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Life Cycle Analysis and Sustainability of High-Performance Concrete Structures

Objectives

To review existing decision-support tools for life-cycle analysis and assessment of the sustainability of high performance concrete (HPC) structures, and to identify research needs.

Background

The use of high performance concrete made with supplementary cementing materials (SCMs) such as fly ash, silica fume or ground granulated blast-furnace slag has increased considerably in the last two decades. HPC structures last longer and incur lower maintenance costs than conventional concrete structures. Furthermore, HPC uses less cement than conventional concrete, thus reducing CO₂ emissions. This suggests that wider use of SCM-based HPC in structures could achieve both environmental and cost benefits and lead to more sustainable structures.

Statement of Work

- Reviewed models for service-life prediction, life cycle cost analysis and environmental impact of HPC structures.
- Compared the design requirements, durability, initial costs, life-cycle costs and environmental impacts of HPC structures with those of conventional concrete structures.
- Recommended guidelines for life-cycle analysis of concrete structures made with SCMs.
- Identified research needs.

Outcome

A final report including recommendations for guidelines on life-cycle analysis of HPC structures made with SCMs was delivered to the Partners.

Partners

Natural Resources Canada, Action Plan 2000 on Climate Change, and Public Works and Government Services Canada.

Start/Completion Dates

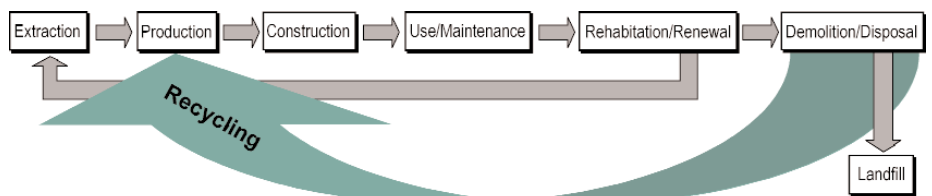
This project began in June 2004 and was completed in March 2006.

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For more information, see
http://irc.nrc-cnrc.gc.ca/ui/cs/hpc_e.html

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Life cycle phases of HPC structures