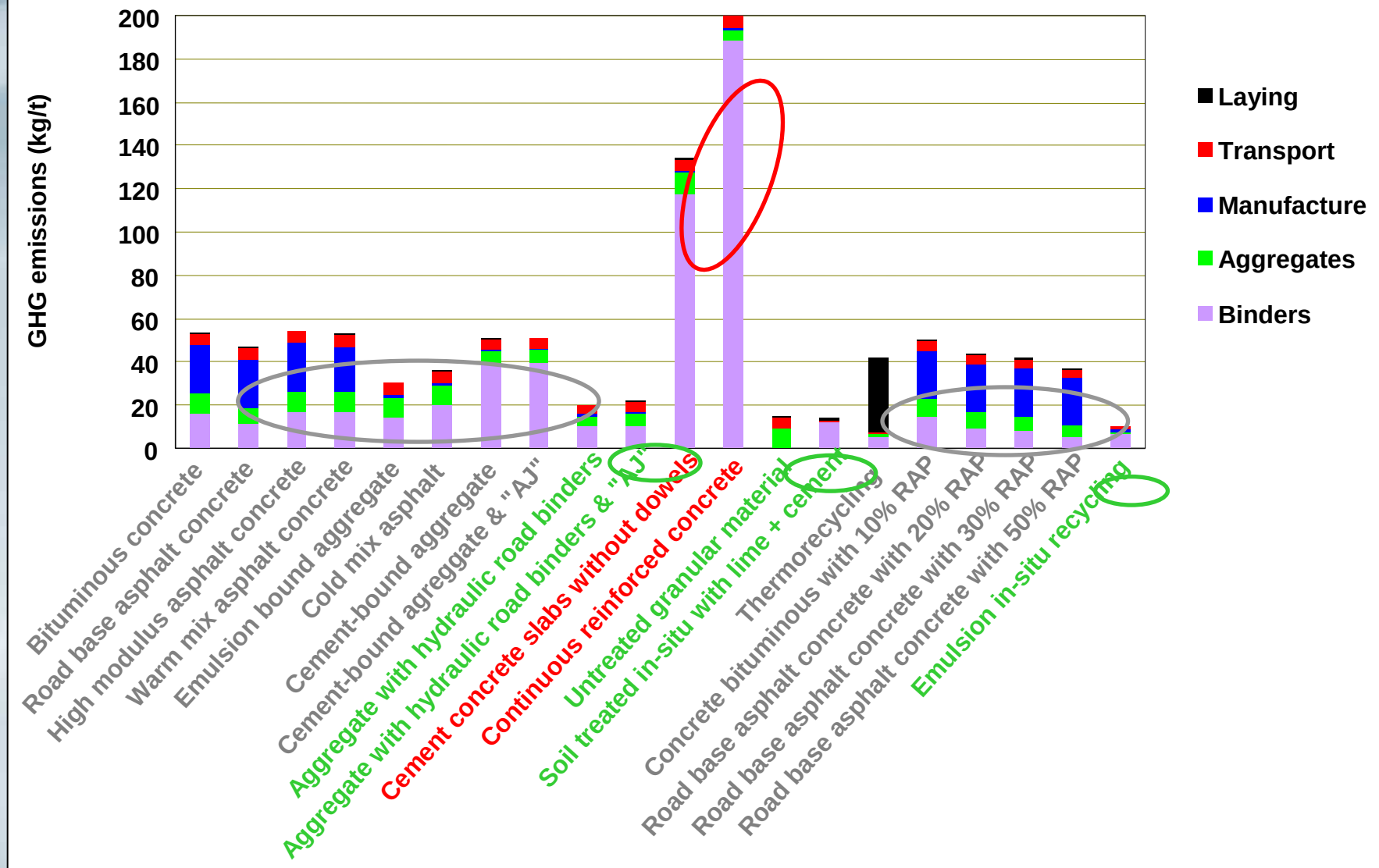
- Paper on: The Environmental Road For the Future
- PIACR meeting in Durban, RSA in 2003


Raw materials extraction
Local extraction of ore:
Crude oil extraction from Middle-East or Venezuela
Transport of raw materials
Production of materials
Refinery
Quarry - Pit
Cement works
Steel works
Transport of materials
75 km
150 km
300 km
500 km
Mixes Manufacture
Transport of mix to worksite
20 km
Roadworks:
Construction + Maintenance
Road pavement:
Construction of the road
Maintenance and rehabilitation
over a 30 years period.

Energy consumption per ton of laid material



GHG emissions per ton of laid material



During the whole life of the road structure, road construction impact is negligeable compared to trafic

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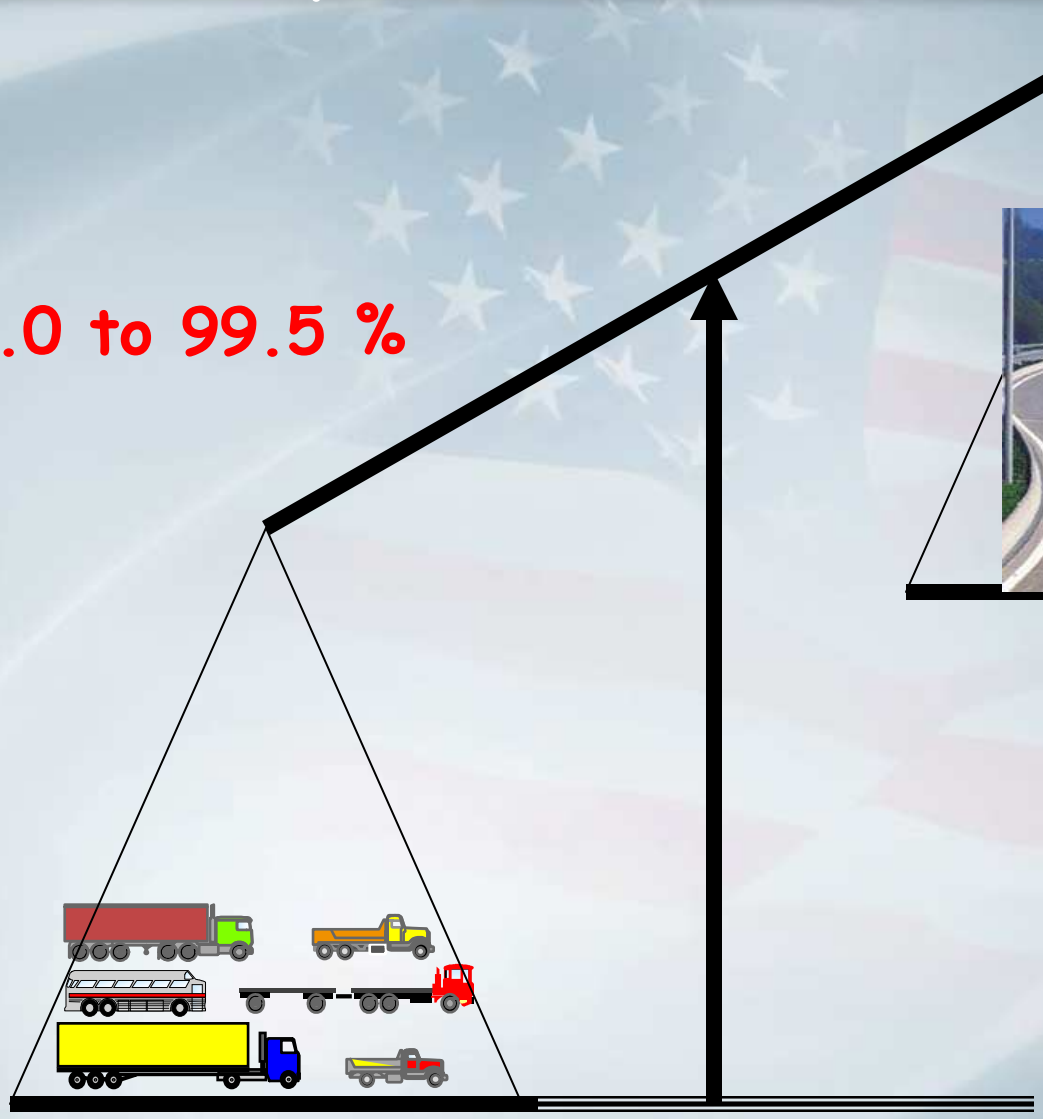
98.0 to 99.5 %



0.5 to 2.0 %

Assessments

- Continuous concrete pavement
- Concrete slabs

- Hot mix asphalt
- HMA + RAP
- In-situ recycling with emulsion

ENERGY

- Continuous concrete pavement

- Concrete slabs

- Hot mix asphalt
- HMA + RAP
- In-situ recycling with emulsion

GHG

2003 :

- « The environmental road of the future »

The first corner stones

2004 - 2005 :

- Several studies carried out with adaptations to local conditions

« Clients are no longer satisfied with an impersonal brochure, but want to assess the real environmental impacts of their projects»

2006 : Development of **« EcologiciеL »**

- User-friendly tool based on Excel sheets,
- User adjustable data (distances, structures, mix-designs),

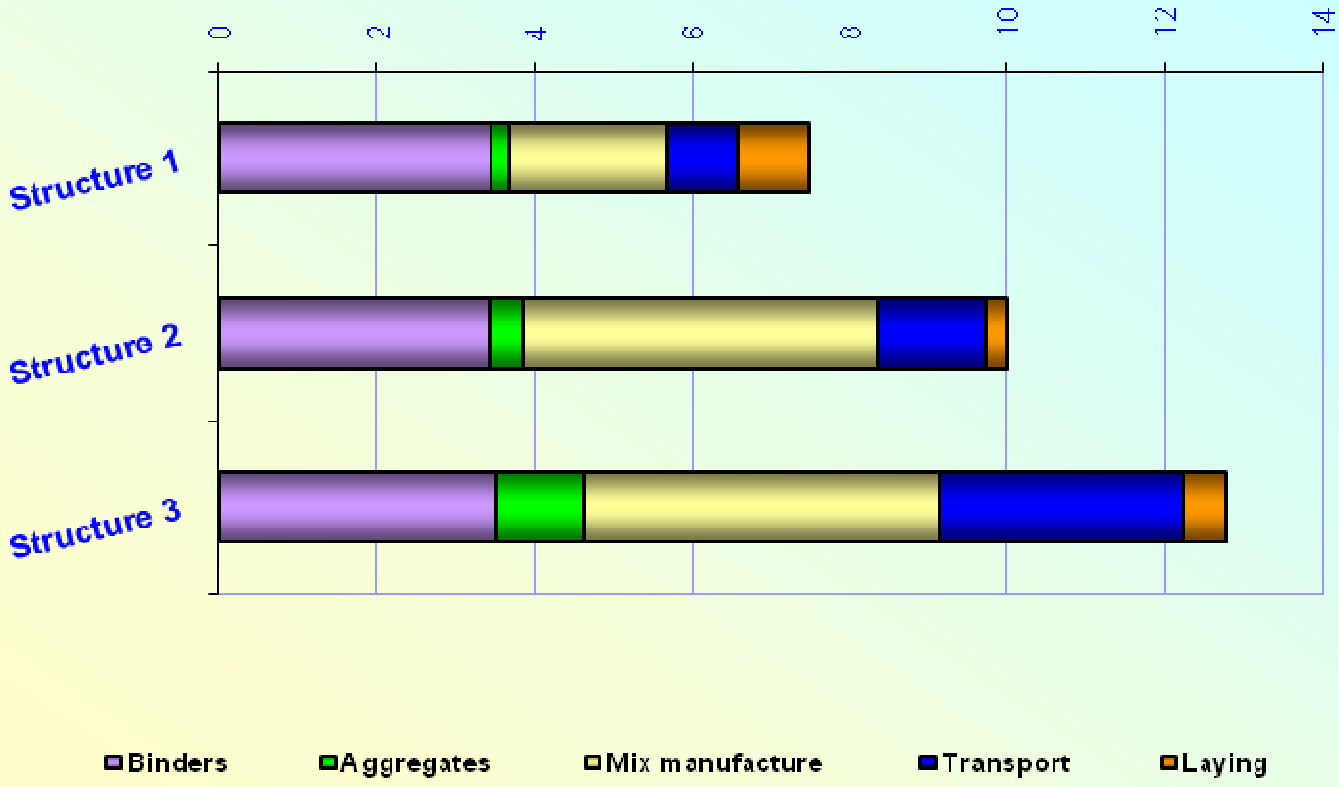
2008 :

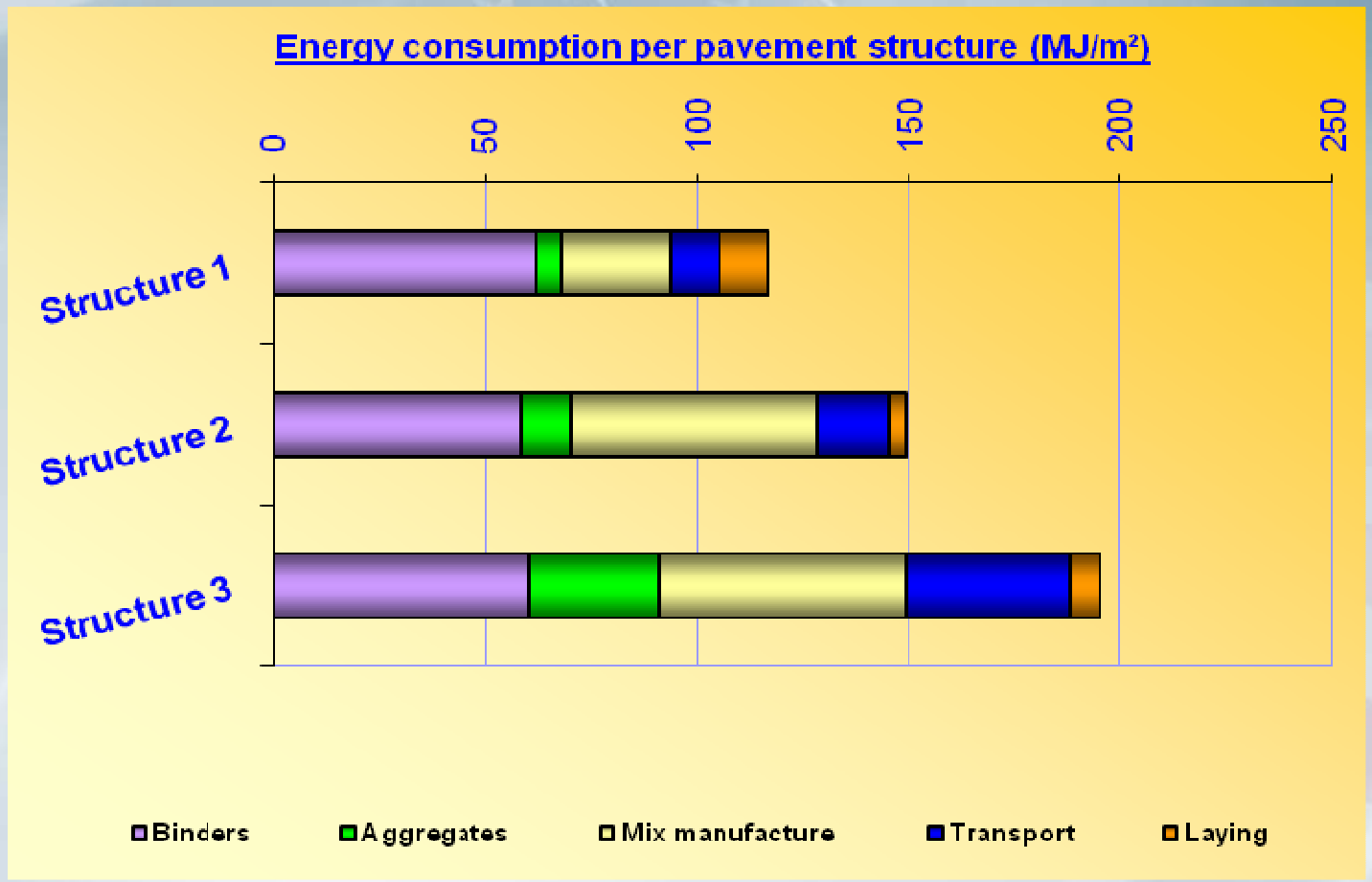
- New version based on users' feedback to be released
- Regional versions (Northern Europe, North America)

Comparisons as an example

- Structure 1: 1 1/2" HMA; 5" Cold In place Recycling
- Structure 2: 3 1/2" HMA
- Structure 3: 3 1/2" HMA ; 6" crushed stone base

GHG emission per pavement structure in equivalent CO_2 (kg/m²)




Energy consumption per pavement structure (MJ/m²)
0
50
100
150
200
250
Structure 1
Structure 2
Structure 3
Binders
Aggregates
Mix manufacture
Transport
Laying

Another example in Quebec

	Techniques used	Unit	Quantities	Total MJ MJ	Total CO2eq tonne
Project	Continuous reinforced concrete	m3	96 888	365 849 088	58 898
Alternate 1	Cement Concrete	m3	114 504	225 343 872	40 889
Alternate 2	High modulus HMA	tonne	270 580	182 100 340	14 205

Paper presented at the TAC meeting in Toronto Sept 08

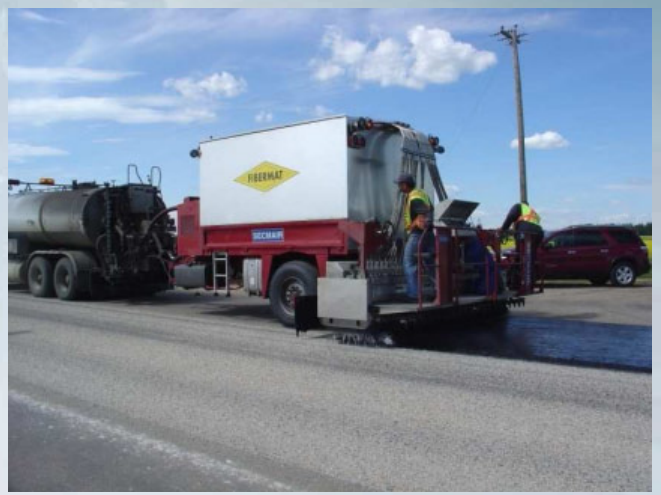
Other examples with PP

- Not done yet
  - Worst first syndrome

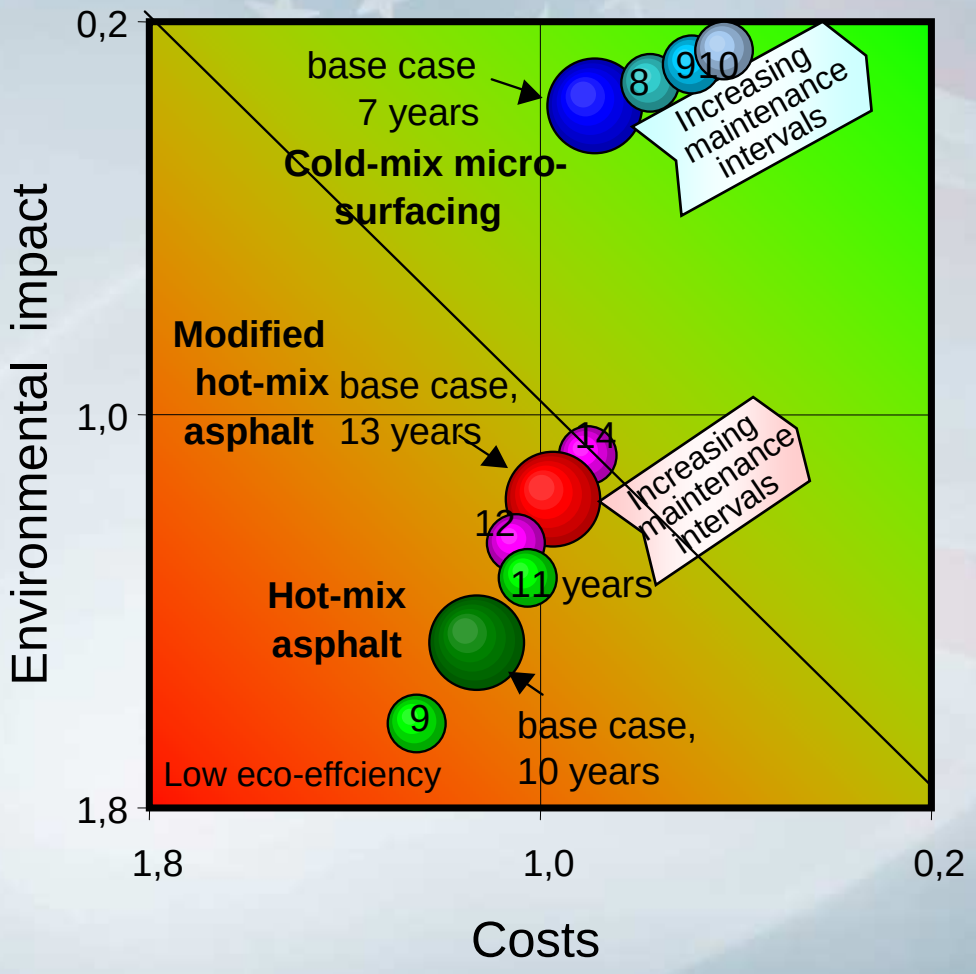
- IRI vs. fuel consumption
  - IRI ⇧ fuel consumption ⇧
  - PP may be more relevant linked to this fact
  - A way to save the users money (users= tax payers)

Innovative techniques

- Racked-in chip seal in Alberta with Fiber reinforced system



ECO-EFFICIENCY PORTFOLIO: SENSITIVITY ANALYSIS / BASF



Cold-mix micro-surfacing

Modified hot-mix asphalt

Hot-mix asphalt

Other Actions for Energy

- Cut-backs
  - Asphalt Cement and Kerosene
  - Replacement by vegetal flux
  - Hot applied
- Emulsion
  - Replacement of the flux by vegetal flux
  - Cost is higher but…
- British Columbia carbon tax on fossil fuels

Innovations

- VEGECOL
  - Plant-based binder
  - 120C – 245F
  - Energy not so good
  - CO2 excellent

Energy in Road Construction

- We are part of a larger picture
- We can participate at our level
- Partnership for innovations
  - Promote new ideas
  - Create the path for it

Contractors point of view

- What do we do?
  - Step by step
  - Contractor versus market
  - Recycling (no paper tools, RAP, PCC,…)
  - Ambassadors in every company in the USA
  - Cars policy
  - Tracking of energy (fuel, gas, natural gas,…)
  - Training to save energy (moisture in HMA plant)

Conclusions

- Difficult times = opportunities
- PP is one:
  - Cold in place recycling
    - Technically sound
    - Energy and GHG efficient
  - Chip seals
    - Flux
  - Micro surfacing
  - Thin and ultra thin overlays

Conclusions

- Performances based products
  - European standards for Chip seals and Micro surfacing
  - Enhance quality of the work
- Innovation promotion
  - Partnership between contractors and owners
  - Energy based?
  - GHG based?