Sustainability and Pavement Preservation

COLAS Inc.

Francois CHAIGNON

COLAS Inc.

VP Quality Assurance & Technical Support

The Agenda

- Quick presentation of COLAS SA
  - R & D in COLAS
- Ecologiciel
- In place recycling & treatment
- How to implement innovations or new techniques
- Conclusions

COLAS (COLd ASphalt) in 2008

- ID Card
  - Turn Over 12.8 Billion Euros / 19 Billion $
  - 74 000 personnel in 40 countries
    - 8000 in North America
  - Aggregates 118 Mt
  - HMA 52 Mt
  - Emulsion 1.5 Mt

Breakdown of Group activity

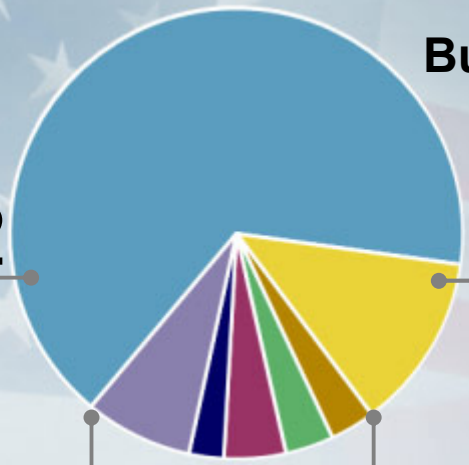
in millions of €

Roads

7,712
(66.1%)

Building materials

1,472
(12.6%)



Concessions:

16.7% Cofiroute
Adelac (A41)
Mars (Reims tramway)

2,489
(21.3%)

Civil engineering, Pipes, Mains

901

Safety, Signing

291

Waterproofing

517

Building

404

Railways

376

1,400 profit centers in 40+ countries

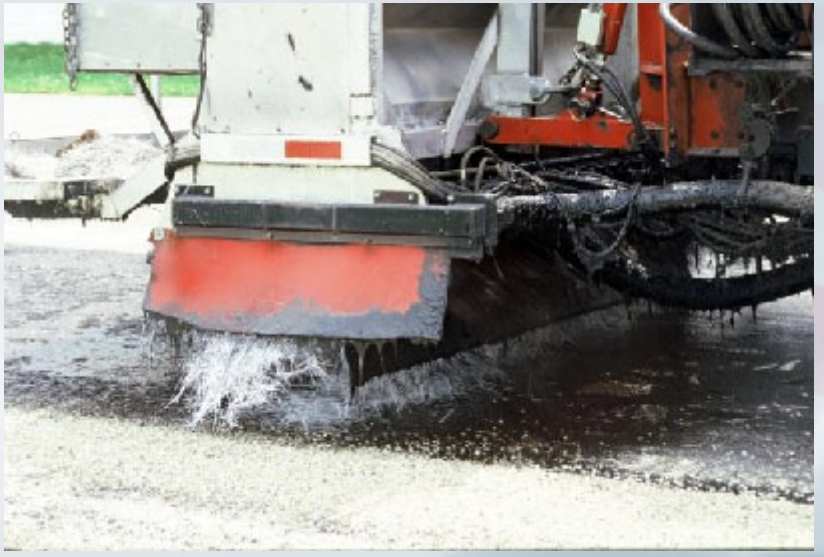
110,000 projects around the world

Scientific & Technical Campus
South West of Paris

Research and Development

- Applied research network:
  - 1,000 engineers, research specialists and technicians worldwide
    - 250 in North America
  - 1 Campus for Science and Techniques, certified ISO 9001 and ISO 14000

Some examples of products



European Approach

- More and More Performance based compared to the USA
- Innovations are part of the business
- Some owners promote it
- Patents, trademarks,…

Environment is part of our business

- Thin and ultra thin overlay
- No more tar use even for fuel resistant properties
- Noise abatements systems
- Quarries
- HMA plants
- Emulsion plants
- Recycling

What about recycling?

- Cold in place recycling
- RAP
- Recycling centers (PCC, ballast, …)

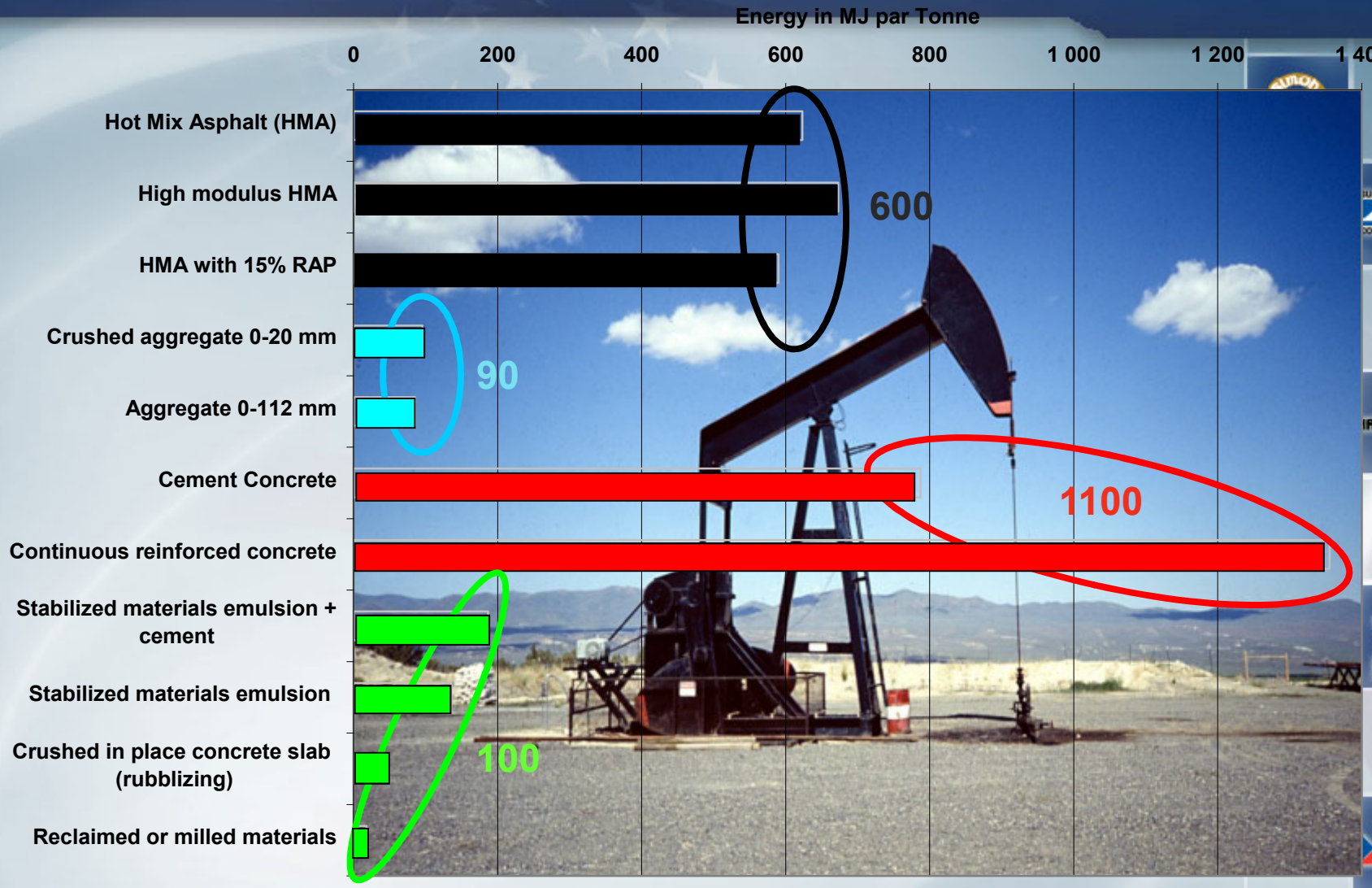
Positive actions

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

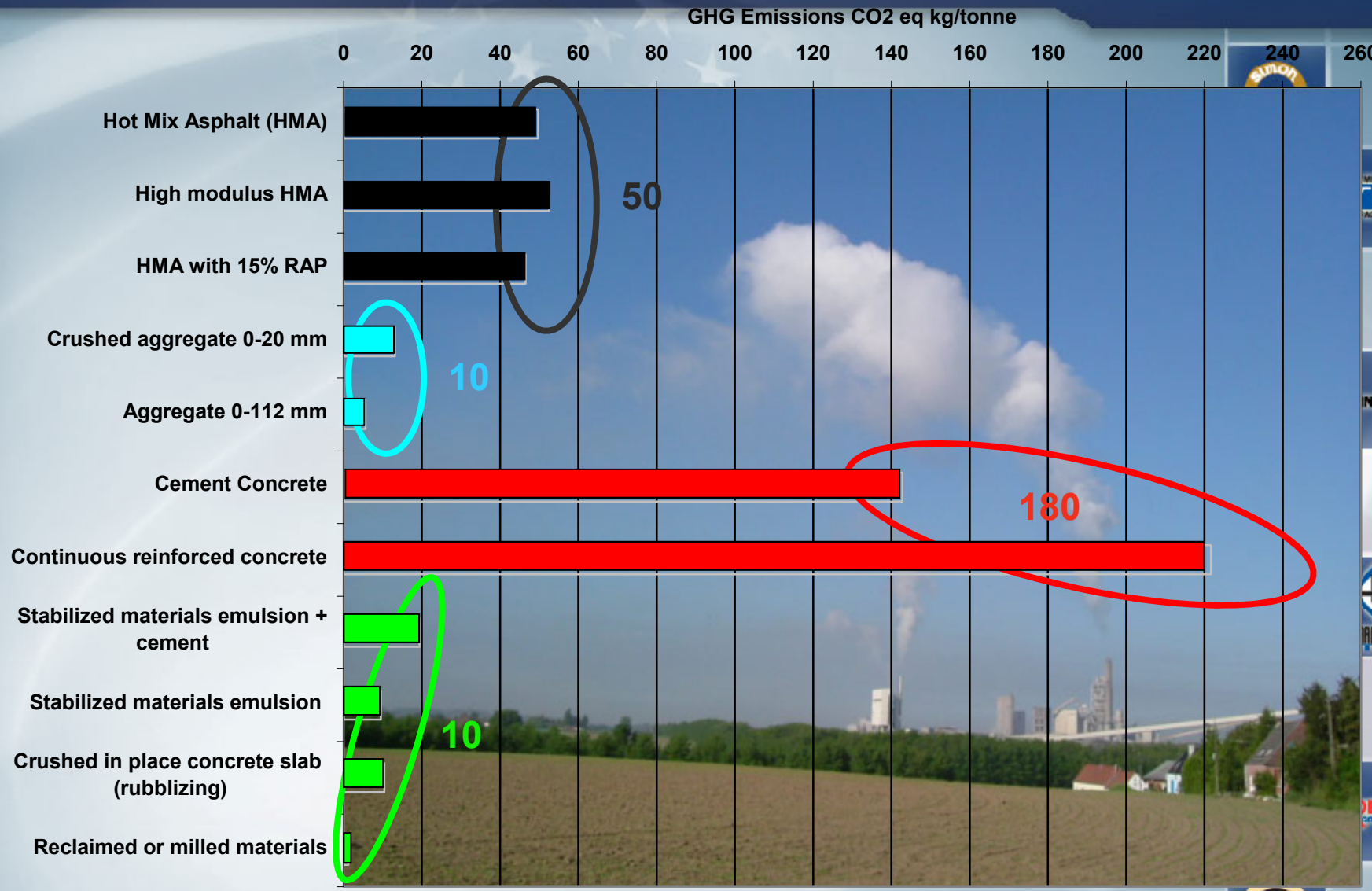
How to evaluate the effect of recycling?

- **2003**
- Paper on the environmental road for the future
  - Comparisons between techniques
- PIACR Durban

Energy Consumption for the Manufacturing and placement of Main Road Technologies



GHG Emissions during Manufacture and Placement of Main Road Technologies

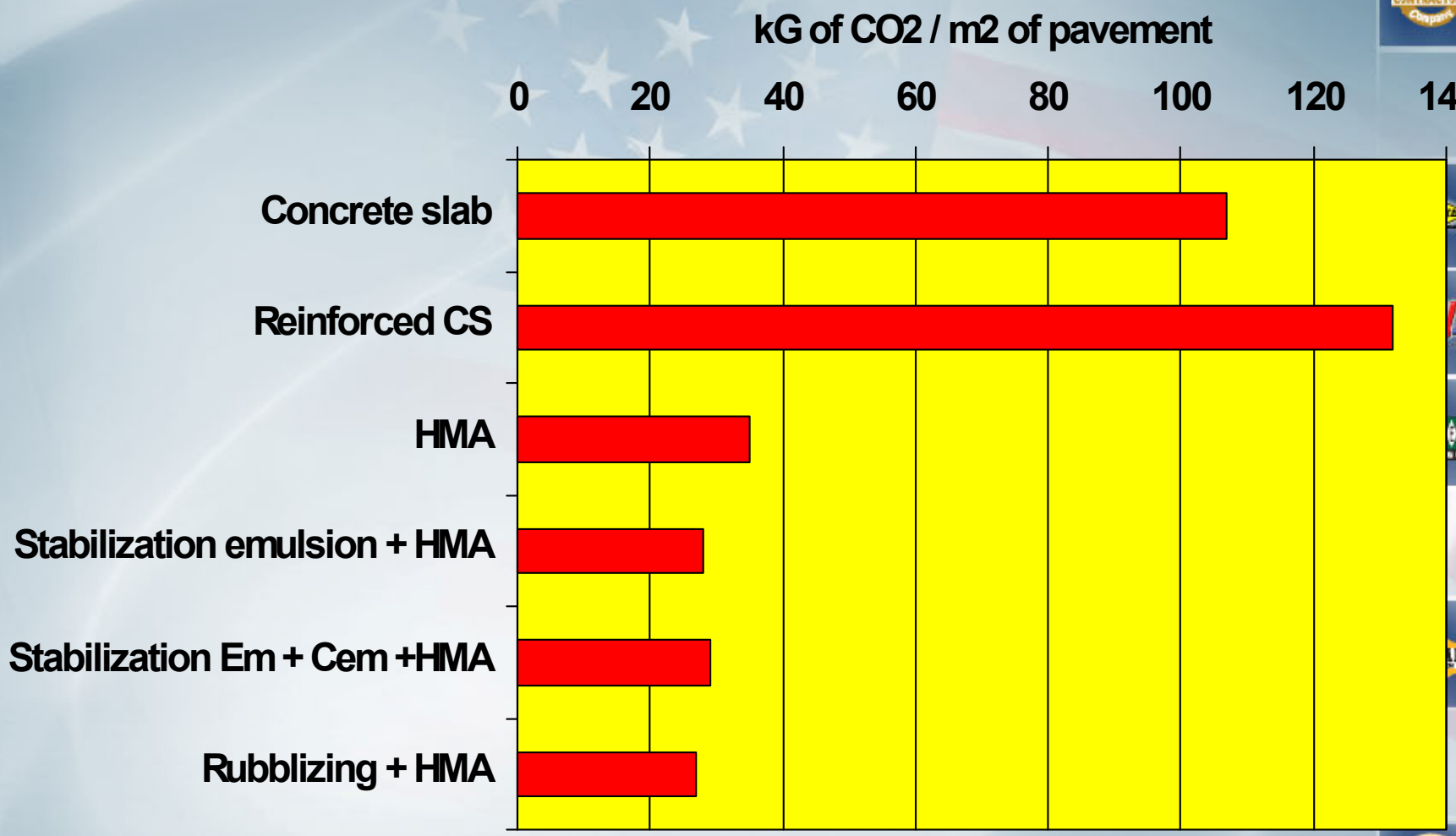


How to evaluate the effect of recycling?

- **2006**
- Internal software ECOLOGICIEL
  - Eco alternatives
  - Optimization of RAP
  - CO_2 eq

Energy Consumption in MJ per m2 For the construction of the Pavement for 100,000 AADT over 30 years

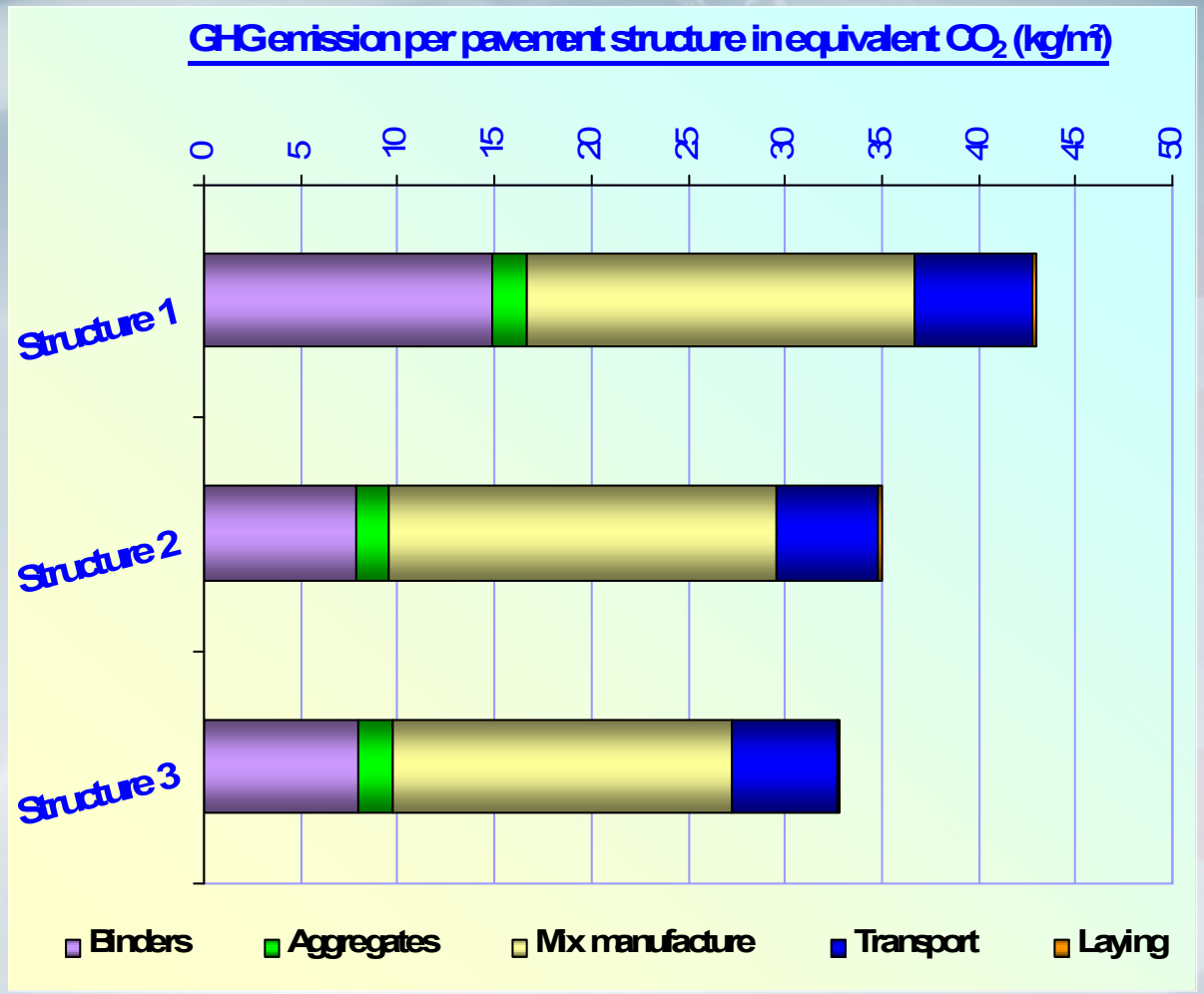
GHG Emission in $C0_{2eq}$ per m2
For the construction of the Pavement for 100,000 AADT over 30 years



Energy Efficiency and Innovative Construction Practices

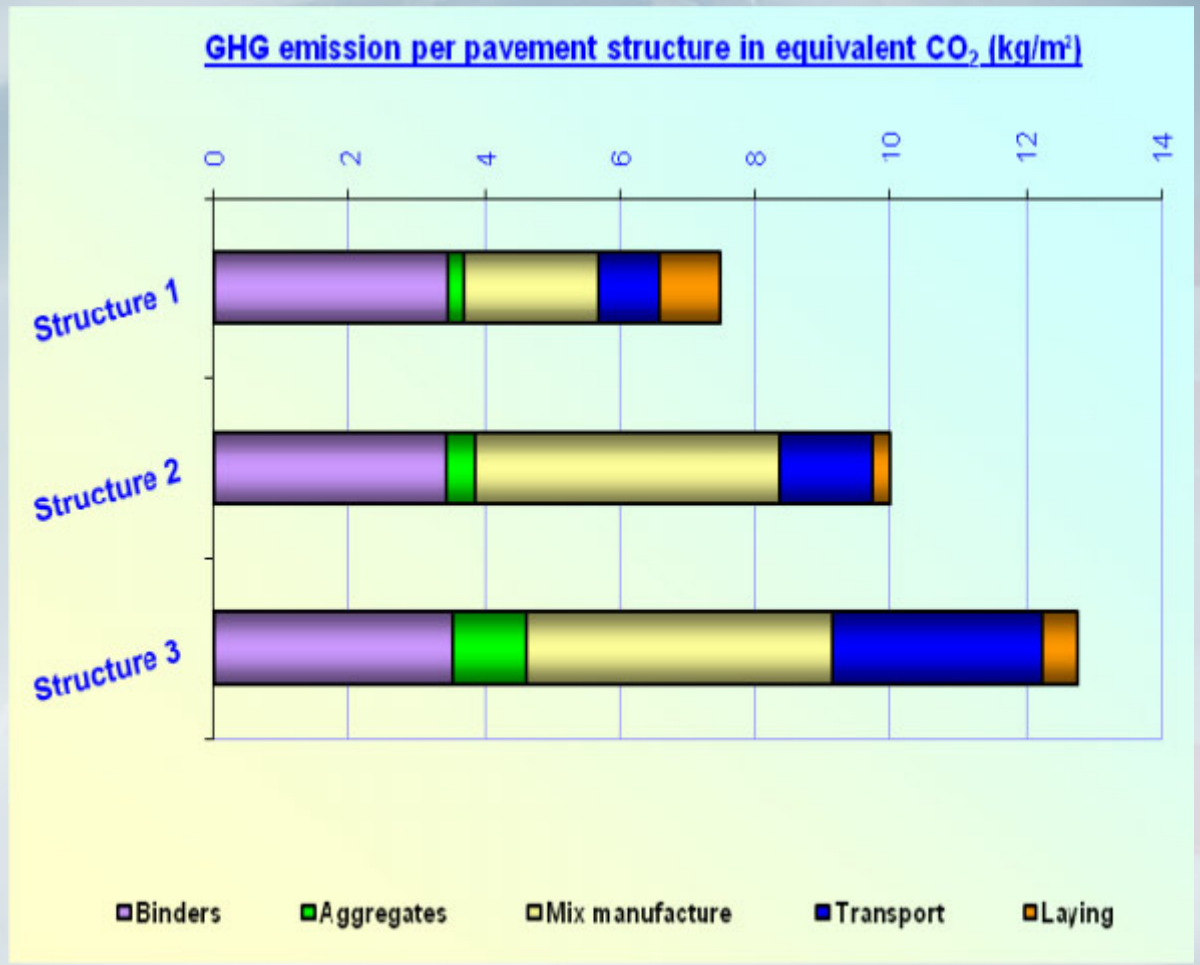
- What do we do?
  - Step by step
  - Analyze road structures
    - Paper done in 2003 PIACR in Durban
    - The environmental road of the future
    - Recycling in place is the best technique
  - Ecologiciel
    - Calculation per m2 of two criteria
    - CO2 and Energy consumption

Per ton of HMA applied



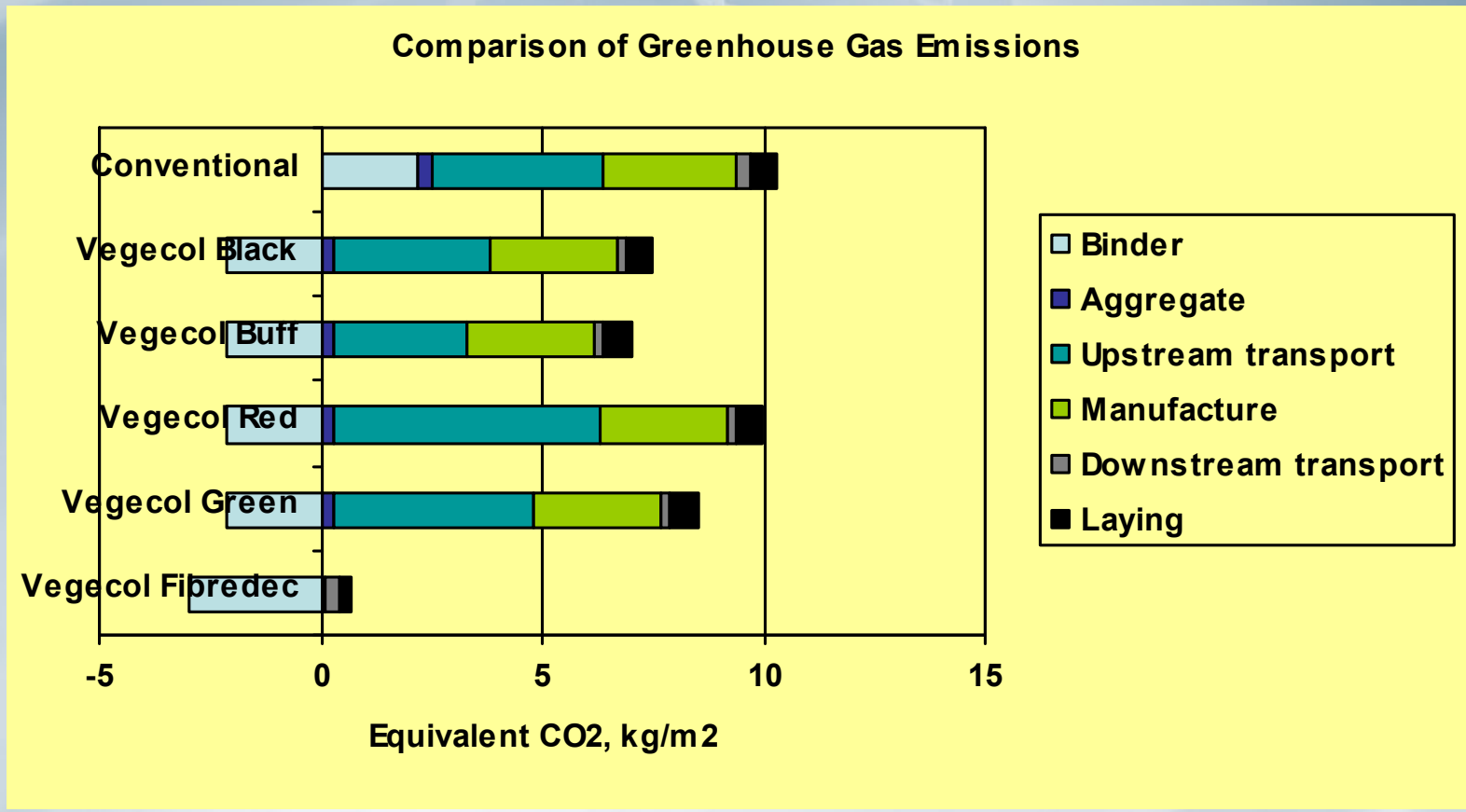
1. Virgin HMA
2. 25%RAP HMA
3. 25% RAP WMA

Per ton of HMA applied



1. 1 ½" HMA+ 5" CIR
2. 3 ½" HMA
3. 3 ½ " HMA + 6" GB

Another example



First approaches

- Eco alternatives
  - Alternatives represent 5-8% of the tenders
  - Using a design software and properties of components
  - To show the gain in GHG per sy on a job
- The owner must be involved
- How to implement innovations or new techniques

How to implement innovations or new techniques?

- In Europe
  - Create the needs
    - Contest tenders
    - Performance based tender
    - Technical response to issues
    - Charter for innovations with funding
- In Canada
  - Value engineering (after the tender)
  - Specific demands to answer issues
  - 5-7 years warrantee projects (design included) per m2
  - Promote actively a technique (environmentally friendly)

How to implement innovations or new techniques?

- In Europe and elsewhere
  - Industry promote also R&D labs,….
  - Long term commitment in a new technique
    - High investment (CIR, FDR, …)
    - Difficult to invest for one job
  - Training to various PP techniques
  - Performance based contracts
    - Technical monitoring
    - Training
    - Training

Initiatives

- Washington State
- New York State
- LEED for Building
- Green Highway
- PPP

GREEN ROADS

more sustainable roads for a better transportation future

Green Roads is a rating system designed to distinguish high-performance sustainable new or redesigned/rehabilitated roads.

It awards credits for approved sustainable choices/practices and can be used to certify projects based on point value.

GREEN ROADS

Green Roads Categories

Category	Goal	Credits
Sustainable Design	Reduce impacts due to alignment of the road.	10
Material & Resources	Reduce impacts from material extraction, processing and transport.	11
Stormwater Management	Reduce impacts of polluted stormwater and treatment devices.	8
Energy & Environmental Control	Improve human and wildlife health.	12
Construction Activities	Reduce impacts from construction activities.	9
Innovation	Encourage innovation in design.	4
	Total	54

GREEN ROADS

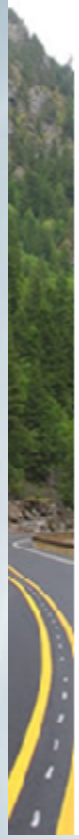
GREEN ROADS CATEGORY

Materials & Resources (MR)

Description	Credits
Construction Waste Management	1
Reuse of Pavement	2
Recycled Content	4
Pavement Life Cycle Analysis	3
Regionally Provided Material	1
Total Credits Available	**11**

GREEN ROADS

Example MR Credit



Recycled Content — 4 Credits

One credit: Use recycled content to a minimum of 20% in the HMA/PCC and 40% of the total material in the structure if base course is included in the project.

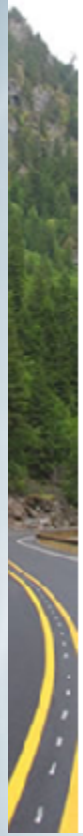
Two credits: Use recycled content to a minimum of 30% in the HMA/PCC and 50% of the total material in the structure if base course is included in the project.

Three credits: Use recycled content to a minimum of 40% in the HMA/PCC and 60% of the total material in the structure if base course is included in the project.

Four credits: Use recycled content to a minimum of 50% in the HMA/PCC and 70% of the total material in the structure if base course is included in the project.

GREEN ROADS

Certification Levels



Green Road certified	Green Road certified SILVER	Green Road certified GOLD	Green Road certified EVERGREEN
19-25 credits	26-31 credits	32-37 credits	38+ credits

Green LITES Labelling – *NYSDOT*
9/25/08

New York State Department of Transportation

Green LITES ***Project Design Certification Program***
Recognizing Outstanding Leadership In Transportation and Environmental Sustainability
September 2008

* * * * * * *

Certification Program for NYSDOT Designs Meeting Criteria for Sustainable Transportation Infrastructure using Environmentally Friendly Practices

Industry Response - *HMA*

Leading America in Recycling

Warm Mix Asphalt

Quiet Pavement

Perpetual Pavement

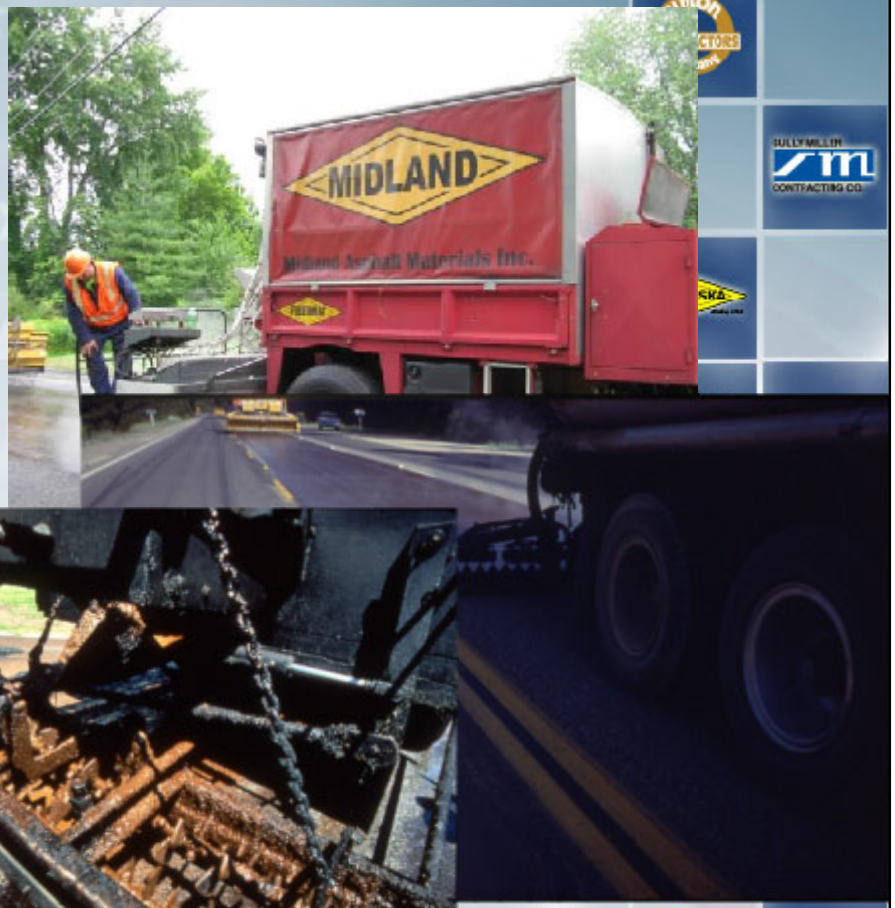
Porous Pavement

Lower GHG & fuel

Industry Response - *Concrete*

Industry Response – *AEMA*

- Emulsion techniques
  - may be handled safely
  - no odors, fumes, smoke or dust
  - preserve the environment
    - protects air quality
    - recyclable
  - low cost techniques
    - quick application time
    - low energy consumption
  - many pavement preservatio



Industry Response – *ISSA*

- **ISSA Outlook**
  - "Environmentalists, taxpayers and legislators will be pleased to know that ISSA member contractors are responsible for making their roads last longer, keeping them safer, and requiring the use of fewer raw materials".

Industry Response - *ARRA*

- ARRA techniques
  - most environmental friendly flexible pavement rehabilitation technique.
  - reuse existing non-renewable material
  - heating of material is not required
  - haulage of material on or off site is not required, i.e. less disturbance to traffic

Environmental Benefits

- Per 2-lane km, CIR/CIREAM emits approximately 50% less GHG, consumes 62% less aggregates, and costs 40-50% less when compared to a conventional mill and overlay treatments
- Since the implementation of CIR/CIREAM contracts, MTO has reduced GHG emissions by:
  - **54,000 t** of CO_2
  - **440 t** of NO_x
  - **9,400 t** of SO_2

And saved 740,000 tonnes of aggregates

Ontario

Ministry of Transportation
Ministère des Transports

Pavement Preservation

"long-term strategy that enhances pavement performance by using an integrated cost-effective set of practices that extend pavement life, improve safety and meet motorist expectations"

	Type of Activity	Increase Capacity	Increase Strength	Reduce Aging	Restore Serviceability
	New Construction	X	X	X	X
	Reconstruction	X	X	X	X
	Major (Heavy) Rehabilitation		X	X	X
	Structural Overlay		X	X	X
Pavement Preservation	Minor (Light) Rehabilitation			X	X
	Preventive Maintenance			X	X
	Routine Maintenance				X
	Corrective (Reactive) Maintenance				X
	Catastrophic Maintenance				X

Table 1- Pavement Preservation Guidelines

The **Right** treatment, to the **Right** road at the **Right** time

Conclusions

- Environment should be more than permits
  - Included in the pre tender or engineering approach
  - Consultants?
- Numerous initiatives in the USA
  - In place recycling should be more used!
  - Promotion of innovations / training (DOT and Industry)
- Industry needs long term commitment
- Quality must be there
  - Needs for the road networks
  - Budget

Conclusions

- Vegetal binders at 250F

FDR in the UK

Conclusions