The Recycling & Reuse of Concrete

Tempe, Arizona
April 13-15, 2010

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Lafarge Worldwide Demographics

1. Three Major Product Lines:
   - Cement
   - Aggregates, Concrete and Asphalt
   - Gypsum Wallboard

2. Manufacturing Operations in 79 Countries

3. 84,000 Employees Worldwide

4. 16,000 Employees in North America

5. 2,200 Facilities Worldwide

6. 1,325 Ready-Mix Concrete Plants Worldwide

7. 620 A&C Quarries Worldwide
BACKGROUND

- Cement Sustainability Initiative (CSI)
  - Leading Worldwide Cement Producers Focused on Understanding, Managing & Minimizing the Environmental and Social Impacts of Cement Production:
    - LAFARGE
    - CEMEX
    - HOLCIM
    - Heidelberg
    - OTHERS—18 Cement Companies are participating today in the CSI Project
  - The WBCSD retained in 1999 Battelle Memorial Institute to Identify the Major Sustainability Topics in order to Position the Cement Industry for a More Sustainable Future
BACKGROUND

Cement Sustainability Initiative:

- Battelle’s final report, “towards a Sustainable Cement Industry” was released in April 2002. It identified eight major topics that would shape the cement industry’s path towards a more sustainable future in the next 20 years:
  - Improve eco-efficiency
  - Climate protection
  - Emission reduction, i.e., dust, NOx, SOx
  - Ecological stewardship
  - Local community well being
  - Regional development
  - Creating more shareholder Value

- The Participating Companies Responded to the Battelle Scoping Report by Launching in 2002 an “Agenda for Action.” The Core CSI program Included:
  - Climate Protection
  - Fuel & Raw Materials Use
  - Employee Health & Safety
  - Air Emissions Reduction
  - Local Impacts
  - Reporting & Communications
BACKGROUND

- Cement Sustainability Initiative

- Each Agenda for Action Topic was Divided Into:
  - Industry Actions, i.e., a protocol to calculate a CO2 emissions inventory, and
  - Company Specific Actions, i.e., setting CO2 mitigation targets
CSI Progress Report

2005 Interim Progress Report:

- Status of implementing “Agenda for Action” top Industry Company Specific Actions

- Added “Concrete Recycling” and Stakeholder Relations Management to the Core CSI Program
CSI Progress Report

- 2007 CSI “Agenda for Action” Accomplishments Report Published:

- CO2 and Climate Protection
  - CO2 Accounting and Reporting Standards for the Cement Industry (with WRI)
  - Developing better company CO2 emissions data—the Getting the Numbers Right Initiative
  - 11 Companies have set Company Specific CO2 Emissions Reduction Targets
  - Independent Assurance of CO2 Emissions Data
  - Lafarge Group Commitment with WWF International
    - Set in 2000 with 2010 Target Date:
      - 10% Absolute Reduction of CO2 in Developed Countries
      - 20% Global Reduction of CO2 on a per ton of Cementitious Materials Basis
      - Annual CO2 tonnage are verified by Ecofys (an Independent Third Party Consultant)
CSI Progress Report

- 2007 CSI “Agenda for Action” Accomplishments Report Published:

  - Responsible Use of Fuels and Raw Materials:
    - Published Industry Guidelines for the Selection and Use of Fuel and Raw Materials in the Cement Manufacturing Process, i.e., wastes, slag, fly ash
CSI Progress Report

- 2007 CSI “Agenda for Action” Accomplishments Report Published:
  - Employee Health and Safety:
    - Top Priority for the Cement & Construction Materials Industry
    - Established an Industry Target of “Aiming for Zero”
    - Across the Board Reporting on Health and Safety Data by CSI Member Companies
    - Independent Assurance of Employee Health and Safety Data
    - Industry Guidelines on Measuring and Reporting Significant Declines in Employee Injuries and Fatalities
CSI Progress Report

2007 CSI “Agenda for Action” Accomplishments Report Published:

- Emissions Monitoring and Reduction:
  - Industry Guidelines Developed for Emissions Monitoring and Reporting
  - Formation and Release of Persistent Pollutants Document Published
CSI Progress Report

- 2007 CSI “Agenda for Action” Accomplishments Report Published:
  - Local Impacts on Land and Communities:
    - Developed Communities and Stakeholders Involvement Guidelines for Local Cement Facilities
    - Developed Local Environmental and Social Impact Assessment Guidelines for Cement Plants
CSI Progress Report

- 2007 CSI “Agenda for Action” Accomplishments Report Published:

- The Next Steps:
  - Additional Work on Climate Change and Climate Policy (focusing on China and India)
  - Regional Outreach and Capacity Building in Key Developing Economies (focusing on China and India)
  - 2005 Addition of Recycling Concrete as a CSI Core Working Area in order to Promote all Stakeholders increasing concrete recycling by:
    - Developing reliable and consistent statistics
    - Developing economic incentives
    - Developing legislation to allow infrastructure that promotes concrete recycling, i.e., green building programs
    - Setting targets for use of recycled concrete in roads and buildings—”no concrete to landfills”
Some Definitions: What is Recycled Concrete?

"EUROPEAN"

- **Source**
  - Rubble from concrete structures demolition (building, curbs, pipes…)
  - Leftover concrete (RMX concrete not used on a job)

- **Product**
  - Crushed into aggregates
  - Can meet different specifications

- **Applications (substitute to virgin aggregates)**
  - Road base or parking lot base
  - Back fill and structural fill for building applications
  - Can be used in new concrete
CONCRETE RECYCLING

- Overarching Objective—No Concrete Waste to Landfills
- Benefits of Increased Concrete Recycling
  - Reduction of Concrete Waste Land-filled or Dumped and Associated Cost of Site Clean-ups
  - Lower Cost for Raw Materials by Substitution of Virgin Aggregates and Water
  - Longer term aggregates and water sustainability by use of recycled aggregates and water
  - Reduced Transportation Costs
  - Sustainable Construction Initiative
CONCRETE RECYCLING

METHODOLOGY & APPROACH

- Lafarge North America Tracks the Following Recycled Materials:
  - TONNES RECYCLED FLYASH
  - TONNES RECYCLED SLAG
  - TONNES RECYCLED RAP / MSM
  - TONNES RECYCLED CONCRETE & AGGREGATES

- Track Quantity on a Recycled Materials on a Quarterly Basis and Publish in our Annual Sustainability Report

- In the Process of Developing Targets for Recycling Concrete and Water for Use in the Coming Years

- Rigorous Policy of:
  - ZERO Return Concrete WASTE
  - ZERO Return WATER Release to the Environment
CONCRETE RECYCLING
SPECIFIC LAFARGE EXAMPLES
“North American”

- Returned Concrete for Next Day Use
- Returned Concrete for PreCast Application
- “Modified Reclaimer” Separating all Constituents for the Production of New Ready Mix Concrete
- Reclaim Old Concrete Into Granular Road Base
CONCRETE RECYCLING

FUTURE INOVATIONS:

- Business arrangement at various RMX sites to take “other company’s” wastewater and/or demolition wastes
- Advanced Rainwater Collection and Recycling Techniques
- Conduct a Water Footprint Analysis to Maximize Collection & Re-use (WBCSD protocol)
- Other Raw Material Reuse as Substitutes for Aggregates
CONCRETE RECYCLING
SUSTAINABLE CONSTRUCTION INITIATIVE

- Implementation of Green Building Codes / Systems Provide an Incentive for the Reuse of Return Concrete and/or Recycled Aggregates

- Lafarge (Worldwide) implements Multiple Programs – LEED, Green Globe, CASBEE, etc.

- Sustainable Construction Program Considers the Following Key Areas:
  - Sustainable Site Development (incl. mgt. of C&DW)
  - Water Savings
  - Energy Efficiency
  - Materials Selection

- The Main Features of our Sustainable Construction Initiative Include:
  - Requirements for on-site waste management plans for demolition of existing structures
  - Requirements for use of existing materials made from recycled components
CONCRETE RECYCLING

- **RECOMMENDATIONS:**
  - The Ultimate Goal is for “ZERO LANDFILL” of Concrete

- **CONSIDERATIONS:**
  - Key Stakeholders Publicity to Change Public Misconceptions
  - Employ Overall Benefits Strategy Analysis to Determine the Best Use of Recovered Concrete in a Given Market
  - Sustainable Building Approaches to Further Encourage Good C&DW Management and use of Recycled Concrete Aggregate
Comments / Questions?