TOOLS TO SUPPORT GREENHOUSE GAS REDUCTION: A REGIONAL EFFORT

Problem
The construction sector plays a significant role in worldwide greenhouse gas (GHG) emissions. The transportation construction industry contributes to these emissions through the burning of fossil fuels in the operation of heavy equipment, deforestation, and release of pollutants from on-site production and use of large quantities of off-gassing materials (e.g. asphalt and concrete). While there are programs to support efforts towards reducing emissions from equipment use and materials production, it appears that no tool exists to aid government agencies and contractors in making construction management plans with the goal of reducing emissions while controlling the impact on costs.

Objective
This research study had two objectives. The first objective was to develop a carbon footprint estimation tool (CFET) to estimate the emissions footprint of construction projects in the transportation sector. The second objective was to summarize European GHG measures, trends, and policies, in an effort to learn from their experience in working towards reduced GHG emissions.

Description
Under the first objective (Part 1), a CFET tool was developed using the state-of-the-practice methodologies available nationally and in accordance with global regulations under the Intergovernmental Panel on Climate Change Guidelines for National GHG inventories. The tool determines emissions from an inventory of equipment and construction processes, and credits efforts to reduce emissions through reforestation and equipment retrofit, while incorporating recent and future GHG policies on quantifying emissions.

The ability to estimate emissions resulting from decisions related to equipment usage, material choice, and site preparation produced from the CFET, enabled the development of an additional class of decision support tools. Specifically, a decision support tool was developed that derives input from an emissions estimation tool to aid construction firms in making profitable decisions in terms of equipment choice and usage while simultaneously reducing project emissions or meeting relevant constraints imposed by emissions-related laws.

Under the second objective (Part 2), a report was developed that summarizes European measures and trends, along with statistics from the sectors that are the principal contributors to GHGs. The policies adopted and proposed by the European Commission to meet strategic objectives and targets are also illustrated and explained in the final report.
Results

Part 1 Results:
The CFET and the decision support tools were applied to a case study of the
the construction of the Inter-County Connector (ICC), a new highway project
in Maryland. Application of the tools to this project showed its utility and
highlighted the need for reduction strategies. For example, the CFET
estimated emissions from each of the processes observed on the construction
site, such as site preparation, operation of equipment and reforestation. The
tool was also able to identify sources of high and low emissions and to
quantify the sequestration capabilities attained by the ICC through
reforestation efforts. Analysis using the decision support tool showed that a
substantial decrease in emissions can be achieved with a relatively small
increase in equipment cost. For example, in the ICC case study it was found
that a savings of 12% in emissions can be achieved through a 0.95% increase
in total cost with the use of more efficient, less emissive equipment. The tool
further aids in establishing a reasonable cap on emissions for a given project
to prevent excessive strain on a budget.

The main benefit of the CFET is its wide applicability to a variety of users, as
well as project sizes and type. The tool can help construction companies
identify sources and reduce emissions, while also allowing state agencies to
monitor these companies in accordance with GHG regulations.

Part 2 Results:
The information summarized from the European experience shows that 57%
of the policies and measures implemented at the national level to reduce
GHGs, were introduced in response to European Union policies and 24%
more have been reinforced by them. With the existing measures in place,
GHGs are projected to increase by 1% between 2006 and 2010. With the
implementation of additional measures, emissions are projected to decrease
continuously between 2006 and 2020.

Report Information
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