



THE GREEN PATH TO CLIMATE NEUTRAL ROADS

The Road Infrastructure Sector goes Carbon Neutral IRF Green House Gas Calculator

Why a GHG Calculator?

The International Road Federation, in conjunction with the Borneo Tropical Rainforest Foundation (BTRF), Scott Wilson Group and other partners, is in the process of designing a methodology for the calculation and modelling of emission estimates in carbon equivalency of road construction and maintenance projects.

- The Greenhouse Gas calculator aims to harmonize the procedure for calculating CO₂ and other greenhouse gas emissions from road construction projects, with a view to report this emissions data and make it available for subsequent use in carbon-offsetting. It will enable the development of an accessible, consistent, and accurate inventory system for companies' environmental management and GHG regulation compliance.
- This GHG Calculator will allow companies to review their GHG expenditure and achieve energy savings.
- Better roads must be built by practitioners who are fully aware of the environmental impact of their activities and of the possibilities for reducing that impact. The new IRF tool will enable that.

What do we want to achieve?

The GHG calculator is designed to be consistent, transparent, and credible in its coverage of emissions sources, and it is functional at different levels, from site-level to company level to industry-wide application. The calculator allows for distinctions to be made between drivers of emissions, thus allowing for technical improvements. It is fully compatible with International Panel on Climate Change (IPCC) guidelines.

This GHG Calculator shall be used by engineering companies, road planners, road construction companies, providers for side products such as signing, ITS, government agencies and road directorates.

We recommend that tender documents of governments include the provision demanding the calculation of GHG of road construction and maintenance projects.

For the user, the GHG calculator will provide a flexible tool to suit different monitoring purposes. It will enable:

- internal management of environmental performance,
- public corporate environmental reporting,
- information for CO₂ taxation or compliance schemes (negotiated agreements or emissions trading),
- benchmarking of the industry and provision of a competitive edge,
- environmental life-cycle analysis of road infrastructure.

The project will be completed and rolled out during 2008. The time table is ambitious, but the importance of this calculator calls for efficiency. Climate knows no boundaries, so the effort to understand it, its rate of change and the degree to which mankind is affecting it, must be a global effort. We are all part of one world. There is general agreement that "business as usual" is not an option. It is not sustainable.

Benefits for all

The calculator is intended for use by road industry, the construction companies and the road equipment companies worldwide as well as for the government agencies. It facilitates the monitoring and accounting of all direct and

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indirect greenhouse gas emissions from road construction projects. Totals are reported in a direct, absolute form of emissions per year and in a specific, ratio-based form of tons emitted per unit consumed.

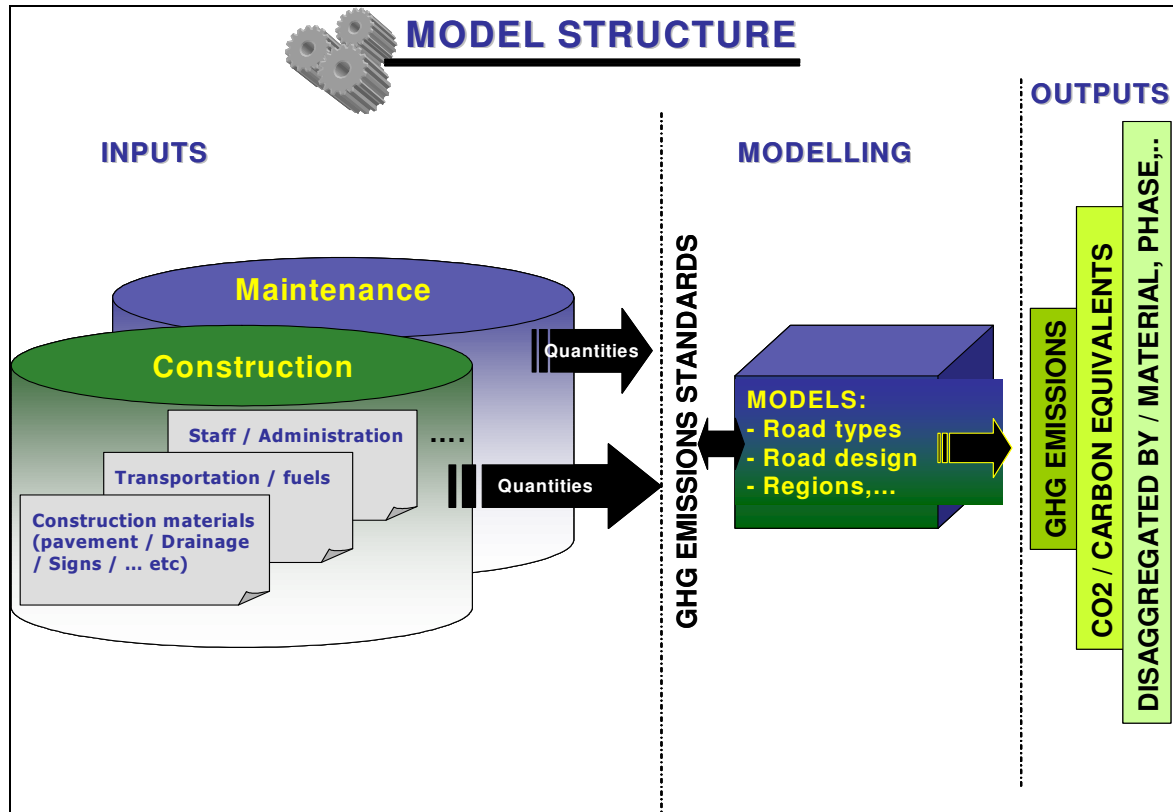
The calculator's output will provide incentive for innovation and advancement of current construction practices in a direction to reduce emissions and generate company savings. **In particular, it will help to identify energy consumption intensive techniques which could be replaced by more energy friendly ones.**

Modelling approach

We have adopted an input/output modelling approach to assess and analyse the environmental interactions throughout the road construction process.

Input/Output models show the amount of resources required (the input) to produce or build a unit of output. The GHG calculator model is based on detailed road construction and maintenance data as well as on appropriate standards for GHG emissions.

The model structure could be illustrated as follows:



Database

The backbone of the calculator is the database, which reflects into details the breakdown of materials used. The creation of the database attached to each data module requests detailed technical knowledge in road construction and maintenance as well as road refurbishing. Each technical data will need to be completed with the relevant data on the standard of emissions. The database needs to be particularly extensive both on the technical side and the emissions side, as the construction company respectively the government agency will chose the materials needed for the construction of a particular stretch of road.

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The complexity of such a database is a challenge. The techniques and materials used, the approved standards of emissions, the quantity of materials, the translation of each material into energy, needs highly qualified people and a close collaboration with IRF members specialized in each field.

This calculator will be used all over the world. Therefore, the database needs to have the flexibility to be adapted to different geographic regions. To compile such an extensive tool, IRF members of all continents verify the database for its completeness.

The data modules

The novelty of the IRF GHG calculator is that it not only takes into account the basic construction of a stretch of road, but the road in its entirety. The overall calculator will be composed of different modules. The basic main module is the pavement/construction module (including pavement, drainage systems, road signs, line painting, road construction machines). Thus model will incorporate several categories of emissions sources into its calculations: road construction materials, fuel consumption, construction site energy usage, and administration and research energy outflow.

In addition to this, there will be the complimentary modules:

- Barriers
- Horizontal signing
- Vertical signing
- ITS
- Transport of materials
- Waste materials
 - waste water treatment
 - combustible solid waste treatment
 - inert solid waste treatment
- On-site management and infrastructure

Each module will include the energy consumption (per unit of volume treated), emission standards and the calculations.

These modules can be used all together or in any wished combination.

Calculations

The emissions of each GHG (carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), etc.) are calculated separately and then converted to CO₂ equivalents based on their global warming potential, as determined in the current IPCC report. These CO₂ equivalencies are then reported to carbon-offsetting project specialists who review the data for program compliancy. The calculator includes maintenance costs and forecasts changes in construction designs over time.

Specific geographic content is also taken into account within the calculations of this model, as carbon costs vary for energy or materials use, depending on region.

Further development, as this calculator is put into use, will allow for continual adaptation and improved functionality.

What more?

The product will be structured in two main parts:

- **The protocol in PDF** describes the overall purpose, content, excel spreadsheets, and sources of emissions.

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- **The calculation model in excel format** contains the calculations for easy quantification of GHG emissions from various sources in the inventory.

The handbooks will be translated into **three languages**. The computer model will remain in English. The choice of language for translations will be decided after a survey of potential users in China, Russia, South America and French speaking regions. A fourth language can be considered if the demand is important enough.

The Excel Workbook section within the PDF Overview contains the description of what is being reported, the actual calculations and aggregation, the default emissions factors, unit conversion information, and complete instructions for use.

A two day training course will accompany each model in order to understand compliance, measurement, and off-setting resources.

Geographic application – Emissions know no boundaries

IRF has members in over 80 countries. It will be important that the IRF Green House Gas Calculator can be applied on various continents, taking into consideration the regional, local specifications.

To this end the database will be submitted to members in Asia, USA, Europe and the Middle East for control and completion. This critical phase will ensure that the calculator database includes specific materials used in these regions. Tests will be carried out on real-time projects as a second phase in order to validate the calculator.

Off-setting

The aim of the IRF GHG Calculator is to identify energy intensive production materials. The basic option is to achieve carbon neutrality by choosing alternative materials to lower the energy consumption of a construction project.

As carbon neutrality will not be achievable by simply lowering the energy consumption, the projects will look into offsetting the CO2 equivalent emissions through offsetting projects. The IRF will include through its partners a catalogue of offsetting projects which are duly verified. This part is an integral part of the IRF GHG Calculator.



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