Climate Change Challenge
Theme 3 – Sustainable Roads

President: Aniceto Zaragoza, Oficemen, Portugal
Moderator: Bachar Hakim, Scott Wilson, UK

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Climate Change Challenge Workshop
Theme 3 – 26 May 2010

- Introduction
- Summary of papers
- Seven papers (USA, Finland, Switzerland, France, Spain, and Netherlands)
- Oral presentations (15 minutes each)
- Debate on main statements
Climate Change Challenge
Papers

1. **Greenroads: development and application of a sustainability rating system for roadways** - Steve Muench, Jeralee Anderson and Tim Bevan, University of Washington, USA

2. **Software tool for environmental, economic and social assessment of road projects** - Konsta Sirvio and Sari Jusi, Sirway Ltd. Finland

3. **Monitoring and assessing GHG emissions from road construction and maintenance activities: the IRF GHG calculator** – Susanna Zammataro, IRF, Switzerland

4. **A unique eco-comparator for all the French road builders’ companies** – Christine Leroy, USIRF Route de France, France

5. **Energy sustainable bituminous mixes** - Maria Del Rio Prat, Elsa Sanchez-Alonso, Daniel Castro-Fresno, Angel Vega Zamanillo and Miguel Angel Calzada Perez, University of Cantabria, Spain

6. **Adapting transport infrastructure for climate change** – Adnan Rahman, Ecorys, Netherlands

7. **Environmental audits for roads** – Enrique Miralles Olivar, Spanish Road association, Spain
1. Greenroads: development and application of a sustainability rating system for roadways

- Seven key components to sustainability: ecology, equity, economy, extent, expectation, experience and exposure.
- Greenroads (V1) has 11 project requirements, 37 voluntary credits (108 points) and up to 10 points worth of customer credits.
- Project level sustainability performance can be assessed.
- Greenroads sets “achievement levels” for scoring (Certified, Silver, Gold and Evergreen).
- Use as an external standard, a project accounting, a sustainable solution and for competitive advantage.
2. Software tool for environmental, economic and social assessment of road projects

• Economic rate of return (vehicle operating cost, travel time and accident costs) for project assessment
• Incorporate environmental and social factors for project planning and post evaluation
• The model is mainly for rural roads
• To assess the impact of road and improve access to markets and services (health and education) on reducing poverty and vulnerability
• Impact on economic growth (reducing cost of production) and quality of life
• Direct impacts (travel time and cost, fuel saving, safety, employment
• Negative impact (environmental, air and water quality, noise and greenhouse emissions)
3. Monitoring and assessing GHG emissions from road construction and maintenance activities: the IRF GHG calculator

- IRF has designed a methodology for the calculation and modelling GHG from road construction projects
- Environmental analysis of road projects
- Comparing various road building technique, materials, supply and transport
- Calculate GHG emissions for projects
3. Monitoring and assessing GHG emissions from road construction and maintenance activities: the IRF GHG calculator

Model Structure

Inputs

Construction

Construction materials (pavement/drainage/etc)

Transport/fuels

Modelling

Models: Road types
Road designs
Regions

CO2/Carbon Dioxide Equivalents

Quantities
3. Monitoring and assessing GHG emissions from road construction and maintenance activities: the IRF GHG calculator

**IRF GHG CALCULATOR**

- **Modules**
  - Pre-construction
  - Pavement

**MODULES STRUCTURE**

1. **Inputs**
   - Road project data
   - Area-Location
   - Specifications-Design...Etc

2. **Calculations**
   - Materials quantities
   - Materials transport
   - Machinery use
   - Energy use (electricity / fuels)

3. **Standards**
   - GHG Emissions standards:
     - Materials production
     - Transportation / Modes / Energy

4. **Results**
   - Total GHG emissions / Materials
   - Energy use
   - Disaggregated Results
3. Monitoring and assessing GHG emissions from road construction and maintenance activities: the IRF GHG calculator
4. A unique eco-comparator for all the French road builders’ companies

- Environmental tool for French road builders to compare technical solutions offered to clients
- Independently auditable guidelines
- Life cycle analysis
- GHG emissions, preservation of natural resources, and consumption of coated aggregates (RAP, etc.)
- Current models include Ecologiciel (Colas), Gaia (Eurovia) and Calculette CO$_2$ (Effiage)
- Financial, technical and environmental assessment of bids (60/20/20)
4. A unique eco-comparator for all the French road builders’ companies

**Evaluation method:** The LCA applied to construction, the use and improvement/demolition of a highway

- **Asphalt plant**
- **Concrete plant**
- **Gravel plant**

**Transport and implementation**

**Production of aggregates, binders**

- Raw materials & energy

**Impacts during the lifetime of the highway** (maintenance, surface waters, etc...)

**Recycling at the end of the highway’s life cycle**

This comprehensive analysis is of interest to the project owner:

It is based on the design and above all the maintenance strategy
4. A unique eco-comparator for all the French road builders’ companies
5. Energy sustainable bituminous mixes

- Energy sustainable bituminous mixes with low energy consumption during mixing and compacting
- Comparative study to assess contributing variables on energy and fuel use
- Continuous (AC) and discontinuous (SAM) mixes, natural and crushed aggregates, binder with different penetrations, additives and temperatures were considered
- Conclusions:
  - Higher energy required for continuous mixes with lower binder content, and greater aggregate size
  - Higher energy required for low penetration binder
  - Lower energy required for rounded aggregates
6. Adapting transport infrastructure for climate change

- Actions to slow climate change, mitigate its impact and adapt to it are required
- Technical challenge for the design, construction and maintenance of transport infrastructure
- Challenge for decision makers, planners and policy makers:
  - The sporadic nature and slowness that the climate change impact become visible
  - Uncertainty
  - Lack of adequate information about local impacts
  - Lack of resources to undertake change in the transport system structure
7. Environmental audits for roads

• Lack of criteria on road project environmental assessment
• European guideline on environmental impact (2001) to compare alternative construction solutions but not operations
• Spanish Road Association is developing a methodology considering the environmental impact of road construction, routine preventative and planned maintenance and during operation
• Audit includes
  – Environmental impact assessment
  – Compliance with established measures
  – Maintenance and preservation activities
  – Infrastructure sustainability indicators
  – Landscape integration of roads